Australia

AUL19980001

Title:
Low level waste immobilization in Australian cements

Title in Original Language:

Topic Code(s):

114 -Waste Immobilization (Bituminization, Cementation, Including Tests of Properties, Leaching Studies); 124 -Waste Immobilization

Abstract:

The use of cementitious systems (containing ordinary portland cement silica fume ground granulated blast furnace slag superplasticisers and pulverised fly ash) are being studied to find the Australian materials that would best immobilise low-level nuclear waste. Paste (cement and water) and mortar (cement sand and water) systems are being optimised to obtain fluid mixes with a maximum flowability which will set to form solids of maximum service life with a minimum porosity and be essentially crack free. The microstructure of the hydrated pastes are checked by microscopy (optical and SEM). Small angle neutron scattering calorimetry and x-ray diffraction are used to follow the formation of the hydration products in maturing pastes. The use of zeolites admixtures to improve the Cs retention are being studied by curing cemented zeolites for over a year and leach testing the waste form. It is found that some zeolites do improve caesium retention in the waste form.

WM Descriptor(s): cements; hydration; low-level radioactive wastes; microstructure; mortars; waste forms; zeolites

Principal Investigator(s):

ALDRIDGE, LAURIE

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Organization Performing the work:

AUSTRALIAN NUCLEAR SCIENCE AND TECHNOLOGY ORGANIZATION A N S T O
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Other Investigators:

Bertram W.

Organization Type:

Other

Program Duration: From: 1990-1-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

Australian Nuclear Science and Technology Organisation;
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Recent publication info:

820

AUL19980002

Title:
Development and evaluation of Synroc for high-level radioactive waste solidification

Title in Original Language:

Topic Code(s):

134 -Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies)

Abstract:

The crystalline waste form Synroc is being developed mainly in Australia as a second-generation high level nuclear waste form with greatly improved chemical durability compared with the first-generation waste form

borosilicate glass. In the Synroc process the high-level waste is solidified in conjunction with an inactive precursor to form an extremely leach-resistant synthetic rock consisting of four-crystalline titanate phases based upon durable natural minerals. The project is centred at the Australian Nuclear Science and Technology Organisation (ANSTO) Lucas Heights Sydney where a non-radioactive Demonstration Plant has been built and operated and used as input to a design and costing study of a conceptual fully active Synroc fabrication plant. This design study is nearing completion. The outstanding ability of Synroc to retain fission products and transuranic actinides against ground water leaching has been demonstrated in many thousands of tests. The radiation stability of Synroc is being studied at ANSTO by fast neutron irradiation and in an associated program at the Japan Atomic Energy Research Institute (JAERI) by doping with curium-244. A significant focus of the Synroc project is a collaborative study between ANSTO and JAERI of modified Synroc compositions specifically designed for the immobilisation of high actinide wastes emanating from either fast reactor fuel reprocessing or enhanced transuranic actinide separation (i.e. actinide partitioning) from the fission product stream. More recent directions involve developing Synroc waste forms for the immobilisation of HLW from the Hapford site and excess weapons plutonium. The formation of Synroc by vitrification instead of sub-solidus ceramic processing is also being studied in conjunction with CEA France and the Russian Ministry of Atomic Energy.

WM Descriptor(s): high-level radioactive wastes; radioactive waste processing; solidification; stability; synroc process; vitrification; waste forms

Principal Investigator(s):

JOSTSONS, ADAM

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Other Investigators:

Vance E.R.; Hart K.

Organization Type:

Other

Program Duration: From: 1979-1-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

Australian Nuclear Science and Technology Organisation; PMB1 Menai NSW 2234 Australia

Associated Organization(s):

ANU JAERI LLNL CEA MINATOM

Recent publication info:

1177

Bangladesh

BGD19980001

Title:

Development of improved liquid radioactive effluents treatment technology by precipitation and ion-exchange and the related analytical control system

Title in Original Language:

Topic Code(s):

122 -Liquid Waste Treatment

Abstract:

A large amount of low and medium level of radioactive wastes are being generated from the operation and maintenance of 3MW TRIGA Mark-II research reactor radioisotope production and other allied nuclear activities at the Atomic Energy Research Established (AERE) Savar and also from peaceful application of radioisotopes in medicine industry and agriculture in different parts of Bangladesh. The treatment conditioning storage and/or disposal of radioactive wastes should be adequately planned implemented and controlled as per

the pertinent regulations so as to avoid unacceptable radiation risks to man and the environment. Various procedures/technologies already developed and established by many advanced countries for waste management can be beneficially used by many other developing countries as well duly considering the local socio-economic conditions and the related infrastructure. A programme has been undertaken for the development of low-cost simple technologies for the treatment of low and intermediate levels of liquid wastes. Under the scope of the project the following studies have been undertaken: (1) characterisation of liquid radioactive wastes; (2) separation of Cs-137 Co-60 and Sr-90 by chemical precipitation method followed by ion-exchange method. For physical characterisation of liquid radioactive wastes the following properties have been studied: colour turbidity pH EC redox potential density dry extract hardness etc. For separation of Cs-137 potassium ferrocyanide method is found to be suitable for treatment of low level liquid radioactive wastes. The best pH value to remove Cs-137 from chosen radioactive solutions is found to be 10. Further work for separation and treatment of Sr-90 Co-60 etc. is in progress. Finally the residues will be treated by cementation as usual and stored and/or disposed of as per regulatory provision.

WM Descriptor(s): cesium 137; cobalt 60; intermediate-level radioactive wastes; ion exchange; liquid wastes; low-level radioactive wastes; precipitation; radioactive effluents; radioactive waste processing; strontium 90

Principal Investigator(s):

RAHMAN, M.M.

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Other Investigators:

Mollah A.S.; Alam K.; Kuddus A.; Begum A.; Islam S.

Organization Type:

Other

Program Duration: From: 1992-1-1 To: 1997-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Institute of Nuclear Science and Technology AERE; P.O.Box 3787 Dhaka-1000 Bangladesh

Recent publication info:

821

Belgium

BEL19980001

Title:

In situ tests on waste package components

Title in Original Language:

Topic Code(s):

135 -Waste Packaging (Canister Types, Materials, Corrosion Studies); 327 -Waste Emplacement

Abstract:

The objective of this research project is to study the long-term behaviour of various candidate waste package components in the in-situ disposal conditions of a geologic repository in a clay formation. In-situ tests are performed in an underground laboratory in the Boom Clay Formation at a depth of 220 m (Mol site Belgium). Samples of waste forms and metallic container materials of interest to Belgium (e.g. DWK/Pamela and Cogema/R7T7 glasses C-steel) are loaded on experimental tubes which are placed in the Boom Clay Formation. Each tube contains 30 to 90 samples. Three types of experimental tubes (type I II and III) were developed and provide an interaction of the samples with respectively clay clay-derived atmosphere and clay-derived

atmosphere that equilibrated with concrete. After a predefined exposure time the samples and the surrounding clay are analyzed. By the end of 1995 four type I one type II and one type III tubes were retrieved from the underground test site. Two type II and one type III tubes will be retrieved in 1996. The main samples loaded on type I tubes (C-steel the Pamela and R7T7 type glasses some of which were doped with Pu-239, U-238 Cs-134 and Sr-90) have been analyzed in detail. The tests also provide information on the performance of other candidate materials such as stainless steel Ni- and Ti-alloys and cemented and bitumenized waste forms.

WM Descriptor(s): clays; containers; laboratories; materials testing; packaging; radioactive waste disposal; underground disposal; underground facilities; waste forms

Principal Investigator(s):

VAN ISEGHEM, P.

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STUDIECENTRUM VOOR KERNENERGIE
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Other Investigators:

Kursten B.; Labat S.; Buyens M.

Organization Type:

Other

Program Duration: From: 1991-1-1 To: 1996-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Studiecentrum voor Kernenergie Centre d'Etude de l'Energie Nucleaire SCK/CEN; Boeretang 200 Mol B-2400 Belgium

Associated Organization(s):

Chalmers University of Technology Goeteborg (Sweden); CEA Valrho (France); Free University Brussels (Belgium); VITO Mol (Belgium)

Recent publication info:

822

BEL19980002

Title:

Compatibility studies on conditioned radioactive waste

Title in Original Language:

Topic Code(s):

124 -Waste Immobilization; 134 -Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies)

Abstract:

The objective of this research project is to study the long-term performance and compatibility of vitrified high-level waste and bitumenized medium-level waste with the geologic disposal conditions of a clay formation (Boom Clay). Additionally we investigate the performance of waste forms of particular interest such as SYNROC different types of bitumen and cemented waste resulting from the reprocessing of spent fuel from the SCK-CEN Materials Testing Reactor. The programme on glass deals with (1) the study of long-term dissolution processes and the behaviour of glass in the presence of backfill corrosion products (2) the leaching of radionuclides from the glasses (3) the study of the migration of Si through clay and (4) the modelling of the glass dissolution in clay media. In the research programme on bitumen the leaching of the waste salts and radionuclides from the bitumenized waste product was studied by laboratory leach experiments. In addition the biodegradation of bitumenized waste in the geologic disposal conditions of a clay formation is investigated. New programmes on waste glasses bitumenized waste and cellulose waste are in preparation. The identification of organic complexes formed by the degradation of the bitumen matrix or cellulose containing waste forms is one of the main objectives. The influence of these complexes on the mobility of radionuclides in the geologic disposal environment will also be studied.

WM Descriptor(s): bitumens; clays; compatibility; high-level radioactive wastes; intermediate-level radioactive wastes; solidification; synroc process; underground disposal; vitrification; waste forms

Principal Investigator(s):
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Organization Performing the work:
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Other Investigators:
Lemmens K.; Sneyers A.; Aertsens M.; Lolivier Ph.; De Canniere P.

Organization Type:
Other

Program Duration: From: 1991-1-1 To: 1999-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Studiecentrum voor Kernenergie Centre d'Etude de l'Energie Nucleaire; SCK/CEN Boeretang 200 B-2400 Mol Belgium

Associated Organization(s):
CEA Cadarache (France); ANSTO (Australia); CIAE (China); VITO (Belgium); Chalmers University of Technology (Sweden)

Recent publication info:
823

BEL19980003

Title:
Characterization of conditioned waste forms

Title in Original Language:

Topic Code(s):
182 -Waste from form characterization

Abstract:
The objective of this research project is to measure and verify various physical and chemical characteristics of the radioactive waste forms relevant to the Belgian waste management programme. In particular research efforts are focused on the characterization of inactive and active Cogema R7T7 and DWK/Pamela glass the evaluation of the physical and chemical properties of bitumen (Belgoprocess/Eurobitum Cogema STE3 bitumen) and on diffusion and leaching experiments on cemented waste (including PWR low-level waste). We completed a full characterization programme on active Pamela glass samples active Eurobitum samples (including the ageing behaviour) and cemented waste (leach tests). New programmes include leach tests on cemented PWR ion exchange resins. SCK/CEN participates in various Working Groups of the European Network of Quality Checking Facilities. Within the Network a round robin campaign will be performed to measure the characteristics of real low-level waste packages by all presently available non-destructive analytical techniques.

WM Descriptor(s): bitumens; cements; glass; leaching; low-level radioactive wastes; radioactive waste processing; solidification; waste forms

Principal Investigator(s):

VAN ISEGHEM, P.

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Organization Performing the work:

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Other Investigators:

Hoskens E.; Bruggeman M.

Organization Type:

Other

Program Duration: From: 1991-1-1 To: 1998-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Studiecentrum voor Kernenergie Centre d'Etude de l'Energie Nucleaire; SCK/CEN Boeretang 200 B-2400 Mol Belgium

Associated Organization(s):

Belgoprocess (Belgium) KEMA (Netherlands) KFA (Germany)

Recent publication info:

824

BEL19980004

Title:

Performance assessments of the geological disposal of radioactive waste in clay layers

Title in Original Language:

Topic Code(s):

322 -Site Survey and Characterization; 324 -Safety Assessment and Performance Studies; 326 -Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

Performance assessments of the geological disposal of high-level and long-lived radioactive wastes are focused on the Boom Clay Formation under the nuclear site Mol-Dessel. The objective of the present research programme is to provide the basis for one of the main chapters of the second Safety Assessment and Feasibility Interim Report (SAFIR 2) which will be prepared by NIRAS/ONDRAF and will be submitted to the Belgian authorities in 1998. The first element of the present performance assessment is a scenario study based on a systematic and documented approach for scenario selection and identification. The second element consists of consequence analyses for scenarios that had not been analyzed in the earlier assessments (PAGIS PACOMA and UPDATING 1990). The analysis of the 'normal evolution scenario' was started in 1995. In this scenario the potential influence of a large number of features events and processes on the behaviour of the repository system are taken into consideration. For the near field special attention will be given to the analysis of the potential impact of gas generation and the influence of the expected evolution of the future climate. SCK/CEN participated in two performance assessments in the framework of the fourth R and D programme 'Management and storage of radioactive waste' (1990-1994) of the EC. The first study is a preliminary performance assessment of the geological disposal of spent fuel in the Boom clay layer. The second study is SCK/CEN's participation in the EVEREST project. The main objective of EVEREST was the identification of the most influential elements of the repository system. Therefore a number of sensitivity analyses have been elaborated in which uncertainties in scenario descriptions conceptual models and parameter values have been considered. A more detailed performance assessment of spent fuel disposal in clay will be carried out in the frame of the new EC Spent Fuel Assessment project.

WM Descriptor(s): clays; forecasting; geologic models; high-level radioactive wastes; performance; radioactive waste disposal; underground disposal

Principal Investigator(s):

MARIVOET, JAN

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Organization Performing the work:

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Other Investigators:

Volckaert G.; Wemaere I.; Walravens J.

Organization Type:

Other

Program Duration: From: 1985-1-1 To: 1998-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Studiecentrum voor Kernenergie Centre d'Etude de l'Energie Nucleaire; SCK/CEN Boeretang 200 B-2400 Mol Belgium

Associated Organization(s):

Vrije Universiteit Brussel Brussels (Belgium); Katholieke Universiteit Leuven Leuven (Belgium); Universite Libre de Bruxelles Brussels (Belgium); Belgische Geologische Dienst/Service Geologique de Belgique Brussels (Belgium); Energieonderzoek Centrum Nede

Recent publication info:

825

BEL19980005

Title:

Performance assessment of the shallow land burial (SLB) of low-level radioactive waste

Title in Original Language:

Topic Code(s):

313 -Earth Science Studies and Models; 314 -Safety Assessment and Performance Studies

Abstract:

Studies were carried out on the selection and description of the intrusion scenarios and on the aquifer modelling of SLB sites. The credibility of the analysis of the intrusion scenarios will be strengthened by consultation of experts in the field of civil engineering. The near field modelling of the designed SLB facilities has been reexamined and verified. The influence of the enhanced engineered barriers in the new repository concept on the performance of the repository system will be assessed.

WM Descriptor(s): aquifers; forecasting; geologic models; ground disposal; low-level radioactive wastes; performance; radioactive waste disposal

Principal Investigator(s):

MARIVOET, JAN

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Organization Performing the work:

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Other Investigators:

Volckaert G.; Wemaere I.; Walravens J.

Organization Type:

Other

Program Duration: From: 1989-1-1 To: 1996-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Studiecentrum voor Kernenergie Centre d'Etude de l'Energie Nucleaire; SCK/CEN Boeretang 200 B-2400 Mol Belgium

Recent publication info:

826

BEL19980006

Title:
RESEAL: a large scale demonstration test for REpository SEALing in an argillaceous host rock

Title in Original Language:

Topic Code(s):

323 -Earth Science Studies and Models

Abstract:

For the long term performance of a HLW repository it is essential to backfill and/or seal the shafts and galleries so that they cannot act as preferential pathways for the migration of water gas or radionuclides. In particular the main objectives of the RESEAL project are: to demonstrate installation techniques for the sealing of a shaft on a representative scale i.e. the 1.4 m diameter shaft in the HADES underground research facility in Mol (Belgium) to demonstrate the sealing of a borehole to demonstrate the stability of a seal under accidental overpressure conditions to demonstrate water and gas tightness of the seal to validate models for the assessment of the seal behaviour. The main sealing material option is a mixture of high density pellets (density > 2.1 g/cm"3) with bentonite powder. This sealing material will be optimized to obtain the best balance between saturation time swelling pressure and hydraulic conductivity. The in situ experiments will be supported by laboratory experiments to develop the seal material production and installation procedure and to measure the water and gas transport properties of the seal material. The geomechanical properties of the sealing material will be determined by swelling pressure tests and suction controlled tests.

WM Descriptor(s): backfilling; bentonite; boreholes; demonstration programs; high-level radioactive wastes; radioactive waste disposal; sealing materials; seals; underground disposal

Principal Investigator(s):

Volckaert, G.

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Organization Performing the work:

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Other Investigators:

Ortiz L.; Bernier F.; Put M.

Organization Type:

Other

Program Duration: From: 1996-5-1 To: 1999-11-1

State of Advancement: Research planned

Sponsoring Organization(s):

Studiecentrum voor Kernenergie Centre d'Etude de l'Energie Nucleaire; SCK/CEN Boeretang 200 B-2400 Mol Belgium

Associated Organization(s):

CEA (France) CIEMAT (Spain) UPC

Recent publication info:

827

BEL19980007

Title:

TRANCOM-CLAY transport of radionuclides due to complexation with organic matter in clay formations

Title in Original Language:

Topic Code(s):

201 -Dispersion and Migration of Radionuclides; 221 -Environmental Transfer Models

Abstract:

This research project focuses on the role of organic matter as a transport agent for trivalent radionuclides through clay formations. Preliminary performance assessment calculations show a potential negative influence of this transport on the safety of a repository. It is intended to obtain reliable transport models and migration parameters directly usable for the Performance Assessment calculations of a deep repository in an argillaceous formation. To reach this objective laboratory and large scale in situ migration experiments with "1"4C-labelled organic matter are planned. The advantage of using labelled organics is that one can trace exactly its pathways. This will lead to a better understanding of the mechanisms of retention and migration. Laboratory migration experiments are also foreseen with the labelled organics complexed with trivalent actinides. This set-up will enable to study under in situ conditions the transport capabilities of organic matter for radionuclides.

WM Descriptor(s): carbon 14 compounds; clays; complexes; labelled compounds; organic matter; radioactive waste disposal; radionuclide migration; underground disposal

Principal Investigator(s):

PUT, MARTIN

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Organization Performing the work:

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Other Investigators:

Dierckx A.; De Canniere P.; Aertsens M.; Wang L.; Moors H.

Organization Type:

Other

Program Duration: From: 1996-1-1 To: 1998-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Studiecentrum voor Kernenergie Centre d'Etude de l'Energie Nucleaire; SCK/CEN Boeretang 200 B-2400 Mol Belgium

Associated Organization(s):

Ecole des Mines de Paris Paris (France) Katholieke Universiteit Leuven Leuven (Belgium) Loughborough University of Technology (United Kingdom)

Recent publication info:

828

BEL19980008

Title:

CERBERUS phase III: study of the effects of heat and radiation on the near field of a HLW or spent fuel repository

Title in Original Language:

Topic Code(s):

145 -Spent Fuel Packaging (Canisters, Materials. etc.); 233 -Long Term Environmental Impact; 326 -Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

For the study of in situ the effects of heat and radiation on the near field of a HLW or spent fuel repository in a clay layer SCK/CEN launched the CERBERUS project under the third framework EC programme on

Radioactive Waste Management and Storage (1990-1994). During 5 years repository components (clay host rock clay buffer canister and waste matrix materials) were submitted to the combined effects of a heat and radiation source simulating a Cogema HLW canister after 50 year cooling time. The test is installed in the HADES underground research facility at SCK/CEN Mol (Belgium). Up till now the main observations relative to the thermo-hydro-mechanical and chemical effects in the clay host rock were: a small decrease in pH and a small increase in Eh the detection of dissolved hydrogen gas (0.4 to 3 #mu#gH_2/kg water) and the presence of thiosulphate and oxalate which can influence the corrosion of steel and the migration of cations. The objective of the phase III of the CERBERUS project is to assess and model the behaviour of engineered barriers and argillaceous host rock submitted at different levels of radiation and temperature.

WM Descriptor(s): clays; containers; heat; high-level radioactive wastes; radiation effects; spent fuel storage; underground disposal; waste-rock interactions

Principal Investigator(s):

Noynaert, Luc

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Other Investigators:

De Canniere P.; Volckaert G.; Put M.

Organization Type:

Other

Program Duration: From: 1996-1-1 To: 1998-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Studiecentrum voor Kernenergie Centre d'Etude de l'Energie Nucleaire; SCK/CEN Boeretang 200 B-2400 Mol Belgium

Associated Organization(s):

CEA (France) ERM and the University of La Coruna (Spain)

Recent publication info:

829

BEL19980009

Title:

PRACLAY/ A demonstration test for HLW disposal in clay

Title in Original Language:

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 323 -Earth Science Studies and Models; 326 -Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

The objective of this research project is to simulate and to investigate the thermo-hydromechanical behaviour of a dummy HLW disposal gallery and the surrounding clay. In addition construction and installation techniques will be demonstrated on semi-industrial scale. The extension of the PRACLAY project requires the construction (planned to start late 1996) of a second shaft and connection gallery with the present HADES Underground Research Facility. The construction works will be monitored through an extensive instrumentation programme. To prepare the in situ demonstration test a mock-up is currently designed to be installed at the surface. This mock-up will simulate at full scale a part of the disposal gallery according to the present Belgian reference concept (canister overpack backfill with hydration system). The mockup should become operational at the end of 1996.

WM Descriptor(s): boreholes; clays; demonstration programs; high-level radioactive wastes; mockup; radioactive waste disposal; underground disposal

Principal Investigator(s):

Verstricht, Jan

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Organization Performing the work:

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Other Investigators:

Bernier F.; Buyens M.; De Bruyn D.; Labat S.; Meynendonckx P.; Neerdael B.; Volckaert G.

Organization Type:

Other

Program Duration: From: 1996-1-1 To: 2005-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Studiecentrum voor Kernenergie Centre d'Etude de l'Energie Nucleaire; SCK/CEN Boeretang 200 B-2400 Mol Belgium

Associated Organization(s):

CEA (Fontenay-aux-Roses France)

Recent publication info:

830

BEL19980010

Title:

Research on gas generation and migration in radioactive waste repository systems

Title in Original Language:

Topic Code(s):

135 -Waste Packaging (Canister Types, Materials, Corrosion Studies); 203 -Gas Diffusion Studies; 324 -Safety Assessment and Performance Studies

Abstract:

The pressure build-up produced by the gas release due to the corrosion of the waste canisters is one of the most relevant issues with regard to the overall safety and the long term performance assessment of a HLW repository. It is therefore essential to have a good understanding of both the gas generation mechanisms within the repository and the gas migration processes in the surrounding host rock. This research project is performed in the of 4th framework programme of the EC. SCK/CEN studies the gas generation and migration behaviour in clay host rock. The importance of the geomechanical properties on the gas migration parameters was demonstrated in the MEGAS project. The main objectives of SCK/CEN in the PROGRESS project are: to derive the relationship between gas migration and in situ geomechanical stress; to develop calibrate and build confidence in a coupled geomechanical gas migration code; to determine experimentally a realistic gas source term. To reach these objectives gas injection experiments and hydraulic tests will be performed in situ and in the surface laboratory. In both cases a tracer injection test will follow the gas injection to obtain information about the long-term influence of gas flow on the host rock behaviour. Experiments will also be performed to measure gas generation by anaerobic metal corrosion. Batch experiments will be carried out under anaerobic conditions with a mixture of clay water and metal powder. The quantity and composition of the produced gas will be measured.

WM Descriptor(s): clays; containers; corrosion; gas flow; gaseous diffusion; gases; high-level radioactive wastes; underground disposal; waste-rock interactions

Principal Investigator(s):

PUT, M.

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Organization Performing the work:

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Other Investigators:

Ortiz Amaya L.; Volckaert G.; De Canniere P.

Organization Type:

Other

Program Duration: From: 1996-5-1 To: 1999-5-1

State of Advancement: Research planned

Sponsoring Organization(s):

Studiecentrum voor Kernenergie Centre d'Etude de l'Energie Nucleaire; SCK/CEN Boeretang 200 B-2400 Mol Belgium

Associated Organization(s):

AEA Technology (United Kingdom); QuantiSci (United Kingdom); Natural Environment Research Council (United Kingdom); University of Birmingham (United Kingdom); University of Exeter (United Kingdom); ISMES (Italy); Universita di Roma 'La Sapienza' (Italy);

Recent publication info:

831

BEL19980011

Title:

Migration of radionuclides in the Boom clay

Title in Original Language:

Topic Code(s):

201 -Dispersion and Migration of Radionuclides; 326 -Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

The Boom Clay Formation has been selected as a potential host formation for the disposal of high level radioactive waste in Belgium. The safety of the nuclear waste repository will rely mainly on the ability of the geologic barrier to retain and to retard the radionuclides released from the waste packages. The objective of the migration project is to understand the basic phenomena governing the mobility of the radionuclides in the Boom Clay to determine their migration parameters and to develop the models (MICOF) needed by the performance assessment studies to extrapolate their transport to a geological timescale. The migration of radionuclides in the Boom Clay is studied by means of laboratory diffusion and percolation experiments on small clay cores and by large scale in-situ injection experiments with non-sorbed tracers (tritiated water 1 2"5I- and "1"4C-labelled bicarbonate). Up to now a good agreement exists between the model calculation and the experimental measurements obtained by tritiated water injection. The model and diffusion parameter values derived from laboratory scale experiments remain valid under in-situ conditions at a metric scale. Because of the very low hydraulic conductivity (K=2 x 10"-"1"2 m.s"-"1) of the Boom Clay and the absence of water active fractures in a plastic clay formation the migration of radionuclides is mainly controlled by molecular diffusion. The results of the laboratory migration experiments show that the key-parameters for the migration are #eta#R (the product of the diffusion accessible porosity and the retardation factor) and the apparent diffusion constant D. Advection plays only a secondary role.

WM Descriptor(s): clays; diffusion; labelled compounds; radionuclide migration; tracer techniques; underground disposal; underground facilities

Principal Investigator(s):

PUT, M.

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Organization Performing the work:

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Other Investigators:

De Canniere P.; Dierckx A.; Lolivier Ph.; Moors H.

Organization Type:

Other

Program Duration: From: 1991-1-1 To: 1997-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Studiecentrum voor Kernenergie Centre d'Etude de l'Energie Nucleaire; SCK/CEN Boeretang 200 B-2400 Mol Belgium

Associated Organization(s):

Louvain University Leuven (Belgium)

Recent publication info:

832

BEL19980012

Title:

Boron recovery from reactor effluents

Title in Original Language:

Afscherming van boorzuur uit reactoreffluenten

Topic Code(s):

112 -Liquid Waste Treatment

Abstract:

The project concentrates on a proprietary SCK/CEN process for the volatilization of boric acid during evaporation at elevated temperature and pressure. This process splits the treated waste stream in a highly concentrated waste which contains all the radioactive and chemical impurities and only some boron a concentrated boric acid solution which can be reused and a highly decontaminated effluent without boron. We demonstrated the process for boron separation in a small pilot installation and with non recyclable LLLW at the nuclear power plant in Doel. The installation performed as theoretically expected. We separated and recovered about 80% of the boron in the form of a four weight percent boric acid solution. Except for tritium traces of boron and a silicon contamination from the unit itself the effluent was radiochemically and chemically pure water. In some plants one could consider an adaptation or replacement of the existing evaporation. In other cases an adapted version of the process could be applied for the treatment of evaporator concentrates.

WM Descriptor(s): boric acid; boron; liquid wastes; low-level radioactive wastes; materials recovery; separation processes; waste processing

Principal Investigator(s):

Bruggeman, A.

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Other Investigators:

Braet J.; Smaers F.; De Regge P.

Organization Type:

Other

Program Duration: From: 1991-1-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

Studiecentrum voor Kernenergie - Centre d'Etude de l'Energie Nucleaire SCK/CEN (Boeretang 200 B-2400 Mol Belgium)

Associated Organization(s):

Laborelec AEA Technology

Recent publication info:

833

BEL19980013

Title:

Studies on Ypresian clays in Belgium

Title in Original Language:

Inventarisatie van de kennis van de Ieperiaanklei in functie van onderzoek naar diepe berging van radioactief afval

Topic Code(s):

322 -Site Survey and Characterization; 511 -Site Characterization

Abstract:

A characterization study is presented of Yeperian Clays in West Belgium as host rock for deep geological radioactive waste repository. All the regions under which Yeperian clays are present with the appropriate thickness and depth are reviewed under geological lithological sedimentological and hydrogeological aspects. The purpose of the study is the selection of suitable zones for further field reconnaissance (cored and logged boreholes and seismic survey).

WM Descriptor(s): clays; geologic surveys; geology; hydrology; petrology; regional analysis; sediments; site characterization; underground disposal

Principal Investigator(s):

DE BREUCK, PROF.

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Organization Performing the work:

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KRIJGSLAAN 281 B-9000 GHENT BELGIUM

Other Investigators:

Wouters L.; De Smet D.

Organization Type:

Other

Program Duration: From: 1995-1-1 To: 1996-3-1

State of Advancement: Research in progress

Sponsoring Organization(s):

University of Gent; Krijgslaan 281 - 9000 Gent

Recent publication info:

834

BEL19980014

Title:

Studies on Belgian natural analogues in clay deposits. Fossile woods rare earth and uranium mobilisation and reconcentration in argillaceous deposits

Title in Original Language:

Topic Code(s):

328 -Natural Analogue Studies

Abstract:

After the completion in 1994 of synthesis volume on natural and archaeological analogues in argillaceous media (ref. WMRA BE 9400023) two studies devoted to clay deposits present in subsurface solution pockets were undertaken. The objectives of the first study was on the one hand the characterization of the preservation state

of Miocene wood fragments and the elucidation of the role performed by clay minerals in this preservation and on the second hand the understanding of mobilisation migration and trapping processes of rare earth elements (REE) located in the epigenetic clays (halloysite and kaolinite) formed on the karst walls REE being studied as analogue for thorium and some actinides. The objective of the second study was to describe and explain some radionuclides mobilization and reconcentration processes in clay minerals from an uraniferous anomaly in the phosphated chalks.

WM Descriptor(s): clays; geologic deposits; mineralogy; natural analogue; preservation; radionuclide migration; rare earths; site characterization

Principal Investigator(s):

DE PUTTER, T.

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Other Investigators:

Manfroy P.

Organization Type:

Other

Program Duration: From: 1994-2-1 To: 1996-1-1

State of Advancement: Unknown

Recent publication info:

835

BEL19980015

Title:

Borehole data integrated interpretation

Title in Original Language:

Integrated interpretation of Borehole DESSEL 1

Topic Code(s):

323 -Earth Science Studies and Models

Abstract:

After the completion of destructive and extensively logged well Dessel 1 (Ref. WMRA BE 9400022) the purpose of this study is to perform an integrated interpretation of all the data gathered during boring operations. This study is aiming at updating and strengthening the litho-stratigraphic knowledge on the Tertiary sedimentary layers (specially the Boom Clay Formation and flanking sandy formations) underlying the Mol/Dessel Nuclear Zone in the Kempen region (N-E of Belgium). Vertical seismic profiles performed during the boring operations are integrated to high resolution geophysical logging data such as resistivity imagery sonic permeability gamma etc in order to obtain an accurate interpretation tool for future existing 3D and 2D seismic data.

WM Descriptor(s): boreholes; data processing; geologic formations; geologic structures; geologic surveys; geophysical surveys; sediments; seismic surveys; well logging

Principal Investigator(s):

ELEWAUT, E.F.M.

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Organization Performing the work:

TNO GRONDWATER EN GEO-ENERGY SCHOENMAKERSTRAAT 97 NL-2600 DELFT NETHERLANDS

Other Investigators:

Wouters L.

Organization Type:

Other

Program Duration: From: 1995-9-1 To: 1996-3-1

State of Advancement: Research in progress

Sponsoring Organization(s):

TNO Grondwater en Geo-Energy; Schoenmakerstraat 97
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Recent publication info:

836

BEL19980016

Title:
Gas diffusion in structural concrete

Title in Original Language:

Topic Code(s):

114 -Waste Immobilization (Bituminization, Cementation, Including Tests of Properties, Leaching Studies); 124 -Waste Immobilization; 203 -Gas Diffusion Studies

Abstract:

The objective of the research programme is to characterize the gas-migration properties of a structural concrete that will be used as a component of a surface low-level waste disposal facility in Belgium. The principal concern regarding gas migration through the concrete is the inward migration of atmospheric oxygen and the potential for the maintenance of aerobic corrosion conditions within the disposal facility. In the absence of a sufficient flux of oxygen corrosion of steel under anaerobic conditions is likely to give rise to the generation of hydrogen and a potentially deleterious rise in pressure within the facility. Consequently the potential rate of outward migration of hydrogen from the facility is also of interest.

WM Descriptor(s): concretes; corrosion; gas flow; gaseous diffusion; ground disposal; hydrogen; low-level radioactive wastes; oxygen; radioactive waste disposal

Principal Investigator(s):

AGG, P.J.

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Organization Performing the work:

AEA TECHNOLOGY HARWELL LABORATORY
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Other Investigators:

Harris A.; Lineham T.; Leung T.

Organization Type:

Other

Program Duration: From: 1995-6-1 To: 1997-5-1

State of Advancement: Research in progress

Sponsoring Organization(s):

AEA Technology; 424.4 Harwell Didcot Oxfordshire OX110RA

Recent publication info:

837

BEL19980017

Title:
Analysis of the corrosion risks of stainless steel AISI 316L

Title in Original Language:

Topic Code(s):

135 -Waste Packaging (Canister Types, Materials, Corrosion Studies)

Abstract:

The objective of this programme is to evaluate the stainless steel AISI 316L as the candidate material for the

overpack. This overpack will contain the Cogema-canisters with the vitrified high level waste and will be surrounded by a clay-based backfill (mixture of Fo-Ca clay sand and graphite). In the first phase of the programme all possible corrosion mechanisms will be described; an experimental study is foreseen in the second phase of the programme.

WM Descriptor(s): backfilling; containers; corrosion; high-level radioactive wastes; packaging; stainless steels; vitrification

Principal Investigator(s):

POURBAIX, A.

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Organization Performing the work:

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Other Investigators:

Kursten B.; Van Iseghem P.

Organization Type:

Other

Program Duration: From: 1995-5-1 To: 1998-4-1

State of Advancement: Research in progress

Sponsoring Organization(s):

CEBELCOR; Av. Paul Heger Grille 2 1050 Brussels B

Associated Organization(s):

CEN.SCK (Mol Belgium)

Recent publication info:

838

BEL19980018

Title:
Radiation tolerance of instrumentation

Title in Original Language:

Topic Code(s):

109 -Waste Characterisation (Radionuclide Inventory Determination), including Computer Codes and Measuring Methods and Techniques; 181 -Methodologies, Analytical Methods, Measurements Instrumentation

Abstract:

Instrumentation placed in radioactive environment suffers from an accelerated ageing process leading eventually to early total failure. This includes reactor instrumentation waste storage monitoring sensors used in dismantling tasks etc. The phenomenon is more critical for advanced systems containing embarked signal processing. The project analyses the degradation process of transducers cabling processing electronics by theoretical analysis and experimental tests. A data base is presently set up with the obtained results covering position sensors force sensors strain gages discrete electronics integrated circuits optoelectronic lenses optical fibers etc.

WM Descriptor(s): electronic circuits; failures; measuring instruments; physical radiation effects; radiation monitors; reactor instrumentation; transducers

Principal Investigator(s):

DECRETON, M.

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Other Investigators:
Coenen S.; Devos P.

Organization Type:
Other

Program Duration: From: 1990-10-1 To: 1996-6-1

State of Advancement: Research in progress

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Associated Organization(s):
Siemens Risoe AEA Technology CIEMAT ENEA SPAR (Canada) NOI (Canada)

Recent publication info:
839

BEL19980019

Title:
Monitoring using optical fibers

Title in Original Language:

Topic Code(s):
109 -Waste Characterisation (Radionuclide Inventory Determination), including Computer Codes and Measuring Methods and Techniques; 181 -Methodologies, Analytical Methods, Measurements Instrumentation

Abstract:
The project analyses the potential advantages of optical fibers for monitoring purposes in nuclear environment as e.g. dismantling works or waste storage plants. Applications considered are fiber sensors for temperature pressure strain chemical composition and radiological dose. The advantages of fiber systems are immunity to electromagnetic perturbation reduction of cabling (distributed sensing) minimal mass. The application of optical fiber communication links is also considered. The work involves technological feasibility experiments study on radiation induced degradation and will include also in-situ testing.

WM Descriptor(s): data transmission; dosemeters; optical fibers; physical radiation effects; pressure gages; radiation monitors; strain gages; thermometers

Principal Investigator(s):
DECRETON, M.

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Organization Performing the work:
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Other Investigators:
Berghmans F.; Deparis O.; Devos P.

Organization Type:
Other

Program Duration: From: 1993-3-1 To: 1998-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):
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Associated Organization(s):
University of Brussels (VUB) and Mons (FPMs) Fraunhofer Institute in Euskirchen

Recent publication info:
840

BEL19980020

Title:

Computer aided teleoperation for nuclear applications

Title in Original Language:

Topic Code(s):

191 -ROHE in waste management facilities; 194 - ROHE in D&D; 423 -Robotics, Remote Operations

Abstract:

Maintenance repair dismantling operations in nuclear facilities as well as waste handling and contaminated site restoration have to be performed remotely to avoid contamination risks and minimise occupational doses on the operators. Computer aided teleoperation enhances safety reliability and performance by freeing the operator's attention from cumbersome repetitive tasks with impeded visual and tactile perception. The project aims at evaluating the potentials of such a telerobotic approach in nuclear environment. It focuses its attention on the reliability of mixed control mode where both computer and human operator share their responsibilities. It looks to the development of position and force sensing strategies helping the operator in difficult localisation tasks and cumbersome utilisation of force feedback systems.

WM Descriptor(s): computerized control systems; decontamination; maintenance; manipulators; nuclear facilities; radiation protection; reactor dismantling; remote handling; remote handling equipment; robots

Principal Investigator(s):

DECRETON, M.

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Organization Performing the work:

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Other Investigators:

De Geeter J.; Deforche K.

Organization Type:

Other

Program Duration: From: 1990-10-1 To: 1995-6-1

State of Advancement: Unknown

Sponsoring Organization(s):

SCK/CEN Belgian Nuclear Research Centre; Boeretang 200 B-2400 Mol

Associated Organization(s):

University of Leuven (KUL)

Recent publication info:

841

BEL19980021

Title:

The influence of temperature on the mechanical characteristics of Boom clay

Title in Original Language:

L'influence de la temperature sur les caracteristiques mecaniques de l'argile de Boom

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 326 - Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

The study aims at quantifying the influence of temperature on the mechanical properties of Boom clay in representative conditions of high-level waste disposal (clay location temperature and pressure range). An existing triaxial cell has been modified to allow for these testing conditions. Three series of tests were performed on specimens respectively trimmed parallel to the bedding planes (series A) perpendicular to the bedding planes (series B) and reconstituted from dried and crushed material (series R). An initial laboratory test programme was performed on the series A specimens and the results were promising (see WMRA 22). Two

complementary series of tests were therefore launched to confirm the results and to investigate the influence of specimen anisotropy and disturbance. A clear tendency for a decrease in the mechanical strength of Boom clay with increasing temperature has been observed for the clay blocks sampled in situ (series A and B) consistent results being obtained for these series. On the other hand we noticed an important scattering of the results on the reconstituted specimens. The mechanical strength is decreasing from series A through series B to series R. At all confining pressures and all temperatures investigated the influence of specimen anisotropy and disturbance is well marked the response being different in the hardening phase (before the peak strength) but also in the softening phase. Specimens taken vertically (series B and R) behave similarly in the softening phase but quite differently in the hardening phase. The results also show that for Boom clay blocks sampled in situ (series A and B) the critical state equation q=M p' should be replaced by q=q_0 + M"* p' but this phenomenon has to be further investigated.

WM Descriptor(s): clays; high-level radioactive wastes; mechanical properties; radioactive waste disposal; rock mechanics; sampling; site characterization; temperature dependence; underground disposal

Principal Investigator(s):

DE BRUYN, D.

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Other Investigators:

Thimus J.Fr.

Organization Type:

Other

Program Duration: From: 1992-1-1 To: 1998-12-31

State of Advancement: Research in progress

Sponsoring Organization(s):

Universite Catholique de Louvain Unite Genie Civil; Place de Levant 1 1348 Louvain-la-Neuve

Recent publication info:

842

BEL19980022

Title:

Waste minimization: Boron recovery from reactor effluents

Title in Original Language:

Topic Code(s):

10 -RADIOACTIVE WASTE; 103 -Effluents and Discharges; 105 -Waste Minimisation; 112 -Liquid Waste Treatment

Abstract:

At most PWRs, evaporation of the Low-Level-Liquid Waste (LLLW) guarantees high decontamination factors and thus low releases of radioactivity. But the boron concentration of these effleunts limits the volume-reduction factor. Boron-containing evaporator concentrates represent an important fraction of the accumulated nuclear waste. The SCK·CEN has developed a process involving the separation of boric acid from evaporator concentrates. We separate and purify solid boric acid by volatilization with superheated, followed by desublimation at a temperature slightly above the dew point of the steam.

WM Descriptor(s): boric acid; boron; liquid wastes; PWR type reactors; radioactive effluents

Principal Investigator(s):
BRUGGEMAN, Aimé

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Organization Performing the work:
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Other Investigators:
BRAET Johan

Organization Type:
Foundation or laboratory for research and/or development

Program Duration: From: 1996-1-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
none

Associated Organization(s):
none

BEL19980023

Title:
Waste minimization: Metallic sodium treatment process

Title in Original Language:

Topic Code(s):
10 -RADIOACTIVE WASTE; 105 -Waste Minimisation; 113 -Solid Waste Treatment; 114 -Waste Immobilization (Bituminization, Cementation, Including Tests of Properties, Leaching Studies)

Abstract:
Processes for the treatment of contaminated sodium coming from LMFBR and R&D programmes already exist. However, they are not optimized in terms of safety and conditioning of the waste. For these reasons, SCK-CEN develops a dedicated safe treatment process which is fully compatible with acceptable immobilization technique. Our process has been patented. A contract has been signed between EDF and SCK-CEN. The former aims to sponsor the research due to the lack of safe techniques on the market. The first version of the design of the fluidized bed reactor has been finished. The reactor is being purchased. Further efforts have been made towards the finalization of the flowsheet and to prepare the process control and the preliminary safety report. Qualification tests are going on with the liquid metal spray nozzle as well as with the gas injector system. We intend to perform the cold feasibility demonstration in the first semester 1998 and the hot demonstration in 1999.

WM Descriptor(s): optimization; radioactive waste processing; sodium; solid wastes

Principal Investigator(s):
RAHIER, ANDRE

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VAN ALSENOY Veerle

Organization Type:
Foundation or laboratory for research and/or development

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

Associated Organization(s):

EDF

none

BEL19980024

Title:
Waste minimization: Decontamination of metallic pieces

Title in Original Language:

Topic Code(s):

10 -RADIOACTIVE WASTE; 105 -Waste Minimisation; 40 -DECONAMINATION AND DECOMMISIONING (D & D); 402 -Nuclear Power Reactor Decommissioning; 404 -Non-Reactor Facility Decommissioning; 410 - DECONTAMINATION TECHNOLOGIES; 412 - Chemical Decontamination Methods

Abstract:

The cerium process, based on the use of Ce^{4+} as strong oxidant, was selected as chemical decontamination process for stainless steel coming from the dismantling of the BR3. Waste minimization can be enhanced in this process by recycling the sulfuric acid being present in the effluents of the cerium process. Electrodialysis experiments were carried out at pilot scale and have confirmed that up to 95 % of the sulphuric acid being present in the effluents of the cerium process can be recycled through this technique. The economics of this approach has been confirmed but only in the case of an on site adequate conditioning of the effluents by separation of the contaminated metals from the aqueous phase (e.g. by precipitation techniques).

WM Descriptor(s): decommissioning; decontamination; metals; minimization; reactor decommissioning; recycling

Principal Investigator(s):

RAHIER, ANDRE

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Other Investigators:

KLEIN, Michel

Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

none

Associated Organization(s):

none

BEL19980025

Title:
Waste and decommissioning management

Title in Original Language:

Development of tools for management of waste and decommissioning activities

Topic Code(s):

10 -RADIOACTIVE WASTE; 102 -Programme Strategy, Planning and Management; 104 -Database & Information Systems, including Technology Transfer Systems. Technical Assistance and Costs; 40 -DECONAMINATION AND

DECOMMISIONING (D & D); 401 -D&D Programme Strategy, Planning and Management; 430 -MANAGEMENT OF DECOMMISSIONING WASTE

Abstract:

SCK-CEN is optimizing its multi-entry model computing the decommissioning costs. This model uses an interactive database covering the physical and radiological inventory of nuclear installations, available decommissioning techniques, operational 'unit costs' deduced from own experience and external projects, costs of further management of waste... As the previous release, the model allows also to simulate different decommissioning strategies, with a special attention for the waste produced and the costs of the operations. It allows the introduction of waste and decommissioning aspects in design and the choice of new processes, equipment and infrastructure. With the previous version, we have already evaluated the decommissioning strategies and costs of the nuclear installations SCK-CEN, including the BR3 reactor, and of the nuclear power plant Tihange 2. We intend to use the new version of our model for the actualization of the decommissioning plan of SCK-CEN by 2000. The database containing the physical and radiological inventory of the SCK-CEN nuclear installations is used to set up a priority list of the waste problems to be solved. According to this list, R&D programmes are launched.

WM Descriptor(s): cost estimation; data base management; decommissioning; program management; radioactive waste management; reactor decommissioning

Principal Investigator(s):

NOYNAERT, LUC

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Other Investigators:

MASSAUT, Vincent CORNELISSEN, René

Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

none

Associated Organization(s):

none

BEL19980026

Title:

Decommissioning of nuclear installations

Title in Original Language:

Decommissioning of the BR3 PWR: from the RD&D up to the application

Topic Code(s):

40 -DECONAMINATION AND DECOMMISIONING (D & D); 401 -D&D Programme Strategy, Planning and Management; 402 -Nuclear Power Reactor Decommissioning; 410 -DECONTAMINATION TECHNOLOGIES; 411 -Mechanical Decontamination Methods; 412 - Chemical Decontamination Methods; 413 - Electrochemical Decontamination Methods; 420 - DECOMMISSIONING TECHNOLOGIES; 421 - Dismantling Techniques; 430 -MANAGEMENT OF DECOMMISSIONING WASTE

Abstract:

Through the project of decommissioning the BR3 pressurized water reactor, selected by the European Commission as a pilot project in its programme of RTD on decommissioning of nuclear installations, the SCK•CEN took the opportunity of developing the necessary tools, techniques and methods of D&D as well as building important know-how in this domain. These developments and know-how are then available for the industry to perform the actual large projects using the best up-to-date methods and knowing their cost. This collaboration with the industry is mainly carried out through partnership or collaboration within actual industrial projects. The main achievements reached in 1997 can be classified into three principal fields of activities :
- the pilot dismantling project, mainly focusing on developing and testing tools and methods for the D&D of nuclear power plants and installations;
- the management and minimization of the generated D&D waste;
- the valorization of the accumulated experience through contracts with international institutions and industrial partners.

Within the BR3 decommissioning project, aiming at the complete clean up of the site of the first European PWR plant, the following main goals were reached :
· The dismantling of auxiliary loops and equipments, applying the ALARA principle to all the sublevels of the activity, and optimizing the used methods to minimize the produced waste.
· The decontamination of concrete anti-missile slabs used above the reactor pool, up to the free release of this concrete.
· The radiological modellisation of the primary loop area in the plant container, in order to simulate the future dismantling operations and to minimize the dose uptake by selecting the most appropriate procedure and dismantling plan.
· The starting of the implementation of the Quality Assurance procedure for the dismantling of the loops and equipments and for the management of the waste.
· The complete comparison and analysis of two methods for dismantling the reactor pressure vessel (RPV) either in-situ or by removing it into the refuelling pool and dismantling it afterwards. The last solution was finally selected as it includes much less technical uncertainty and allows to reuse as much as possible existing tools used during the preceding phases of the project (i.e. the dismantling of the reactor internals). This implies indeed that the selected method is much cheaper than the other one. Detailed design and ordering of the main components were already started.
· The starting of the removal works of the contaminated thermal insulation of the primary loop containing asbestos. The main part of the work has been achieved in 1997 and the declaration of asbestos free area is expected early in 1998.

WM Descriptor(s): nuclear facilities; radiation doses; radioactive wastes; reactor decommissioning; solid wastes; technology development; technology transfer; waste characterization

Principal Investigator(s):

MASSAUT, Vincent

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Organization Performing the work:

SCK/CEN
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Other Investigators:

COLLARD, Guy KLEIN, Michel LEFEBVRE, Alain DEMEULEMEESTER, Yves

Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

none

Associated Organization(s):

NIRAS/ONDRAF
BELGATOM
FRAMATOME

BEL19980027

Title:

RADIOACTIVE WASTE, DECOMMISSIONING AND CLEANUP

Title in Original Language:

Topic Code(s):

10 -RADIOACTIVE WASTE; 100 -RADIOACTIVE WASTE - GENERAL; 110 -LOW AND INTERMEDIATE LEVEL WASTE FROM NFC FACILITIES; 130 -HIGH LEVEL WASTE; 140 -SPENT FUEL; 150 -ALPHA BEARING/TRU WASTE; 160 -HAZARDOUS/MIXED WASTE; 180 -WASTE CHARACTERIZATION; 20 -ENVIRONMENTAL IMPACT/ASSESSMENT STUDIES; 200 -ENVIRONMENTAL IMPACT/ASSESSMENT; 210 -BIOLOGICAL UPTAKE AND TRANSFER; 220 -ENVIRONMENTAL TRANSFER; 230 -RADIOLOGICAL ASSESSMENT; 240 -ENVIRONMENTAL MONITORING; 300 -FACILITY/SITE - GENERAL; 310 -STUDIES FOR NEAR SURFACE DISPOSAL FACILITIES; 320 -STUDIES FOR GEOLOGICAL REPOSITORIES; 330 -STUDIES FOR LANDFILL SITES; 40 -DECONAMINATION AND DECOMMISIONING (D & D); 400 -D&D -GENERAL; 410 -DECONTAMINATION TECHNOLOGIES; 420 -DECOMMISSIONING TECHNOLOGIES; 430 -MANAGEMENT OF DECOMMISSIONING WASTE; 50 -ENVIRONMENTAL RESTORATION; 601 -Criteria for Exempt Levels; 80 -ACTINIDE & TRANSMUTATION

Abstract:

The Radioactive Waste and Cleanup division of the SCK·CEN studies and develops strategies, techniques, and technologies to achieve intrageneration equity. Therefore, we not only study the interaction of radioactive and toxic waste with the underground disposal environment, but we also use the results of these studies to propose both more adequate conditioning techniques for this waste and better disposal concepts. For the same reasons, we compared different decommissioning strategies of nuclear power plants and demonstrate that the immediate decommissioning of the BR3 reactor is the most ethical and acceptable alternative. Therefore also, we are developing decontamination techniques and processes to reduce the amount of radioactive waste produced by the exploitation and the decommissioning of nuclear installations and to deliver a concentrated fraction of radioactive materials which can be conditioned in the most adequate manner. Because our responsibility towards the safety of present and future generations regarding the existing waste and radioactive-contaminated settlements and environments and their negative influence on the acceptance of nuclear energy is not geographically limited, we still extended our participation in international organizations and programmes dealing with these problems.

WM Descriptor(s): decommissioning; environmental restoration; radioactive waste disposal; radioactive wastes; waste management

Principal Investigator(s):

COLLARD, GUY

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Organization Performing the work:

SCK/CEN
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Other Investigators:

CARCHON Roland DECRETON Marc MASSAUT Vincent NEERDAEL Bernard NOYNAERT Luc VANDEVELDE Léon RAHIER A

Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

none

Associated Organization(s):

NIRAS/ONDRAF
European Commission
IAEA
Worldwide universities and Research institutes

BEL19980028

Title:

Determination of Disposal Critical Nuclides in Waste from PWR Power Plants.

Title in Original Language:

Topic Code(s):

103 -Effluents and Discharges; 109 -Waste Characterisation (Radionuclide Inventory Determination), including Computer Codes and Measuring Methods and Techniques

Abstract:

When considering the long-term storage of radioactive wastes, the presence of long-lived nuclides will become the major safety problem in the future. Their low content, low specific activity or the particular characteristics of their radiation make them difficult to be currently measured due to the presence of other highly active nuclides. Advanced separation techniques are necessary to allow their immediate determination without interferences. Those critical nuclides are produced in the nuclear reactor either by activation (H-3, C-14, Ni-59, Ni-63, Nb-94) or by fission and transmutation (Sr-90, Tc-99, I-129, Cs-135, U-234, U-235, U-236, U-238, Pu-239, Pu-240, Am-241, Cm-242, Cm-244). Their concentration may be correlated to so-called key nuclides, presently measurable with a good accuracy and representative for activation (Co-60) or fission (Cs-137) reactions. We determined the scaling factors for most of the critical nuclides with respect to the key-nuclides in evaporator concentrates, ion-exchange resins and coolant particle filters from reactor power plants. During this year, we focused our efforts on the development of a more efficient dissolution technique based on microwave digestion. We developed suitable dissolution schemes for resins, cement and incinerator ashes, leading to clear solutions in a minimized volume. The simpler resulting matrix, as compared to the fusion-dissolution method, simplifies the further use of separation techniques. We further tried to develop suitable separation and measurement techniques for Tc-99, I-129, Am-241, Cm-242 and Cm-244. We investigated several purification methods for low amounts of Tc-99 in complex matrices. Solvent extraction using tri-n-octylamine in xylene yielded the most promising results. The presence of an excessive amount of Ru-106 however interferes on the measurements, even with extra purification steps. The method previously developed to separate I-129 is not yet suited for the determinations of concentrations below 5 Bq/ml solution. At higher concentrations the I-129 can be measured by gamma-spectrometry and the separation yield can be monitored using a I-125 tracer. For very low concentrations however, the amount of I-129 is insufficient for gamma-spectrometry and the salt content of the sample impedes Neutron Activation Analysis.

WM Descriptor(s): americium 241; cesium 137; curium 244; gamma spectroscopy; iodine 125; iodine 129; neutron activation analysis; plutonium 239; plutonium 240; PWR type reactors; radioactive effluents; strontium 90; technetium 99; uranium 234; uranium 238; waste characterization

Principal Investigator(s):

VAN DE VELDE, L.

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Other Investigators:

Roalnd CARCHON, Mirelle GYSEMANS, Peter THOMAS, Pierre VAN ISEGHEM,Stephaan VAN WINCKEL, Michel BRU

Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: Not provided To: 2000-7-1

State of Advancement: Research in progress

Sponsoring Organization(s):

NIRAS/ONDRAF

Associated Organization(s):

BELGONUCLEAIRE, EURATOM, CEC, ...

BEL19980029

Title:

CLIPEX - CLay Instrumentation Programme for the EXtension of an underground research laboratory

Title in Original Language:

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 323 -Earth Science Studies and Models; 325 -Design, Construction, Commissioning

Abstract:

The CLIPEX project is aimed at elaborating an instrumentation programme for the extension of the underground research facility at Mol. This programme will allow the assessment of the performance of mechanised excavation techniques and the corresponding reduction of plastic zones in the frame of a high-level waste repository. The main objectives are:

- to determine the hydro-mechanical behaviour of the clay close to the tunnel face of a gallery during its excavation;
- to get more representative data on the initial hydro-mechanical field conditions for designing, modelling and interpreting future experiments;
- to assess the extent of the plastic zone around a gallery excavated by mechanised techniques and lined with a stiff lining;
- to test hydromechanical models by comparison with blind predictions.

WM Descriptor(s): Belgium; design; excavation; measuring instruments; rheology; soil mechanics

Principal Investigator(s):

Bernier, Frederic

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Organization Performing the work:

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Other Investigators:

Huertas, Fernando; Palut, Jean-Michel; Van Cauteren,

Organization Type:

Foundation or laboratory for research and/or development

Luc

Program Duration: From: 1997-1-1 To: 2000-1-1

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):

ANDRA; EC; E.I.G. PRACLAY, ENRESA

Associated Organization(s):

none

BEL19980030

Title:

PRACLAY Mockup

Title in Original Language:

Maquette PRACLAY

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 326 - Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

The PRACLAY project aims at a preliminary demonstration of the feasibility of the HLW disposal concept. This concept consists in the disposal of HLW in 2 m I.D. horizontal galleries excavated in a clay layer. Before performing the demonstration test in the underground research facilities, it was decided to carry out a preliminary mock-up test on the surface. The mock-up represents a 5 m long section of a HLW disposal gallery on a 1/1 scale. It has been backfilled and equipped like a disposal gallery. Electric resistances have been placed to simulate the waste thermal output. The hydration of the backfill material started in December 1997. The heating elements were switched on in June 1998. The behaviour of the mock-up will be monitored until 2002.

WM Descriptor(s): backfilling; Belgium; calibration; high-level radioactive wastes; mock-up; simulation; thermal analysis

Principal Investigator(s):

Verstricht, Jan

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Organization Performing the work:

SCK/CEN
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Other Investigators:

Gatabin, Claude; Dereeper, Bernard; Van Cauteren, Luc; Brosemer, Didier

Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: 1997-1-1 To: 2002-1-1

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):

NIRAS/ONDRAF

Associated Organization(s):

CEA

BEL19980031

Title:

Study of vitrified HLW emplacement techniques - pushing robot and overpack

Title in Original Language:

Etude de la mise en place des déchets vitrifiés - Robot pousseur et suremballage

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 327 - Waste Emplacement

Abstract:

The disposal concept for vitrified HLW consists in placing the waste canisters in overpacks in surface installations. This enhances long-term safety and, since the overpacks are equipped with wheels, enables them to be pushed into 200 m long 0,5 I.D. horizontal disposal tubes. The present study deals with the overpack and the pushing robot for positioning the overpacks in the disposal tubes from a mechanical point of view. Prototypes are being manufactured and tested; they are going to be displayed at the PRACLAY exhibition in Mol.

WM Descriptor(s): Belgium; high-level radioactive wastes; radioactive waste disposal; robots

Principal Investigator(s):

Van Cauteren, Luc

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Organization Performing the work:

ONDRAF/NIRAS
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Other Investigators:

De Meester, Bruno; Postiau, Tony; Glibert, Christophe; Brosemer, Didier

Organization Type:

Other

Program Duration: From: 1993-2-1 To: 1998-10-1

State of Advancement: Research in progress

Sponsoring Organization(s):

none

Associated Organization(s):

UCL-PRM: Institution of higher education

BEL19980032

Title:

Study of vitrified HLW emplacement techniques - transfer wagon

Title in Original Language:

Etude de la mise en place des déchets vitrifiés - Chariot de transfert

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 327 - Waste Emplacement

Abstract:

Study of the machine that will transport the vitrified HLW from the surface installation to the front of the disposal galleries. This machine also carries the robot which pushes the HLW into the disposal galleries. A prototype has been built and tested and will be displayed at the PRACLAY exhibition in Mol.

WM Descriptor(s): Belgium; high-level radioactive wastes; radioactive waste disposal; robots; shielding; vehicles

Principal Investigator(s):

Van Cauteren, Luc

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Organization Performing the work:

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Other Investigators:

Ledru, Pierre; Demoulin, Xavier; Brosemer, Didier

Organization Type:

Other

Program Duration: From: 1994-6-1 To: 1998-10-1

State of Advancement: Research in progress

Sponsoring Organization(s):

none

Associated Organization(s):

Manutention Bodart - private industry

BEL19980033

Title:
CERBERUS phase III: study of the effects of heat and radiation on the near field of a HLW or spent fuel repository

Title in Original Language:

Topic Code(s):
326 -Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

The CERBERUS project has been set up in view of studying the in situ effects of heat and radiation on the near field of a HLW or spent fuel repository in a clay formation. During 5 years, repository components (clay host rock, clay buffer, canister and waste matrix materials) have been submitted to the combined effects of heat and radiation, simulating a Cogema HLW canister after a 50 year cooling time. The test has been performed in the HADES underground research facility at SCK/CEN, Mol (Belgium). Up till now, the main observations relative to the thermohydro-mechanical and chemical effects in the clay host rock were: a small decrease in pH and a small increase in Eh, the detection of dissolved hydrogen gas (0.4 to 3 µgH2/kg water) and the presence of thiosulphate and oxalate, which can influence the corrosion of steel and the migration of cations. The objective of the phase III of the CERBERUS project is to assess and to model the behaviour of engineered barriers and argillaceous host rock submitted to different levels of radiation and temperature.

WM Descriptor(s): Belgium; gamma radiation; gaseous diffusion; high-level radioactive wastes; radiation effects; radioactive waste disposal; underground facilities; waste-rock interactions

Principal Investigator(s):
Noynaert, L.

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Organization Performing the work:
SCK/CEN
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Other Investigators:
De Cannière, P.; Volckaert, G.; Put, M.

Organization Type:
Foundation or laboratory for research and/or development

Program Duration: From: 1996-1-1 To: 1998-12-1

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):
EC, Brussels (Belgium), NIRAS/ONDRAF, Brussels (Belgium)

Associated Organization(s):
CEA (France), ERM and the Universityi of La Coruña (Spain)

BEL19980034

Title:
Research on Gas Generation and Migration in Radioactive Waste Repository Systems

Title in Original Language:

Topic Code(s):
202 -Dispersion and Migration Models; 203 -Gas Diffusion Studies; 223 -Effects of Gaseous Releases; 326 -Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

In a geologic repository for radioactive waste, gas may be released due to the corrosion of waste canisters. The pressure buildup as a consequence of gas release is one of the most relevant issues with regard to the overall safety and the long term performance assessment of a HLW repository. It is therefore essential to have a good understanding of both the gas generation mechanisms within the repository and the gas migration processes in the surrounding host rock. As part of the 4th framework programme, SCK/CEN studies the gas generation and migration behaviour in clay host rock. The importance of the geomechanical properties on the gas migration parameters was demonstrated in the MEGAS project. The main objectives of SCK/CEN in the PROGRESS project are:
- to derive the relationship between gas migration and in situ geomechanical stress;
- to develop, calibrate and build confidence in a coupled geomechanical gas migration code;
- to determine experimentally a realistic gas source term.

To reach these objectives, gas injection experiments and hydraulic tests will be performed in both laboratory and in situ test conditions. In both cases, gas injection is followed by tracer injection in order to obtain information on the long-term influence of gas flow on the host rock behaviour. Experiments will also be performed to measure gas generation by anaerobic metal corrosion. Batch experiments will be carried out under anaerobic conditions with a mixture of clay, water and metal powder. The quantity and composition of the produced gas will be measured.

WM Descriptor(s): Belgium; clays; field tests; fractures; gases; hydrogen; mathematical models; permeability; radioactive waste disposal; risk assessment; source terms; stresses; validation

Principal Investigator(s):

Put, M.

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Organization Performing the work:

SCK/CEN
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Other Investigators:

Ortiz Amaya, L.; Volckaert, G.; De Cannière, P.

Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: 1996-5-1 To: 1999-5-1

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):

EC, Brusssles (Belgium); NIRAS/ONDRAF, Brussels (Belgium)

Associated Organization(s):

AEA Technology (United Kingdom); QuantiSci (United Kingdom); Natural Environment Research Council (United Kingdom); University of Birmingham (United Kingdom); University of Exeter (United Kingdom); ISMES (Italy), Università di Roma 'La Sapienza' (Italy) T

BEL19980035

Title:

Migration of radionuclides in the Boom clay

Title in Original Language:

Topic Code(s):

157 -Waste Disposal

Abstract:

The Boom Clay Formation has been selected as a potential host rock for the disposal of high level radioactive waste in Belgium. The safety of the nuclear waste repository will rely mainly on the performance of the geologic barrier with respect to the retention of radionuclides, released from the waste packages. The objective of the migration project is to understand the basic phenomena governing the mobility of the radionuclides in the

Boom Clay, to determine their migration parameters, and to develop models (MICOF). These models are required for performance assessment studies in order to extrapolate the transport of radionuclides to a geological time scale. The migration of radionuclides in the Boom Clay is studied by laboratory diffusion and percolation experiments on small clay cores, and by large scale in-situ injection experiments with non-sorbed tracers (tritiated water, I-125, and C-14 labelled bicarbonate). Up to now, a good agreement has been found between the model calculations and the experimental measurements obtained by tritiated water injection. The model and diffusion parameter values derived from laboratory scale experiments remain valid under in-situ conditions at a metric scale. Because of the very low hydraulic conductivity (K=2x10 to the power of -12 m per s) of the Boom Clay and the absence of water active fractures in a plastic clay formation, the migration of radionuclides is mainly controlled by molecular diffusion. The results from the laboratory migration experiments show that the key parameters for the migration are IIR (the product of the diffusion accessible porosity and the retardation factor), and the apparent diffusion constant D. Advection plays only a secondary role.

WM Descriptor(s): Belgium; clays; diffusion; dispersions; mathematical models; radioactive waste disposal; radionuclide migration; rock-fluid interactions; site characterization; underground facilities; validation

Principal Investigator(s):
Put, M.

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Organization Performing the work:
SCK/CEN
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Other Investigators:
Dierckx, A.; De Cannière, P.; Maes, N.; Wang, L.; Moors, H.

Organization Type:
Foundation or laboratory for research and/or development

Program Duration: From: 1991-1-1 To: 2001-12-1

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):
EC, Brussels (Belgium); NIRAS/ONDRAF, Brussels (Belgium)

Associated Organization(s):
Louvain University, Leuven (Belgium)

BEL19980036

Title:
RESEAL: a large scale demonstration test for REpository SEALing in an argillaceous host rock

Title in Original Language:

Topic Code(s):
137 -Waste Disposal (including Spent Fuel); 325 -Design, Construction, Commissioning; 326 -Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

For the long term performance of a HLW repository, effective backfilling and sealing of the shafts and connection galleries is needed to avoid preferential pathways for the migration of water, gas and radionuclides. Therefore, the in situ demonstration of the feasibility of the sealing on a representative scale is essential. The objectives of the research project are:
- to demonstrate installation techniques for the sealing of a shaft on a representative scale i.e. the 1.4 m diameter shaft in the HADES underground research facility in Mol (Belgium),
- to demonstrate the sealing of a borehole,
- to demonstrate the stability of a seal under accidental overpressure conditions;
- to demonstrate water and gas tightness of the seal,
- to validate models for the assessment of the seal behaviour.

The main sealing material option is a mixture of high density bentonite pellets (density > 2.1 g per cubic cm)

with bentonite powder. This sealing material will be optimized to obtain the best balance between saturation time, swelling pressure and hydraulic conductivity. The in situ experiments will be supported by laboratory experiments to develop the seal material production and installation procedure and to measure the water and gas transport properties of the seal material. The geomechanical properties of the sealing material will be determined by swelling pressure tests and suction controlled tests.

WM Descriptor(s): backfilling; Belgium; bentonite; boreholes; buffers; clays; closures; construction; demonstration programs; engineered safety systems; high-level radioactive wastes; radioactive waste disposal; sealing materials; seals

Principal Investigator(s):

Volckaert, G.

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Organization Performing the work:

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Other Investigators:

Holvoet, F-X.; Ortiz, L.; Bernier, F.; Put, M.

Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: 1996-5-1 To: 1999-11-1

State of Advancement: Unknown

Preliminary report(s) available: Yes

Sponsoring Organization(s):

EC, Brussels (Belgium) ENRESA (Spain), ANDRA (France), NIRAS/ONDRAF, Brussels (Belgium)

Associated Organization(s):

CEA (France), CIEMAT (Spain), ANDRA (France)

BEL19980037

Title:

TRANCOM-CLAY Transport of Radionuclides due to complexation with Organic Matter in Clay formations

Title in Original Language:

Topic Code(s):

201 -Dispersion and Migration of Radionuclides;
323 -Earth Science Studies and Models

Abstract:

This research project focuses on the role of organic matter as a transport agent for trivalent radionuclides through clay formations. Preliminary performance assessment calculations have indicated a potential negative influence of this transport on the safety of a repository. It is intended to obtain reliable transport models and migration parameters as input data for the Performance Assessment calculations of a deep repository in an argillaceous formation. To reach this objective, laboratory and large scale in situ migration experiments with C-14 labelled organic matter are planned. The advantage of using labelled organic materials is that one can trace exactly its pathways. This will contribute to a better understanding of the mechanisms of retention and migration. Laboratory migration experiments are also foreseen with the labelled organics, complexed with trivalent actinides. This setup will enable to study the transport capabilities of organic matter for radionuclides under in situ conditions

WM Descriptor(s): aquatic ecosystems; Belgium; carbon 14; clays; complexes; organometallic compounds; radioactive waste disposal; tracer techniques; transport

Principal Investigator(s):

Put, M.

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Organization Performing the work:

SCK/CEN
BOERETANG 200 B-2400 MOL BELGIUM

Other Investigators:

Dierckx, A.; De Cannière, P.; Aertsens, M.; Wang, L.; Moors, H.

Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: 1996-1-1 To: 1998-12-1

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):

EC, Brussels (Belgium); NIRAS/ONDRAF, Brussels (Belgium)

Associated Organization(s):

Ecole des Mines de Paris, Paris (France), Louvain University (Belgium), Loughborough University of Technology (United Kingdom)

BEL19980038

Title:

The Boom clay as a natural analogue

Title in Original Language:

Topic Code(s):

323 -Earth Science Studies and Models; 328 - Natural Analogue Studies

Abstract:

For over 20 years, the Belgian Nuclear Research Centre SCK has been studying the Boom Clay as a host formation for the geological disposal of radioactive waste. It is now generally acknowledged that geochemical processes, which are active over very long (geological) time-scales, can influence the performance of the repository. Due to the complexity of the geochemical processes and the long time-periods involved, these processes cannot be fully studied by laboratory experiments. Therefore, this study investigates the distribution and migration of trace elements and radionuclides that have been naturally present in low (background) concentrations in the Boom Clay formation since its deposition, 32 million years ago. The proposed scientific methodology consists of the detailed geochemical and mineralogical analyses of samples from the Boom clay formation. This approach enables data to be obtained on the long-term behaviour of critical elements or radionuclides in realistic geological disposal conditions over geological time-periods, relevant for the assessment of the safety of disposal. The objectives of the proposed research project are:

- to study the geochemical distribution and behaviour of trace elements and naturally occurring isotopes of U, Th, and their daughter isotopes in the Boom Clay formation, and
- to verify or support predictions on the long-term behaviour of disposed radionuclides by comparing the results from this natural analogue study with results from migration experiments and performance assessment calculations.

WM Descriptor(s): Belgium; clays; geochemistry; mineralogy; natural analogue; radioactive waste disposal; rare earths

Principal Investigator(s):

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Organization Performing the work:

SCK/CEN
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Other Investigators:
De Craen, M.; Delleuze, D.; Sneyers, A.; Volckaert, G.

Organization Type:
Foundation or laboratory for research and/or development

Program Duration: From: 1997-2-1 To: 1999-12-31

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):
NIRAS/ONDRAF, Brussels (Belgium)

Associated Organization(s):
University of Louvain-la-Neuve (Belgium)

BEL19980039

Title:
Performance assessments of the geological disposal of high-level radioactive waste in clay layers

Title in Original Language:

Topic Code(s):
323 -Earth Science Studies and Models; 324 -Safety Assessment and Performance Studies

Abstract:
In Belgium, performance assessment calculations on the geological disposal of high-level and long-lived radioactive wastes are focused on the Boom Clay Formation (Mol-Dessel site). The objective of the present research programme is to provide a basis for one of the main contributions to the second Safety Assessment and Feasibility Interim Report (SAFIR-II). This report is being prepared by NIRAS/ONDRAF and will be submitted to the Belgian authorities in 1999. In the present assessments, most efforts are devoted to the improvement of the transparency and traceability of the scenario selection and the consequence analyses. SCK/CEN participates in the Spent Fuel Assessment (SPA) project in the framework of the fourth R&D programme "Management and storage of radioactive waste" (1995-1999) of the EC. SCK/CEN's contribution to the SPA project is a detailed performance assessment of the geological disposal of spent fuel in the Boom Clay formation.

WM Descriptor(s): Belgium; clays; high-level radioactive wastes; performance; radioactive waste disposal; underground disposal

Principal Investigator(s):
MARIVOET, JAN

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Organization Performing the work:
SCK/CEN
BOERETANG 200 B-2400 MOL BELGIUM

Other Investigators:
Volckaert, G.; Wemaere, I.; Meyus, Y.; Mallants, D.; Sillen, X.

Organization Type:
Foundation or laboratory for research and/or development

Program Duration: From: 1994-1-1 To: 2000-12-1

State of Advancement: Unknown

Sponsoring Organization(s):
NIRAS/ONDRAF, Brussels (Belgium); EC, Brussels (Belgium)

Associated Organization(s):
Vrije Universiteit Brussel, Brussels (Belgium); Louvain University (Belgium); Université Libre de Bruxelles, Brussels (Belgium); Belgische Geologische Dienst / Service Géologique de Belgique, Brussels (Belgium); Energieonderzoek Centrum Nederland, Petten

BEL19980040

Title:
Performance assessments of the surface and deep disposal of low-level radioactive waste

Title in Original Language:

Topic Code(s):
313 -Earth Science Studies and Models; 314 -Safety Assessment and Performance Studies

Abstract:

In March 1998, NIRAS/ONDRAF has launched a new research programme on the disposal of LLW in Belgium. Two options are presently being investigated:
- surface disposal in fully engineered facilities, and
- disposal in a clay host rock at moderate depth.

The contribution of SCK/CEN consists of the elaboration of a feasibility report in which the potential impact of gas effects on the performance of the repository is investigated and of reports that describe the data are needed for the elaboration of the performance assessment of the repository systems. SCK/CEN is also carrying out performance assessment calculations for candidate repository sites for the disposal of MLW and LLW in NW Russia and in Hungary in the framework of the EC TACIS and PHARE programmes.

WM Descriptor(s): Belgium; low-level radioactive wastes; performance; radioactive waste disposal; underground disposal

Principal Investigator(s):
Volckaert, G.

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Organization Performing the work:
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Other Investigators:
Zeevaert, T.; Marivoet, J.; Wemaere, I.; Mallants, D.

Organization Type:
Foundation or laboratory for research and/or development

Program Duration: From: 1998-3-1 To: 2001-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):
NIRAS/ONDRAF, Brussels (Belgium), EC, Brussels (Belgium)

Associated Organization(s):
BELGATOM, Brussels (Belgium)

BEL19980041

Title:
Regional characterisation of the Mol site

Title in Original Language:

Topic Code(s):
323 -Earth Science Studies and Models; 324 -Safety Assessment and Performance Studies

Abstract:

In the framework of the radioactive waste management programme of RINRAS/ONDRAF, SCK/CEN collects since more than 15 years data on the ground water level in approximately 130 boreholes at 35 locations in NW Belgium. A regional hydrogeological model is being developed. To extend the data that are available for the calibration of the regional model, a data acquisition campaign consisting of the drilling of 4 additional

boreholes has been elaborated from 1996 to 1998. In the framework of the fourth R&D programme "Management and storage of radioactive waste" (1995-1999) of the EC, SCK/CEN is the coordinator of the PHYMOL project which is a palaeohydrogeological study of the Mol site. Within this project, the geochemistry and isotope composition of ground water samples taken from the boreholes of SCK/CEN's regional peizometric network or from clay cores obtained from the 1996-98 data acquisition campaign. the objectives of the PHYMOL project are
- to obtain information on the groundwater flow in the aquifers surrounding the Boom Clay formation during the last 50.000 years,
- to reconstruct the observed geochemical and isotope distributions using simulations and
- to develop a methodology for climate evolution scenarios applicable to the assessment of the performance of disposal in clay formations.

WM Descriptor(s): Belgium; radioactive waste disposal; site characterization; underground disposal

Principal Investigator(s):

Wemaere, I.

SCK/CEN
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Mol

Organization Performing the work:

SCK/CEN
BOERETANG 200 B-2400 MOL BELGIUM

Other Investigators:

Marivoet, J.; Meyus, Y.; Labat, S.

Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: 1996-1-1 To: 2000-12-1

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):

NIRAS/ONDRAF, Brussels (Belgium), EC, Brussels (Belgium)

Associated Organization(s):

Belgian Geological Survey, Brussels (Belgium), Université de Paris-Sud, Orsay (France), CEA, Saclay (France), Technical University of Delft (the Netherlands)

BEL19980042

Title:
In situ tests on waste forms

Title in Original Language:

Topic Code(s):

135 -Waste Packaging (Canister Types, Materials, Corrosion Studies); 326 -Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

The objective of this research project is to study the in situ interaction between conditioned radioactive waste and the Boom clay. The experimental approach consists of in situ tests that are performed at the Hades underground laboratory (Mol, Belgium). The in situ tests are complementary to laboratory experiments and modelling studies. Two in situ experiments are presently running:
- In the CORALUS project, the interaction between HLW glass (doped with about 0.85% actinides) and the near field barrier (a bentonite mixture) or the far field (Boom clay) is studied. In order to simulate realistic disposal conditions, the tests are performed in the presence of a gamma radiation field and a heat source (heating temperatures of 40 and 90°C). In 1998, a first in situ test using inactive glass samples has been started. Data from this test will be used to set up an experiment on active waste glasses. This experiment is planned to begin in 1999/2000. The results of the CORALUS test will be interpreted in terms of gas production, glass dissolution, actinide release and migration through the clay, and changes in the chemistry of the reacting clay. The actinide doped glass is provided by CEA while the gas analyses are performed by GRS.
- In the framework of a EC project, the interaction between cemented waste forms and the Boom clay is

investigated by in situ experiments. In particular, different cement formulations of interest to the nuclear industry, are exposed to Boom clay. The maximum test duration is 18 months and the in situ tests are performed at two temperatures (25 and 85°C). The in situ interaction tests are complementary to laboratory tests, carried out by other laboratories within the EC project. After retrieval, the cement samples will be analysed using different surface electron optical methods. In addition, cement-clay interactions will be modelled using geochemical codes. The objective is to assess the stability of cement in a clay repository environment. The in situ tests have been started and the cement samples will be retrieved during the second semester of 1999.

WM Descriptor(s): cements; concretes; corrosion; gamma radiation; glass; heating; high-level radioactive wastes; in-situ processing; materials testing; radioactive waste disposal; waste-rock interactions

Principal Investigator(s):

VAN ISEGHEM, P.

S.C.K./C.E.N. BELGIAN NUCLEAR RESEARCH CENTRE
BOERETANG 200
B-2400
MOL

Organization Performing the work:

SCK/CEN
BOERETANG 200 B-2400 MOL BELGIUM

Other Investigators:

Sneyers, A.; Valcke, E.; Labat, S.; Buyens, M.

Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: 1997-1-1 To: 1999-12-1

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):

European Commission (Brussels)

Associated Organization(s):

CEA Valrhô (FR), GRS Braunschweig (DE), Aberdeen University (UK)

BEL19980043

Title:

Compatibility studies on vitrified high-level waste

Title in Original Language:

Topic Code(s):

134 -Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies)

Abstract:

The objective of this research project is to study the long-term performance and the compatibility of vitrified high-level waste with geologic disposal in the Boom clay. Two glass compositions are studied: The Cogéma R7T7 glass SON68, and the DWK/Belgoprocess PAMELA SM539 glass. The research programme includes:
- the study of long-term dissolution processes and the behaviour of glass in the presence of backfill and corrosion products,
- the study of the leaching of radionuclides from vitrified waste,
- the study of the migration of Si through clay, and
- the modelling of the glass dissolution in clay media.

In the experimental studies, the most relevant media for the glass dissolution are investigated, i.e. Boom clay as it is considered as the most corrosive medium in the case of tests on inactive glass,a and the bentonite backfill as this medium is expected to determine the release and speciation of the radionuclides from the active glass. The modelling of glass dissolution is performed using Monte Carlo simulations, which allow to predict the glass dissolution as a function of the ratio network modifier to network former. In addition, analytical models are used. Geochemical codes are applied for the interpretation of the influence of clay on glass dissolution as well as for the study of the role of secondary phases. Finally, a research project, studying Np-complexes (humates,

carbonates, hydroxides, mixed complexes) that can be formed during the interaction of the HLW glass and Boom clay water, has been started. These complexes are identified by Laser Photoacoustic Spectroscopy (LPAS). As part of this study, the complexation constant of Np-humate complexes has been determined in order to contribute to a better understanding of the behaviour and speciation of Np in geological disposal conditions.

WM Descriptor(s): clays; complexes; corrosion; glass; high-level radioactive wastes; leaching; materials testing; mathematical models; neptunium

Principal Investigator(s):

VAN ISEGHEM, P.

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MOL

Organization Performing the work:

SCK/CEN
BOERETANG 200 B-2400 MOL BELGIUM

Other Investigators:

Lemmens, K.; Aertsens, M.; Lolivier, Ph.; De Cannière, P.; Pirlet, V.; Malengreau, N.

Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: 1991-1-1 To: 1999-12-1

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):

NIRAS/ONDRAF, Brussels (Belgium); EC, Brussels (Belgium)

Associated Organization(s):

CEA Valrhô (France); University Liège (B); FZK Karlsruhe (G); Chalmers University Technology (Sweden)

BEL19980044

Title:

Characterization of conditioned waste forms

Title in Original Language:

Topic Code(s):

182 -Waste from form characterization

Abstract:

The objective of this research topic is to measure and to verify different physical and (radio)chemical characteristics of radioactive waste forms, relevant to the Belgian waste management programme. In particular, the following waste forms have been investigated:
- inactive and active vitrified waste (Cogéma R7T7 and DWK/Pamela glass),
- inactive and active bituminized waste (Belgoprocess/Eurobitum, Cogéma STE3 bitumen),
- cemented waste (including PWR low-level waste).

New programmes include leach tests on cemented PWR ion exchange resins. SCK/CEN participates in several working groups of the European Network of Quality Checking Facilities. Within the Network, techniques for the characterization of waste forms and packages are discussed, developed and improved. As part of a joint EC round robin campaign, the characteristics of real and artificial low-level waste packages are measured by all presently available non-destructive analytical techniques. These waste packages contain fissile and non-fissile materials. The comparison of the results of this campaign will allow to evaluate different DNA assay systems.

WM Descriptor(s): bitumens; cements; diffusion; gamma detection; glass; quality control; radioactive wastes; waste characterization

Principal Investigator(s):

VAN ISEGHEM, P.

S.C.K./C.E.N. BELGIAN NUCLEAR RESEARCH CENTRE
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Organization Performing the work:

SCK/CEN
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Other Investigators:

Wacquier, W.; Bruggeman, M.; Boden, S.; Carchon, R.; Borgermans, P.; Vanderlinden, F.

Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: 1991-1-1 To: 1998-12-1

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):

NIRAS/ONDRAF, Brussels (Belgium); EC, Brussels (Belgium)

Associated Organization(s):

Belgoprocess (Belgium), KEMA (Netherlands), KFA (Germany)

BEL19980045

Title:

Compatibility of organic waste forms with geological disposal in Boom clay

Title in Original Language:

Topic Code(s):

117 -Waste Disposal

Abstract:

The objective of this study is to investigate the compatibility of organic waste forms with geological disposal in Boom clay. In particular, bituminized reprocessing waste and alpha-contaminated cellulose waste is studied as part of this research project. Bituminized radioactive waste has been produced by Eurochemic/Belgoprocess (Eurobitum) and by Cogéma (STE3 bitumen) while alpha contaminated cellulose-containing waste is generated during MOX-production.

Leach experiments on bituminized waste have shown that high leach rates are typical for the embedded soluble salts (nitrates, sulphates). Lower leach rates were measured for the embedded radionuclides. In addition, bituminized waste may swell due to the uptake of water. A research programme on the radiolytic degradation of bituminized waste has been started recently. In particular, the influence of the radiolytic degradation products on the solubility of radionuclides is investigated. In another research project, the degradation of cellulose at high pH conditions (cement matrix) is investigated. For both waste forms, a similar approach is followed. First, in a degradation test, potential complex-forming organic degradation products are identified. Subsequently, the solubility of two selected radionuclides (Pu and Am) in the different media, relevant to geologic disposal, is measured. Finally, the influence of these degradation products on the sorption behaviour of Pu and Am on Boom clay, is assessed by sorption experiments.

WM Descriptor(s): actinides; bitumens; cellulose; clays; radiolysis; solubility; sorption; waste

Principal Investigator(s):

VAN ISEGHEM, P.

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Organization Performing the work:

SCK/CEN
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Other Investigators:
Sneyers, A.; Valcke, E.

Organization Type:
Foundation or laboratory for research and/or development

Program Duration: From: 1996-1-1 To: 1999-12-1

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):
NIRAS/ONDRAF (B)

Associated Organization(s):
Nihil

BEL19980046

Title:
The degradation of cemented MTR waste in geological disposal conditions in Boom clay

Title in Original Language:

Topic Code(s):
144 -Spent Fuel Immobilization/Conditioning

Abstract:

The objective of this project is to investigate the compatibility of cemented waste resulting from the reprocessing of spent research reactor fuel with the geological disposal conditions of Boom clay. In particular, research is focused on waste, generated during the reprocessing of spent fuel from the SCK/CEN research reactor BR2. The resulting liquid waste will be conditioned in a cement matrix by AEA Dounreay. Inactive cement samples for testing were provided by AEA Dounreay and radioactive samples will be manufactured by FZ Jülich. Leach tests are performed in media, simulating the composition of repository water in the Boom clay formation. Two scenarios are investigated: clay water equilibrated with oxidized clay or with non-oxidized clay. The experiments will be interpreted in terms of cement degradation and radionuclide leaching. Special attention will also be paid to the performance assessment of this waste form in geological disposal conditions of the Boom clay formation.

WM Descriptor(s): Belgium; bitumens; cements; clays; intermediate-level radioactive wastes; leaching; liquid wastes; radioactive waste disposal

Principal Investigator(s):
Sneyers, A.

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Organization Performing the work:
SCK/CEN
BOERETANG 200 B-2400 MOL BELGIUM

Other Investigators:
Van Iseghem, P; Sikun Xu; Marivoet, J.

Organization Type:
Foundation or laboratory for research and/or development

Program Duration: From: 1994-1-1 To: 1999-12-1

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):
EC

Associated Organization(s):
University of Aberdeen (UK), KFA Jülich (DE)

BEL19980047

Title:
Study of ILW and HLW emplacement

Title in Original Language:
Etude de la manutention des déchets de catégorie B et C

Topic Code(s):
117 -Waste Disposal; 137 -Waste Disposal

moyennement calorifiques

(including Spent Fuel); 327 -Waste Emplacement

Abstract:

Preliminary studies of the machines and procedures for placing ILW and HLW in disposal galleries.

WM Descriptor(s): backfilling; Belgium; high-level radioactive wastes; intermediate-level radioactive wastes; radioactive waste disposal; robots; vehicles

Principal Investigator(s):

Van Cauteren, Luc

ONDRAF/NIRAS
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Brussels

Organization Performing the work:

ONDRAF/NIRAS
B-1210 Brussels BELGIUM

Other Investigators:

Demoulin, Xavier; Demarche, Marc; Brosemer, Didier

Organization Type:

Other

Program Duration: From: 1997-10-1 To: 1998-10-1

State of Advancement: Research in progress

Sponsoring Organization(s):

none

Associated Organization(s):

Manutention Bodard - private industry

BEL19980048

Title:

Corrosion behaviour of candidate container materials in Boom clay repository conditions

Title in Original Language:

Topic Code(s):

135 -Waste Packaging (Canister Types, Materials, Corrosion Studies)

Abstract:

In this research topic, the corrosion resistance of candidate container materials for long-lived, solidified radwaste in Boom clay media is investigated. The reference material in Belgium is stainless steel AISI 316L. In addition, alternative materials such as UHB 904L, other steels, Ti alloys, and Ni alloys are also investigated. In previous in situ experiments in the Boom clay formation, high corrosion resistances were observed for stainless steel AISI 316L. C-steel was found to be susceptible to pitting corrosion. The in situ tests were performed in the HADES underground laboratory of SCK/CEN. In the CERBERUS in situ experiment, a gamma irradiation field was present. In the present programme, electrochemical corrosion tests are performed to investigate crevice and pitting corrosion. In these tests, the chloride and thiosulphate concentration in the clay water have been used as the main parameters. Complementary immersion tests are carried out in order to study the corrosion processes in function of time. The experimental set-up takes account of various disposal conditions: aerobic, anaerobic; contact with bentonite near field material, contact with Boom clay far field material.

WM Descriptor(s): bentonite; containers; corrosion; stainless steels

Principal Investigator(s):

Kursten, B.

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Organization Performing the work:

SCK/CEN
BOERETANG 200 B-2400 MOL BELGIUM

Other Investigators:

Van Iseghem, P.; Druyts, F.

Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: 1991-1-1 To: 2000-12-1

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):

NIRAS/ONDRAF, EC, EDF (F)

Associated Organization(s):

FZK Karlsruhe

Brazil

BRA19980001

Title:

Safety assessment of the repository for the Cs-137 wastes from the Goiania accident

Title in Original Language:

Analise de seguranca do repositorio de Goiania

Topic Code(s):

127 -Waste Disposal; 430 -MANAGEMENT OF DECOMMISSIONING WASTE

Abstract:

The 3 500 cubic metres of wastes generated during the decontamination work performed in Goiania following the accident involving the violation of a teletherapy source with 1375 Ci of Cs-137 will be placed in concrete vaults to be constructed close to the site where these wastes are presently stored. A mathematical model based on conservative scenarios is being developed to preliminary evaluate the migration of Cs-137 from the repository and to estimate the resulting radiation doses to the critical group. The determination of experimental data to allow the validation of the model is also envisaged.

WM Descriptor(s): cesium 137; decontamination; low-level radioactive wastes; radiation accidents; radioactive waste disposal; radionuclide migration; risk assessment; safety

Principal Investigator(s):

HEILBRON, PAULO F. L.

COORD. DE INSTALACOES NUCLEARES E RADIATIVAS (CODIN) COMISSAO NACIONAL DE ENERGIA NUCLEAR (CNEN)
RUA GRAL SEVERIANO 90, SALA 400B
BR-22294-900
RIO DE JANEIRO

Organization Performing the work:

CNEN BRAZILIAN NUCLEAR ENERGY COMMISSION, DEPARTMENT OF NUCLEAR RADIOACTIVE INSTALLATION
BR-22294-900 RIO DE JANEIRO BRAZIL

Other Investigators:

Malamut C.; Xavier A.; Rochedo E.; Miaw S.

Organization Type:

Other

Program Duration: From: 1993-9-1 To: 1995-9-1

State of Advancement: Unknown

Sponsoring Organization(s):

CNEN - Brazilian Nuclear Energy Commission Department of Nuclear and Radioactive Installations

Associated Organization(s):

none

Recent publication info:

843

BRA19980002

Title:

Development of a national computer code for the safety assessment of radioactive waste repositories

Title in Original Language:

Topic Code(s):

Desenvolvimento de um codigo nacional para a analise de seguranca de repositorios de rejeitos radioativos

109 -Waste Characterisation (Radionuclide Inventory Determination), including Computer Codes and Measuring Methods and Techniques; 127 -Waste Disposal; 201 -Dispersion and Migration of Radionuclides

Abstract:

The National Nuclear Energy Commission (CNEN) and the Federal University of Rio de Janeiro COPPE/UFRJ are undertaking a joint effort on the development of a national capability on safety assessment of near surface repositories as well as on the treatment of radioactive waste. The first part of this project consists on the development of a straightforward computational code for the simulation of the migration of radionuclides in the soil and includes the experimental determination of the physical parameters involved and the analysis of environmental impact. This part of the project is already being undertaken and a numerical-analytical code for the safety assessment of Goiania's waste is available. Following storage treatment and disposal of radioactive waste will be studied.

WM Descriptor(s): computer codes; computerized simulation; ground disposal; low-level radioactive wastes; radionuclide migration; risk assessment; safety

Principal Investigator(s):

HEILBRON, PAULO F. L.

COORD. DE INSTALACOES NUCLEARES E RADIATIVAS (CODIN) COMISSAO NACIONAL DE ENERGIA NUCLEAR (CNEN)
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Organization Performing the work:

COMISSAO NACIONAL DE ENERGIA NUCLEAR RUA GENERAL SEVERIANO 90 BRA-22294-900 RIO DE JANEIRO BRAZIL

Other Investigators:

Figueira da Silva E.; Cotta R.M.; Sousa R.; Romani Z.V.

Organization Type:

Other

Program Duration: From: 1995-7-1 To: 2000-6-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Comissao Nacional de Energia Nuclear; Rua General Severiano 90 Anexo I Botafogo 22294-900 Rio de Janeiro - RJ - Brazil

Associated Organization(s):

COPPE/UFRJ

Recent publication info:

844

BRA19980003

Title:

Development of a Brazilian computer code for the safety assessment of near surface radioactive waste repositories.

Title in Original Language:

Desenvolvimento de um código nacional para a avaliação de segurança de repositórios próximos à superfície para rejeitos radioativos.

Topic Code(s):

201 -Dispersion and Migration of Radionuclides; 202 -Dispersion and Migration Models; 304 -Safety Assessment and Performance Studies; 314 -Safety Assessment and Performance Studies

Abstract:

A Brazilian computer code for the safety assessment of near surface radioactive waste repositories is being developed in a joint project from the Brazilian Nuclear Energy Commission (CNEN) with the Federal University of Rio de Janeiro (UFRJ). The first part of the code, consisting of a one- dimensional screening model for the geosphere simulation, was validated against the GWSCREEN and the DUST codes. A one

dimensional chain calculation is being developed, as well as a two-dimensional model for the geosphere, considering the soil saturated. A straightforward graphical interface was developed to improve the public acceptance of the repository. This interface is responsible for the pre- and post-processing of the main code and can show two- and three-dimensional plots of concentration in the aquifer versus time and space, as well as an animation of the leakage from the repository into the aquifer, among other features. This project is also being sponsored by the IAEA under project BRA/4/046.

WM Descriptor(s): computer codes; computerised simulation; coordinated research programs; differential equations; ground water; radionuclide migration

Principal Investigator(s):

HEILBRON, PAULO F. L.

Coordenação de Rejeitos Radioati Comissão Nacional de Energia Nuc
22294-900
RIO DE JANEIRO

Organization Performing the work:

Comissão Nacional de Energia Nuc Coordenação de Rejeitos Radioati
22.294-900 Rio de Janeiro BRAZIL

Other Investigators:

E.Figueira da Silva J.S.Pérez Guerrero N.J. Ruperti Jr. M.A. Leal R.M. Cotta

Organization Type:

Other

Program Duration: From: 1995-10-1 To: Not provided

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):

none

Associated Organization(s):

Federal University of Rio de Janeiro (COPPE/UFRJ)

Bulgaria

BUL19980001

Title:
Spent fuel/high level waste characterisation

Title in Original Language:

Harakterizirane na otraboteno qdreno goriwo/wisoks-aktiwni otpadutzi

Topic Code(s):

108 -Waste Management System Analysis; 134 -Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies); 144 -Spent Fuel Immobilization/Conditioning

Abstract:

As a part of long term programme for radioactive waste disposal in Bulgaria the VVER-440 and VVER-1000 reactor spent fuel accumulation is assessed. Different scenarios for spent fuel management are estimated. Types and quantities of wastes during the spent fuel reprocessing and spent fuel conditioning are assessed. The radionuclide inventory is under estimation.

WM Descriptor(s): forecasting; fuel management; high-level radioactive wastes; radioactive waste processing; reprocessing; spent fuels; WWER type reactors

Principal Investigator(s):

STEFANOVA, IRA

DEPT OF RADIOCHEMISTRY AND RADIOECOLOGY INSTITUTE FOR NUCLEAR RESEARCH AND NUCLEAR ENERGY
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SOFIA

Organization Performing the work:

INSTITUTE OF NUCLEAR RESEARCH AND NUCLEAR ENERGY
72 TZARIGRADSKO CHAUSSEE BD BG-1784 SOFIA
BULGARIA

Other Investigators:

Organization Type:

Other

Program Duration: From: 1994-6-1 To: 1996-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Institute for Nuclear Research and Nuclear Energy; blvd Tsarigradsko chaussee 72 Sofia 1784 Bulgaria

Recent publication info:

845

BUL19980002

Title:

Development of technology and pilot plant for treatment of small volumes liquid radioactive wastes

Title in Original Language:

Razrabotwane na technologiya I pilotna instalaziya za prerabotwane na malki obemi techni radioaltiwni otpadutzi

Topic Code(s):

122 -Liquid Waste Treatment

Abstract:

The application of radionuclides in research institutions hospitals and industries generates a range of aqueous waste streams needing treatment to reduce the quantities of radioactive contaminants to levels which allow safe discharge according to international conventions and our national regulations. As a part of IAEA Coordinated Research Programme 'Treatment Technologies for Low and Intermediate Level Wastes Generated from Nuclear Applications' technology and pilot plant for decontamination of low level liquid waste are under development. The radioactive liquid wastes are treated by chemical precipitation and sorption of radionuclides on natural and modified inorganic sorbents. The resulting sludge and loaded sorbents are solidified by cementation.

WM Descriptor(s): adsorbents; decontamination; ion exchange; liquid wastes; low-level radioactive wastes; precipitation; radioactive waste processing; solidification

Principal Investigator(s):

STEFANOVA, IRA

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Organization Performing the work:

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BULGARIA

Other Investigators:

Milanov M.; Airanov M.; Milusheva A.

Organization Type:

Other

Program Duration: From: 1992-9-1 To: 1996-5-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Institute for Nuclear Research and Nuclear Energy; blvd Tsarigradsko chaussee 72 Sofia 1784 Bulgaria

Recent publication info:

846

BUL19980003

Title:

Characterisation of radioactive wastes from nuclear power plant

Title in Original Language:

Harakterizirane na radioaktiwnite otpaduzi ot AEZ

Topic Code(s):

109 -Waste Characterisation (Radionuclide Inventory Determination), including Computer Codes and Measuring Methods and Techniques; 114 -Waste Immobilization (Bituminization, Cementation, Including Tests of Properties, Leaching Studies); 117 -Waste Disposal

Abstract:

The radioactive waste accumulation during the life time of NPP Kozloduy is estimated as a part of long term programme for radioactive waste disposal in Bulgaria. Different scenarios for waste treatment and conditioning are assessed. The final volume of the radioactive wastes which would be disposed of and the total radionuclide inventory are predicted.

WM Descriptor(s): forecasting; high-level radioactive wastes; inventories; kozloduy-1 reactor; kozloduy-2 reactor; kozloduy-3 reactor; radioactive waste disposal; radioactive waste processing

Principal Investigator(s):

STEFANOVA, IRA

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Organization Performing the work:

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BLVD TSARIGRADSKO CHAUSSEE 72 BG-1784
SOFIA BULGARIA

Other Investigators:

Organization Type:

Other

Program Duration: From: 1994-6-1 To: 1996-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Institute for Nuclear Research and Nuclear Energy; blvd Tsarigradsko chaussee 72 Sofia 1784 Bulgaria

Recent publication info:

847

BUL19980004

Title:

Increasing the safety of the existing Novi Han repository for radioactive waste from nuclear applications

Title in Original Language:

Powishawane na bezopasnostta na sushtestwuwashtoto

Topic Code(s):

127 -Waste Disposal; 304 -Safety Assessment and

hranilishte krayi Novi Han

Performance Studies

Abstract:

Radioactive waste from nuclear applications has been disposed of in the existing near surface Novi Han Repository located in Losen mountain near Sofia. The increasing the safety of the repository includes its reconstruction as above ground storage facility construction of appropriate monitoring and control system construction of equipment for waste treatment and conditioning retrieving the waste from the existing disposal vaults and their conditioning and/or repackaging safety assessment of the facility.

WM Descriptor(s): ground disposal; radioactive waste disposal; radioactive waste processing; risk assessment; safety; safety analysis; underground disposal

Principal Investigator(s):

MILANOV, MILKO

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TZARIGRADSKO CHAUSSEE BD 72
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SOFIA

Organization Performing the work:

INSTITUTE FOR NUCLEAR RESEARCH AND NUCLEAR ENERGY
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SOFIA BULGARIA

Other Investigators:

Stefanova I.; Mateeva M.; Prodanov J.; Mishev P.

Organization Type:

Other

Program Duration: From: 1995-10-1 To: 1999-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Institute for Nuclear Research and Nuclear Energy; blvd Tsarigradsko chaussee 72 Sofia 1784 Bulgaria

Recent publication info:

848

BUL19980005

Title:

Study of the transport of radionuclides in natural and engineered barriers

Title in Original Language:

Izuchavane na transporta na radionuklidi w prirodni I izkustweni barieri

Topic Code(s):

118 -Waste Transportation (Methods, Containers, Transportation Means); 138 -Waste Transportation (Methods, Containers, etc.)

Abstract:

Development of methodology and equipment for the transport of radionuclides is investigated in natural and engineered barriers on the basis of permanent control of dynamic processes. The experimental results are used for the verification of the model calculation of the radionuclide migration around repositories for radioactive wastes and other potential sources of radionuclide contamination.

WM Descriptor(s): radioactive waste disposal; radionuclide migration; underground disposal

Principal Investigator(s):

MILANOV, MILKO

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Organization Performing the work:

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Other Investigators:
Stefanova I.; Mateeva M.

Organization Type:
Other

Program Duration: From: 1996-1-1 To: 1998-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Institute for Nuclear Research and Nuclear Energy; blvd Tsarigradsko chaussee 72 Sofia 1784 Bulgaria

Recent publication info:
849

BUL19980006

Title:
Safety assessment of repositories for radioactive wastes

Title in Original Language:
Otchenka na bezopasnostta na hranilishta za radioaktiwni otpadutchi

Topic Code(s):
127 -Waste Disposal; 304 -Safety Assessment and Performance Studies

Abstract:
The safety and reliability of near-surface repository for low and intermediate level wastes is assessed. The methodology includes the estimation of the dose burden for critical group of the population.

WM Descriptor(s): dose commitments; ground disposal; intermediate-level radioactive wastes; low-level radioactive wastes; radiation doses; radioactive waste disposal; reliability; risk assessment; safety; safety analysis

Principal Investigator(s):
MATEEVA, MAYIA

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Other Investigators:

Organization Type:
Other

Program Duration: From: 1994-6-1 To: 1998-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Institute for Nuclear Research and Nuclear Energy; blvd Tsarigradsko chaussee 72 Sofia 1784 Bulgaria

Recent publication info:
850

Canada

CAN19980001

Title:
Microbially influenced corrosion of copper

Title in Original Language:

Topic Code(s):

125 -Waste Packaging; 138 -Waste Transportation (Methods, Containers, etc.)

Abstract:

An assessment has been done of the potential for microbially influenced corrosion (MIC) of copper containers. The purpose of the review is to provide evidence that MIC will not significantly limit the lifetimes of copper containers and to identify areas of further work. The extent and diversity of microbial activity within a disposal vault is likely to be restricted by the limited availability of water and nutrients and the presence of a gamma-radiation field. Most of the reports about MIC of copper in the literature involve environmental conditions that are different than the conditions in a disposal vault and therefore copper containers would not be subject to those forms of MIC. However at this stage it is not possible to definitely exclude the possibility of MIC due to sulphate-reducing bacteria and stress corrosion due to microbial ammonia production. Experimental programs are underway in these areas.

WM Descriptor(s): biodegradation; containers; copper; corrosion; gamma radiation; lifetime; microorganisms; radioactive waste disposal

Principal Investigator(s):

KING, FRASER

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Organization Performing the work:

CANDU OWNERS GROUP

Other Investigators:

Stroes-Gascoyne S.

Organization Type:

Other

Program Duration: From: 1994-1-1 To: 1996-1-1

State of Advancement: Unknown

Sponsoring Organization(s):

CANDU Owners Group

Recent publication info:

851

CAN19980002

Title:

Disposal vault design for in-room emplacement

Title in Original Language:

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 305 -Design, Construction, Commissioning

Abstract:

A design of a used-fuel disposal facility using the in-room emplacement method is being produced to provide a design description schedule and cost estimates for an alternate postclosure assessment. This vault design provides an alternative to the in-borehole emplacement option considered earlier in the Canadian Nuclear Fuel Waste Management Program. Two hypothetical sites were selected for an assessment of the performance of the in-room emplacement disposal vault: a hydraulically favourable site (low permeability rock) which is located at a depth of 750 m is 4 sq. km in area and can accommodate 5.8 million used-fuel bundles; and a site with a higher permeability with the vault at 500 m with overall plan dimensions of 1.9 by 2.1 km and a capacity of 4.3 million bundles. Design description schedule and a cost estimate are being produced for the 750-m depth option.

WM Descriptor(s): design; high-level radioactive wastes; positioning; radioactive waste disposal; site characterization; site selection; spent fuels; underground disposal

Principal Investigator(s):

BAUMGARTNER, P.

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Organization Performing the work:

CANDU OWNERS GROUP

Other Investigators:

Organization Type:

Other

Program Duration: From: 1994-1-1 To: 1996-1-1

State of Advancement: Unknown

Sponsoring Organization(s):

CANDU Owners Group

Associated Organization(s):

none

Recent publication info:

852

CAN19980003

Title:

Carbon-14 in the biosphere

Title in Original Language:

Topic Code(s):

201 -Dispersion and Migration of Radionuclides;
211 -Biological Uptake Mechanisms and Models

Abstract:

Carbon-14 an important radionuclide for both high- and intermediate-level radioactive waste management behaves uniquely in the biosphere because of isotopic mixing with stable carbon. Research has been done on two aspects of C-14 retention of C-14 on carbonate containing soil and unconsolidated material; and plant absorption of C-14 from contaminated groundwater. The soil retention research clearly indicates that the carbonate content of geological and soil materials in the vicinity of a C-14 waste disposal site are important because they enhance the retardation of C-14 migration and buildup in soils. The plant absorption research highlights that plant concentrations of C-14 are dependent on local atmospheric conditions even when groundwater is the C-14 source.

WM Descriptor(s): biosphere; carbon 14; environmental exposure pathway; ground disposal; ground water; high-level radioactive wastes; intermediate-level radioactive wastes; radioactive waste disposal; radionuclide migration; soils

Principal Investigator(s):

SHEPPARD, STEPHEN C.

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Organization Type:

Other

Program Duration: From: 1994-1-1 To: 1996-1-1

State of Advancement: Unknown

Sponsoring Organization(s):

CANDU Owners Groupation

Associated Organization(s):

none

Recent publication info:

853

CAN19980004

Title:
Effects of microbes on transport of radionuclides

Title in Original Language:

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 211 - Biological Uptake Mechanisms and Models

Abstract:

Experiments are continuing to investigate radionuclide migration in artificial fractures created from granite thin sections on which biofilms have been grown. These experiments are a part of a study to determine the effects of microbes on the transport of radionuclides in the geosphere. The results to date suggest that the effect of the biofilm on the retardation of 1 3"7Cs 7 5Se and "1"1"3Sn is negligible however this may be due to the limited amount of biofilm that is present in these fractures. Consequently work has started on migration experiments in columns containing crushed rock because in such a medium a larger surface area of geological material is available to serve as substrates for the formation of biofilm. Biofilms are being grown in these columns of crushed rock for future migration experiments.

WM Descriptor(s): bioconversion; cesium 137; geologic fractures; microorganisms; radionuclide migration; retention; rocks; selenium 75; tin 113; underground disposal

Principal Investigator(s):

STROES-GASCOYNE, SIMCHA

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Organization Performing the work:

CANDU OWNERS GROUP

Other Investigators:

Organization Type:

Other

Program Duration: From: 1994-1-1 To: 1996-1-1

State of Advancement: Unknown

Sponsoring Organization(s):

CANDU Owners Groupation

Recent publication info:

854

CAN19980005

Title:
Groundwater flow modelling

Title in Original Language:

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 221 - Environmental Transfer Models

Abstract:

Groundwater flow modelling is being done for a disposal system case study located in the Whiteshell Research Area whose parameters differ significantly from the case study presented in the Environmental Impact Statement. The coupled finite element code MOTIF was used to define the groundwater flow paths for this case study. Once the flow paths were established information was available for GEONET the groundwater flow

model incorporated into the SYVAC systems model. GEONET is an assemblage of one-dimensional pathways. Analysis using MOTIF provided the following information for construction of GEONET: the nodal coordinates of the geosphere transport pathways network segments their physical and chemical properties classification segment permeabilities and hydraulic heads at the nodes. A number of empirical relationships were also established. Other transport properties such as porosities and dispersivities of the GEONET pathways are currently being determined.

WM Descriptor(s): environmental transport; flow models; ground disposal; ground water; m codes; site characterization

Principal Investigator(s):
OPHORI, D.

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Organization Performing the work:
CANDU OWNERS GROUP

Other Investigators:
Melnyk T.; Schier N.; Stevenson D.R.; Khair K.

Organization Type:
Other

Program Duration: From: 1994-1-1 To: 1996-1-1

State of Advancement: Unknown

Sponsoring Organization(s):
CANDU Owners Group

Recent publication info:
855

CAN19980006

Title:
Effects of particle composition and groundwater chemistry on colloid transport

Title in Original Language:

Topic Code(s):
137 -Waste Disposal (including Spent Fuel); 221 - Environmental Transfer Models

Abstract:
A series of migration experiments has been started in a large granite block to investigate the effects of particle composition and groundwater chemistry on colloid transport. Tests will also be carried out to determine whether the density of injected colloidal silica tracers can affect their migration. The effects of flow path geometry will be further investigated to improve our understanding of why colloid migration differs from that of dissolved species. Field-scale migration experiments have also been carried out and may be continued in the future.

WM Descriptor(s): chemical composition; colloids; environmental exposure pathway; environmental transport; granites; ground water; particles; tracer techniques; underground disposal

Principal Investigator(s):
VILKS, PETER

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Organization Performing the work:
CANDU OWNERS GROUP

Other Investigators:
Bachinski D.

Organization Type:
Other

Program Duration: From: 1994-1-1 To: 1996-1-1

State of Advancement: Unknown

Sponsoring Organization(s):

CANDU Owners Group

Recent publication info:

856

CAN19980007

Title:
Natural organics in groundwater from granite and their potential effect on radionuclide transport

Title in Original Language:

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 201 - Dispersion and Migration of Radionuclides

Abstract:

Shallow and deep groundwaters from the Whiteshell Research Area (WRA) are being characterized for their content of natural organics to determine the potential effect of complexation by organics on the migration of radionuclides from a hypothetical high-level nuclear waste disposal vault located within crystalline rock of the Canadian shield. Research has focused on the variation of dissolved organic carbon (DOC) with depth the identification and elimination of sampling artifacts the isolation of organics by absorption chromatography the evaluation of organic complexing capacity by acid-base titrations and the effects of this complexing capacity on radionuclide solubility and sorption.

WM Descriptor(s): complexes; granites; ground water; high-level radioactive wastes; organic matter; radioactive waste disposal; radionuclide migration; site characterization

Principal Investigator(s):

VILKS, PETER

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Organization Performing the work:

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Other Investigators:

Bachinski D.; Ticknor K.

Organization Type:

Other

Program Duration: From: 1994-1-1 To: 1996-1-1

State of Advancement: Unknown

Sponsoring Organization(s):

CANDU Owners Groupation

Recent publication info:

857

CAN19980008

Title:
In situ diffusion in granite

Title in Original Language:

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 221 - Environmental Transfer Models

Abstract:

Of the eight barriers in the Canadian concept for disposal of nuclear fuel waste diffusion through the intact rock of the Waste Exclusion Zone (WEZ) is the most significant retardation mechanism at 10"4 a after closure of the disposal vault. However the input parameters for diffusion in the assessment modelling were obtained from laboratory measurements on drillcore samples rather than from in-situ measurements on intact rock under relevant ambient stress conditions at depth. The scope of this experiment includes the determination of diffusion

parameter values relevant to the expected in-situ conditions in the WEZ of a disposal vault. The work involves the measurements of values for the porosity diffusivity and formation factor in intact granite under the ambient stress conditions at a depth of #approx#440 m in the AECL's Underground Research Laboratory (URL). The in-situ measurements will be supported and calibrated with laboratory measurements on associated granite core samples as well as a program of laboratory experiments to determine diffusion rates in unstressed granite of variable compositions. An additional objective of this work is the development of a site-characterization methodology for the determination of representative diffusion parameter values for intact rock under in-situ stress conditions.

WM Descriptor(s): diffusion; granites; high-level radioactive wastes; laboratories; radioactive waste disposal; site characterization; underground disposal; underground facilities

Principal Investigator(s):

CRAMER, JAN J.

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Organization Performing the work:

CANDU OWNERS GROUP

Other Investigators:

Melnyk T.W.

Organization Type:

Other

Program Duration: From: 1996-1-1 To: 1998-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

CANDU Owners Group

Recent publication info:

858

CAN19980009

Title:

Failure due to heating in rocks

Title in Original Language:

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 323 - Earth Science Studies and Models

Abstract:

The Heated Failure Test (HFT) is being conducted in the Underground Research Laboratory (URL). Its purpose is to: evaluate the excavation disturbed zone created around underground openings study the mechanisms influencing failure establish the controlling factors and study the feasibility of the in-hole waste container emplacement concept. HFT is an investigation of the progression of failure around large-diameter boreholes caused by thermally induced stresses. Tubular heaters are used to raise the temperature of the wall of the observation borehole at mid-height to 850 deg C. Currently the effects of a low (100 kPa) confining pressure on failure in a heated observation hole are being studied. Monitoring instrumentation includes acoustic emission sensors convergence arrays piezometers thermocouples and thermistors.

WM Descriptor(s): boreholes; failures; heating; laboratories; positioning; radioactive waste disposal; rock drilling; underground disposal; underground facilities

Principal Investigator(s):

READ, R.

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Organization Performing the work:

CANDU OWNERS GROUP

Other Investigators:

Organization Type:
Other

Program Duration: From: 1995-1-1 To: 1998-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):
CANDU Owners Group

Recent publication info:
859

CAN19980010

Title:
Evolution of redox in groundwater recharge environments

Title in Original Language:

Topic Code(s):
137 -Waste Disposal (including Spent Fuel); 323 - Earth Science Studies and Models

Abstract:

A multidisciplinary study of the evolution of redox and its controls is being conducted at two locations on the lease area of the Underground research Laboratory (URL) Manitoba Canada. One site is an upland granitic environment with clay overburden cover in lower-lying areas; the other is the area immediately adjacent to the URL shaft where recharge flows rapidly to depth due to drawdown of the water table. Measurements of Eh dissolved O_2 H_2S Fe"2"+ dissolved organic carbon and micro-organism content are being made under different seasonal conditions in groundwaters from several piezometers and borehole zones in these two areas. In addition stable isotopic ("2H 1 8O) compositions of the groundwaters are being used to determine flow rates and penetration depths of recharge. These data will allow rates of change of redox conditions and controlling agents to be determined.

WM Descriptor(s): flow rate; geochemistry; granites; ground water; hydrogen; laboratories; oxygen 18; redox reactions; rock-fluid interactions; underground disposal; underground facilities

Principal Investigator(s):
GASCOYNE, MELVYN

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Organization Performing the work:
AECL RESEARCH WHITESHELL LABORATORIES
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Other Investigators:
Frost L.H.; Thorne G.A.; Stroes-Gascoyne S.; Vilks P.

Organization Type:
Other

Program Duration: From: 1995-6-1 To: 1997-4-1

State of Advancement: Research in progress

Recent publication info:
860

CAN19980011

Title:
Dating fractures and recent movement on faults

Title in Original Language:

Topic Code(s):
137 -Waste Disposal (including Spent Fuel); 322 -

Site Survey and Characterization

Abstract:

Fracture-infilling minerals are being analyzed by uranium-series methods to obtain radiometric ages (on calcites) and indications of recent (<10"6 years) alteration in the granitic Lac du Bonnet Batholith Manitoba Canada. These results will be used together with a review of available radiometric age data on whole rock and high-temperature mineral separates and regional geological studies to determine ages and rates of propagation of fractures. Analysis of fault gouge using electron spin resonance techniques is also being performed to determine whether there has been recent movement on faults in the Lac du Bonnet Batholith.

WM Descriptor(s): age estimation; geochemistry; geologic faults; geologic fractures; minerals; radiometric analysis; regional analysis; underground disposal

Principal Investigator(s):

GASCOYNE, MELVYN

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Organization Performing the work:

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Other Investigators:

Brown A.; Ejeckam R.B.; Everitt R.A.

Organization Type:

Other

Program Duration: From: 1994-1-1 To: 1996-4-1

State of Advancement: Unknown

Sponsoring Organization(s):

AECL; Pinawa MB ROE 1LO Canada

Associated Organization(s):

McMaster University Geological Survey of Canada Hamilton ON Canada

Recent publication info:

861

CAN19980012

Title:

Review of selected hydrogeologic and geophysical characterization methods for intact crystalline rocks

Title in Original Language:

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 322 - Site Survey and Characterization

Abstract:

An evaluation was completed of the ability of borehole hydraulic tests seismic surveys and ground penetrating radar to detect fractures in otherwise massive crystalline rock at depths between 500 and 1 000 metres in the Canadian Shield. The evaluation of three rock characterization methods was made considering the theoretical basis of each method by completion of scoping calculations and from reviews of application and verification case studies in the literature. The study indicates that remote detection of fracture zones and large single fractures is not possible with hydraulic testing. However remote detection of wide fracture zones is possible with both seismic survey and ground penetrating radar methods. These methods have not however been widely developed and demonstrated. Hydraulically significant single fractures and narrow fracture zones remain elusive targets for both methods. The evaluation suggests that such features are not likely to be detectable with available geophysical technology beyond several metres from an underground opening or borehole.

WM Descriptor(s): boreholes; geologic fractures; geophysical surveys; hydraulics; hydrology; radar; rocks; seismic surveys; site characterization

Principal Investigator(s):

RAVEN, K.G.

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Organization Performing the work:

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Other Investigators:

West A.; Annan A.P.; West G.F.

Organization Type:

Other

Program Duration: From: 1992-1-1 To: 1994-4-1

State of Advancement: Unknown

Sponsoring Organization(s):

Raven Beck Environmental Limited; 265 Carling Avenue Suite 208 Ottawa Ontario K1S 2E1 Canada

Associated Organization(s):

Multiview Geoservices Inc. University of Toronto

Recent publication info:

862

CAN19980013

Title:

Survey of geoscientific data on deep underground mines in the Canadian Shield

Title in Original Language:

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 322 - Site Survey and Characterization

Abstract:

Geoscientific data from deep underground mines in the Canadian Shield were compiled reviewed and assessed to identify sites for further geoscientific studies for use in evaluating the Canadian concept for nuclear fuel waste disposal. Data on the geology geochemistry and hydrology from 59 operating mines of depths greater than 500 metres have been assembled. They indicate that zones of ground water flow at depths greater than 500 metres are restricted to major structural discontinuities such as zones with fractures faults and shears. The inflows are typically saline to brine CaCl_2/NaCl waters although inflows of fresh CaNCO_3 waters were also found. Evidence of high pre-mining stresses in massive crystalline rocks was also noted. The investigation indicated that significant amounts of geoscientific data could be obtained from deep mines through on-site inspection mapping and testing. Results from the study are available in a published report.

WM Descriptor(s): geochemistry; geologic structures; geologic surveys; geology; ground water; hydrology; mines; radioactive waste disposal; underground disposal; underground facilities

Principal Investigator(s):

RAVEN, K.G.

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Other Investigators:

Clark I.D.

Organization Type:

Other

Program Duration: From: 1992-9-1 To: 1994-12-1

State of Advancement: Unknown

Sponsoring Organization(s):

Associated Organization(s):

Raven Beck Environmental Limited; 265 Carling Avenue Suite 208 Ottawa Ontario K1S 2E1 Canada

University of Ottawa

Recent publication info:

863

CAN19980014

Title:

Experimental modelling of thermal consolidation effects around a high-level waste repository

Title in Original Language:

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 326 -Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

A test facility was developed for the simulation and study of coupled thermal diffusion and hydraulic transport processes in saturated geomaterials with low permeability. Tests were performed using a synthetic cement-based porous material which possesses permeabilities in the range of dense unfractured sandstones or shales. Specially manufactured pore-pressure transducers were installed within blocks of the test material at locations adjacent to a plane free boundary. The blocks were saturated with water and in that state the plane boundary was heated with a constant temperature heater. The resulting pore-pressures generated and temperature distribution were monitored at various locations in the test blocks. Results from the study are presented in a published report.

WM Descriptor(s): high-level radioactive wastes; hydraulic transport; materials testing; porosity; radioactive waste disposal; sedimentary rocks; thermal diffusion; underground disposal

Principal Investigator(s):

SELVADURAI, A.P.

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Other Investigators:

Organization Type:

Other

Program Duration: From: 1992-1-1 To: 1994-11-1

State of Advancement: Unknown

Sponsoring Organization(s):

Carleton University Department of Civil Engineering; 1125 Colonel By Drive Ottawa Ontario Canada

Recent publication info:

864

Chile

CHI19980001

Title:

Decontamination of acidic uranium solution

Title in Original Language:

Descontaminacion de soluciones acidas de uranio

Topic Code(s):

122 -Liquid Waste Treatment; 132 -Liquid Waste Treatment; 412 -Chemical Decontamination Methods

Abstract:

In order to obtain the necessary parameters for the design of an ion exchange column systems for the treatment of 15 m"3 of liquid effluents that contain uranium in concentration of 70 ppm/ and to obtain a decontaminated liquid (concentration of U: 3 ppm) bench scale experiments have been developed with two columns whose design is based on mobile pieces. Due to the solids content in suspension in the solution to be treated in the columns of 2 l each a fibre filtering of national manufacture REICOTEX No. 3017 has been used to retain the size particles up to 25 #mu#m. For a total volume of 40 l of solution this descendent flow system permits the use of 0.8 l each column of ion exchange resins selective for uranium and a 95% decontamination factor is achieved. Volume reduction of 18 times has been obtained.

WM Descriptor(s): decontamination; inorganic acids; inorganic ion exchangers; ion exchange; liquid wastes; radioactive effluents; separation processes; uranium

Principal Investigator(s):

HIDALGO JORQUERA, OSVALDO

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Organization Performing the work:

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Other Investigators:

Sanhueza Mir A.

Organization Type:

Other

Program Duration: From: 1994-9-1 To: 1996-3-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Comision Chilena de Energia Nuclear Unidad de Gestion de Desechos Radiactivos; Amunategui 95 Santiago Chile

Recent publication info:

865

CHI19980002

Title:

Management for tritium waste arising from users application

Title in Original Language:

Gestion de desecho para tritio producido por aplicaciones de usuarios

Topic Code(s):

112 -Liquid Waste Treatment; 122 -Liquid Waste Treatment; 412 -Chemical Decontamination Methods

Abstract:

The aim of the work is to acquire the technical experience and knowledge to develop the methodology to be implemented for radioactive wastes arising from hospitals and universities. It was started with the characterization of a total volume of 3 m"3 containing tritium. Results indicate that the whole volume in packages containing vial+liquid has a high tritium activity and it can be exempted. Having in mind the public opinion the scheme imposed by Radiological and Environmental Authorities does not accept the release of these wastes under such a way (vial+liquid). To endure the situation the separation of solid and liquid has been planned in a special system designed for these specific wastes. Solid wastes become triturated and liquid is collected in a container separately. After washing the solids are radiologically controlled as to discharge in a landfill. Liquid waste is also controlled and it can be diluted and released provided exemption criteria is

accomplished.

WM Descriptor(s): decontamination; liquid wastes; radioactive effluents; radioactive waste processing; separation processes; solid wastes; tritium

Principal Investigator(s):

SANHUEZA MIR, AZUCENA

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Organization Performing the work:

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UNIDAD GESTION DESECHOS RADIACTIVOS
CASILLA 188-D SANTIAGO DE CHILE CHILE

Other Investigators:

Diaz R.J.; Vega A.

Organization Type:

Other

Program Duration: From: 1995-1-1 To: 1996-7-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Comision Chilena de Energia Nuclear Unidad Gestion Desechos Radiactivos; Casilla 188-D; Santiago Chile

Recent publication info:

866

CHI19980003

Title:

Low level activity and hazardous waste treatment plant

Title in Original Language:

Planta para tratamiento de desechos peligrosos y de baja actividad

Topic Code(s):

112 -Liquid Waste Treatment; 122 -Liquid Waste Treatment; 412 -Chemical Decontamination Methods

Abstract:

The task consists of an adequation of a precipitation plant to treat radioactively decontaminated liquid effluents. The system serves as complement to the Radioactive Waste Processing Plant. Liquid wastes from the uranium recovery research done in some indigenous minerals will be the first waste to be treated in this plant. Different methods to reduce volume of these effluents have bee studied before. Significant reduction volumes cannot be achieved by direct precipitation due to high content of copper iron sulfates phosphates and strong acidity of the solution. These liquid effluents must be previously decontaminated by ion exchange resin selective for U where U content decreases to 3 ppm. The plant designed for batch operation of variable flow is fed by piping from liquid storage facility to the precipitation vessel of 150 liter capacity. The precipitant agent can be transferred by pipeline or manually depending on every operation conditions. Sludge obtained is settled in the vessel then it is sent by gravity to a Denver drum filter 180 liter slurry capacity where liquid is separated from solid. The liquid effluent is chemically controlled as to decide evacuation and solid should be characterized to dispose in landfill according to environmental regulations.

WM Descriptor(s): liquid wastes; low-level radioactive wastes; precipitation; radioactive effluents; radioactive waste processing; separation processes; uranium

Principal Investigator(s):

SANHUEZA MIR, AZUCENA

COMISION CHILENA DE ENERGIA NUCLEAR
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Organization Performing the work:

COMISION CHILENA DE ENERGIA NUCLEAR
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Other Investigators:
Hidalgo Jorquera O.

Organization Type:
Other

Program Duration: From: 1994-6-1 To: 1997-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Comision Chilena de Energia Nuclear Unidad Gestion Desechos Radiactivos; Casilla 188-D; Santiago Chile

Recent publication info:
867

Cuba

CUB19980001

Title:
Technical-economical studies for low and intermediate level radioactive waste disposal system in Cuba

Title in Original Language:
Estudios de factibilidad technico-economico del Sistema de Evacuacion de Desechos Radiactivos de Baja y Media Actividad en Cuba

Topic Code(s):
127 -Waste Disposal

Abstract:
Technical and economical feasibility studies for low and intermediate level radioactive waste disposal in Cuba are being performed according to use. Site selection conceptual design of near surface facility repository package form transportation system and conditioning of radioactive wastes from small producers (medical institutions research laboratories and other industries) are included in these studies. Also future radioactive wastes from the first nuclear power station which is under construction is being considered in this work with its corresponding performance assessment.

WM Descriptor(s): feasibility studies; ground disposal; intermediate-level radioactive wastes; low-level radioactive wastes; packaging; radioactive waste disposal; site selection; transport

Principal Investigator(s):
CHALES SUAREZ, G.

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Organization Performing the work:
NUCLEAR TECHNOLOGY CENTER
CALLE 18 AE/AVE 43 Y 47 PLAYA HABANA CUBA

Other Investigators:
Peralta Vital J.L.; Franklin Saburido R.; Gil Castillo R.; Rodiguez Reyes A.; Fernandez Rondon M.; B

Organization Type:
Other

Program Duration: From: 1990-1-1 To: 1998-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Nuclear Tecnology Center; Calle 18-A e/ ave 43 y 47 Playa Habana Cuba

Associated Organization(s):
Nuclear Energy Agency

Recent publication info:
868

CUB19980002

Title:

Conditioning of Cuban spent sealed sources

Title in Original Language:

Acondicionamiento de las Fuentes Selladas Gastadas Almacenadas

Topic Code(s):

124 -Waste Immobilization; 125 -Waste Packaging; 126 -Waste Storage

Abstract:

Various types of sealed radiation sources are widely used in Cuba in industry, medicine and research. Once the radiation sources are considered spent, the Center for Radiation Protection and Hygiene (the organization responsible for radioactive waste management in Cuba) makes their centralized collection. All spent radiation sources are stored at present in the Cuban Storage Facility. There are more than 2700 spent sources. A strategic programme to define the procedures for conditioning of existing spent sealed sources began in 1996. The research was developed under the Cuban Nuclear Agency Project. Three prototypes of waste packages (conditioned drums) for different kind of radiation sources were prepared in 1997. Prefabricated concrete cubes were used for larger spent sources. As most stored sources are industrial Cs sources, four of them were selected to construct a prototype for a conditioned waste package. A 200-litre drum was prepared with concrete filling. The Cs-137 industrial sources were successively placed into the drum (the limit of activity was previously defined). Cement mortar was then poured over the sources. The prepared package with identification number DA-97-01 contains four sources with a total activity of 310 GBQ. The dose rate was 184 mSv/h at 1m.

WM Descriptor(s): caesium 137; industrial wastes; radiation sources; waste management; waste storage

Principal Investigator(s):

BENITEZ, JUAN CARLOS

CENTER FOR RADIATION PROTECTION AND HYGIENE
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Organization Performing the work:

CENTER FOR RADIATION PROTECTION AND HYGIENE
CIUDAD, LA HABANA 6 CUBA

Other Investigators:

Mercedes Salgado; Luis Jova; Alejandro Hernández; Nivardo Garcia; Oscar Martinez Sandalio Madrazo

Organization Type:

Other

Program Duration: From: 1996-1-1 To: 1998-12-1

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):

Ministry of Science, Technology and Environment

Associated Organization(s):

none

CUB19980003

Title:

Proposed modifications for the Cuban radioactive waste treatment facility

Title in Original Language:

Modificaciones propuestas a realizar en la Planta de Tratamiento de Desechos Radiactivos de Cuba

Topic Code(s):

301 -General Planning and Management; 305 -Design, Construction, Commissioning

Abstract:

In 1990 the Cuban Nuclear Energy Agency established a facility for the treatment of low level wastes (LLW) in Managua (40 km from Havana). About 30 cubic metres of low level liquid wastes could be processed per year using the installed technology. This facility is still not in use mainly because of its over dimensioning for existent and estimated future wastes. So it was necessary to modify the construction and simplify the waste treatment processes. Remodelling of the treatment facility and relocation of the necessary equipment was proposed according to the amount of radioactive wastes (annual volume to be generated), amount and type of accumulated radioactive wastes until 1996, activity and exposure rate of wastes, as well as the treatment and

conditioning systems chosen. That way the New Radioactive Waste Treatment Facility (NRWTF) should be simple, practical and economical. The NRWTF is a building that includes a technological area of 100 m² and a laboratory area with a surface of around 30 m². Other areas to be distinguished inside the proposed treatment facility are: Office, Clothes Change Room, Storage Area for Decay, Reception and Segregation Area. The solid and liquid treatment areas occupy a surface of 25 m². These areas have access and exit doors for materials as well as for the personnel. A concrete mixer and a press are required for the treatment of solid wastes. A hydraulic hoist will perform the transport of 200-litre conditioned containers. The selected technology for liquid conditioning should include a mixer, feed tank, 200-L drums and pump. The ventilation system in the facility, as well as other auxiliary systems (compressed air, water and vacuum), should be modified and adapted to new conditions. The floor and the walls should have an covering that is easy to wash and decontaminate. The modifications to be carried out in the technological area and in the auxiliary systems are simple, reliable and guarantee a rational management of radioactive wastes in Cuba. These aspects were considered in the IAEA Technical Attendance Project CUB/9/010.

WM Descriptor(s): modifications; radioactive waste facilities; radioactive waste management; radioactive waste processing

Principal Investigator(s):

BENITEZ, JUAN CARLOS

CENTER FOR RADIATION PROTECTION AND HYGIENE
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Organization Performing the work:

CENTRO DE PROTECCION E HIGIENE DE LAS RADIACIONES
CALLE 20 ENTRE 41 Y 47 CIUDAD HABANA 11300
CUBA

Other Investigators:

Mercedes Salgado; Luis Jova; Miguel Prendes; Nivardo García; Sandalio Madrazo

Organization Type:

Other

Program Duration: From: 1996-1-1 To: 1998-12-1

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):

IAEA, Cuban Ministry of Science, Technology and Environment

Associated Organization(s):

none

CUB19980004

Title:

Characterization of low level liquid radioactive wastes

Title in Original Language:

Caracterizacion de los Desechos Radiactivos Liquidos de Baja Actividad

Topic Code(s):

109 -Waste Characterisation (Radionuclide Inventory Determination), including Computer Codes and Measuring Methods and Techniques; 180 -WASTE CHARACTERIZATION; 185 -Radionuclide characterization in storage tanks

Abstract:

Around 3m3 of liquid radioactive wastes are accumulated at the storage facility of the Center for Radiation Protection and Hygiene. A research project for conditioning of these wastes is carried out. The first task of this project was the characterization of the liquid wastes. This study comprises the determination of radionuclides, phase (organic or aqueous), pH and sulfate content. More than 100 samples have been analyzed. For gamma emitters, a Gamma Ray Spectrometric system is being used to determine the radionuclide present. A liquid scintillation counter is being used for beta emitters. Based on radionuclides present in wastes and the activity content, it was estimated that around 1 cubic metre of stored wastes could be evacuated. The remainder needs to be conditioned. This study is still in progress. The methodology applied for the characterization of liquid wastes and the results obtained are described in procedures and registered under the quality assurance programme for

radioactive waste management.

WM Descriptor(s): liquid wastes; measuring methods; sulfates; waste characterization; waste management

Principal Investigator(s):
BENITEZ, JUAN CARLOS

CENTER FOR RADIATION PROTECTION AND HYGIENE
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Organization Performing the work:
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Other Investigators:
Danyl Pérez; Leidy González; Mercedes Salgado; Luis Jova; Idelisa Barroso; Sandalio Madrazo

Organization Type:
Other

Program Duration: From: 1996-1-1 To: 1998-12-1

State of Advancement: Unknown

Sponsoring Organization(s):
Ministry of Science, Technology and Environment

Associated Organization(s):
none

CUB19980005

Title:
Conditioning of Cuban spent Ra-226 sealed sources for long term storage

Title in Original Language:
Acondicionarmiento de las Fuentes Selladas Gastadas de Ra-226 para almacenamiento prolongado

Topic Code(s):
124 -Waste Immobilization; 125 -Waste Packaging; 126 -Waste Storage

Abstract:

Similar to other countries, Cuba has made an extensive use of Radium sources in medicine for treatment of cancer tumors. Owing to radiological characteristics (long half-life and decay mode of Ra-226) and physical characteristics of Ra-226 sources, they were replaced with Cs-sources, as it was requested by the IAEA. All spent Ra-226 sources were collected and they are now stored at the Cuban treatment and storage facility. There exists an adequate inventory of these sources. In 1996 the Center for Radiation Protection and Hygiene developed a methodology for conditioning spent radium sources using own resources. The used method is, in principle, similar to the one recommended by the IAEA. The methodology consists of the following steps:
Step 1 - The sources are successively placed in a stainless steel capsule, until the activity in it is around 150 mCi. Then the capsule is sealed using an appropriate closure method (i.e. welding or screw-type cap).
Step 2 - The capsule is introduced into a lead container which is sealed by soldering.
Step 3 - The lead container is placed into a stainless steel cylinder, which is filled up with activated carbon. Three lead containers can be put in one cylinder. The cylinder is sealed by welding or using a screw-type cap.
Step 4 - The cylinder is placed into a pre-cemented 200l drum.
A special package was developed for long term storage and transportation of radium sources. It conforms to the type A specifications described in the IAEA Regulations for the Safe Transport of Radioactive Materials. The adopted criterion for the package design considers that the sources should be kept in a form that must not be readily dispersible and the package should be stored for more than 40 years without any hazard to the operating personnel. The package design includes two containers (barriers) and activated carbon to ensure radiological safety. Up to 500mg of Ra-226 could be accommodated in one package. The methodology, radiological evaluations and procedures for conditioning process were developed during 1996. At the end of that year a prototype of waste package was prepared. Its identification number is DA-96-01. This package contains 118 radium sources with a total activity of 364 mCi.

WM Descriptor(s): containers; radium 226; waste management; waste storage

Principal Investigator(s):

JOVA, LUIS

CENTER FOR RADIATION PROTECTION AND HYGIENE
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Organization Performing the work:

CENTRO DE PROTECCION E HIGIENE DE LAS RADIACIONES
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CUBA

Other Investigators:

Juan Carlos Benitez; Nivardo García; Oscar Martínez; Mercedes Salgado; Alejandro Hernández

Organization Type:

Other

Program Duration: From: 1996-1-1 To: 1996-12-1

State of Advancement: Unknown

Sponsoring Organization(s):

Ministry of Science, Technology and Environment

Associated Organization(s):

none

CUB19980006

Title:

Quality assurance programme for radioactive waste management service

Title in Original Language:

Establecimiento de un Sistema de Garantia de Calidad en el servicio de Gestión de Desechos Radiactivos

Topic Code(s):

102 -Programme Strategy, Planning and Management; 106 -Quality Assurance Aspects

Abstract:

A quality assurance programme is an important requirement of the IAEA's safety standards on Establishing a National System for Radioactive Waste Management. The objective of this programme is to develop planned and systematic actions to provide adequate confidence that the processes involved and the entire system will satisfy given requirements for quality. The Cuban integral policy of nuclear development is entrusted to the Nuclear Energy Agency of the Ministry of Science Technology and Environment (CITMA). The Center for Radiation Protection and Hygiene (CPHR) is in charge of waste management policy. Radioactive waste management service comprises the centralized collection, transportation, segregation and temporary storage of radioactive waste. These activities are performed by CPHR, so it is responsible for establishing and implementing a quality assurance programme in all these phases of radioactive waste management. The procedures for these operations and the inventory system to register radioactive waste and control the performed activities have been developed and implemented. The programme also considers other aspects necessary to guarantee and demonstrate that the required quality has been achieved. For this purpose a research project is carried out.

WM Descriptor(s): planning; quality assurance; radioactive waste management

Principal Investigator(s):

SALGADO, MERCEDES

CENTER FOR RADIATION PROTECTION AND HYGIENE
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CIUDAD HABANA

Organization Performing the work:

CENTRO DE PROTECCION E HIGIENE DE LAS RADIACIONES
CALLE 20 ENTRE 41 Y 47 CIUDAD HABANA 11300
CUBA

Other Investigators:

Juan Carlos Benítez; Isis Fernández; Luis Jova; Mariela Marrero; Miguel Prendes

Organization Type:

Other

Program Duration: From: 1997-1-1 To: 1998-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Cuban Ministry of Science, Technology and Environment

Associated Organization(s):
none

CUB19980007

Title:
Radiological characterization of unknown spent sealed sources

Title in Original Language:
Caracterización Radiológica de las Fuentes Selladas en Dususo Desconocidas

Topic Code(s):
109 -Waste Characterisation (Radionuclide Inventory Determination), including Computer Codes and Measuring Methods and Techniques; 180 -WASTE CHARACTERIZATION; 185 -Radionuclide characterization in storage tanks

Abstract:

Different sealed radiation sources are widely used in Cuba in industry, medicine and research. Once the radiation sources are no longer suitable for their original purpose or further use they become spent radiation sources. In this case, the users have to transfer the source to the Center for Radiation Protection and Hygiene (CPHR), which is responsible for the management of radioactive waste in Cuba. At present more than 2700 spent radiation sources are collected and stored in the centralized storage facility of CPHR. The radiological characteristics of around 200 of these sources are unknown, although they are well registered in the national waste management inventory and in the control system of the storage facility. The study for characterization of these sources includes the determination of radionuclides, activity, identification number and the type of source. The absence of external contamination was verified, the dose rate was measured, and the spectrum of each source was analyzed. For this purpose two gamma ray spectrometric systems were used, one of them portable. The methodology applied for identification and characterization of the sources, as well as the results obtained, are described in procedures and registered under the quality assurance programme in radioactive waste management.

WM Descriptor(s): detection; industrial wastes; measuring methods; radiation sources; waste characterization; waste management; waste storage

Principal Investigator(s):
BENITEZ, JUAN CARLOS

CENTER FOR RADIATION PROTECTION AND HYGIENE
PC. 10600
CIUDAD HABANA

Organization Performing the work:
CENTRO DE PROTECCION E HIGIENE DE LAS RADIACIONES
CALLE 20 ENTRE 41 Y 47 CIUDAD HABANA 11300
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Other Investigators:
Leidy González; Danyl Pérez; Mercedes Salgado; Luis Jova

Organization Type:
Other

Program Duration: From: 1996-1-1 To: 1998-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Ministry of Science, Technology and Environment

Associated Organization(s):
none

CUB19980008

Title:

Safety analysis for Cuban long term storage facility

Title in Original Language:

Análisis de Seguridad de la Instalación de Almacenamiento Prolongado de Desechos Acondicionados

Topic Code(s):

200 -ENVIRONMENTAL IMPACT/ASSESSMENT; 304 -Safety Assessment and Performance Studies

Abstract:

The Cuban radioactive waste storage facility is constructed as an earth-covered mound above the original ground surface. The storage design includes the use of engineered barriers, according to the site-specific conditions. The facility is a concrete building with two compartments (21m x 6m x 4.5m). It has been in operation receiving radioactive wastes since 1985. Up to date radioactive wastes and spent sealed sources have been collected and stored in the facility without conditioning. The conditioning process of stored wastes began at the end of 1996. The Cuban nuclear programme will generate approximately 120 cubic metres of conditioned wastes (waste packages including matrix and container for disposal) at the end of 2030. According to the storage capacity and an optimal distribution of these waste packages, the storage facility will be filled in that year. Most conditioned wastes, in terms of activity content and volume will be spent sealed sources. As no final repository to receive radioactive wastes generated in the country has been defined, the existing storage facility will operate as a "long term" storage facility of conditioned wastes. Because of that, the long term safety of this facility has to be evaluated. For this reason, a new research project will begin next year (1999) and it will conclude at the end of 2001. Some aspects relating to the site characteristics (geography meteorology, climatology, geology, hydrology), Facility Design, Construction, Operational Aspects, Radionuclide release under normal and unusual operation conditions, the assessment of impacts and the long term stability will be detailed studied and evaluated. Finally a safety analysis report (SAR) will be prepared according to the IAEA recommendations.

WM Descriptor(s): environmental impacts; radioactive waste disposal; radioactive waste facilities; radioactive waste storage; safety analysis; site characterization; waste management

Principal Investigator(s):

BENITEZ, JUAN CARLOS

CENTER FOR RADIATION PROTECTION AND HYGIENE
PC. 10600
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Organization Performing the work:

CENTRO DE PROTECCION E HIGIENE DE LAS RADIACIONES
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CUBA

Other Investigators:

Reynaldo Gil; José Luis Peralta; Ricardo Franklin; Mercedes Salgado; Nestor Cornejo; Luis Jova

Organization Type:

Other

Program Duration: From: 1999-1-1 To: 2001-12-1

State of Advancement: Research planned

Sponsoring Organization(s):

Ministry of Science, Technology and Environment

Associated Organization(s):

Cuban Center of Nuclear Technology

CUB19980009

Title:

Establishment of requirements and methods for low level waste package acceptability

Title in Original Language:

Establecimiento de los Criterios de Aceptacion para Bultos de Desechos Acondicionados y de los Metodos de Control de los mismos

Topic Code(s):

125 -Waste Packaging; 126 -Waste Storage; 127 -Waste Disposal

Abstract:

Radioactive wastes in Cuba are generated by radioisotope applications in medicine, research and industry and by labeled compound production. A considerable amount of solid and liquid radioactive wastes and spent sealed sources are stored at present at Cuban radioactive waste storage facility. At end of 1998 general procedures and instructions for conditioning of these wastes will be established. As a disposal strategy has not yet been defined, radioactive wastes will be packaged for interim storage. Such conditioned wastes include those awaiting further disposition. A new research project related to the establishment of general acceptance criteria for long term storage of conditioned low and intermediate level radioactive wastes should begin next year (1999). The Center for Radiation Protection and Hygiene (CPHR), in conjunction with the national regulatory authority, is responsible for the establishment of these criteria. To avoid the radiological and economic impacts of unnecessary reconditioning, waste conditioning strategies have to consider the requirements for long term storage and further transportation. Development of waste acceptance criteria should be carried out in parallel with the development of safety analysis of Cuban long term storage facility. The selection of criteria is based on the properties to be assessed. Some aspects, such as waste and container characteristics and properties, treatment and conditioning process and long term storage conditions have to be detailed, identified, studied, controlled and documented. Some important parameters of waste packages, such as mechanical strength, resistance to impact, radiation stability, chemical durability, fire resistance and containment, should be demonstrated and assessed.

WM Descriptor(s): mechanical properties; packaging; radioactive waste management; radioactive waste storage; stability; waste characterization

Principal Investigator(s):

BENITEZ, JUAN CARLOS

CENTER FOR RADIATION PROTECTION AND HYGIENE
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CIUDAD HABANA

Organization Performing the work:

CENTRO DE PROTECCION E HIGIENE DE LAS RADIACIONES
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Other Investigators:

Mercedes Salgado; Luis Jova; Nivardo García; Sandalio Madrazo; Isis Fernandez; Miguel Prendes

Organization Type:

Other

Program Duration: From: 1999-1-1 To: 2001-12-1

State of Advancement: Research planned

Sponsoring Organization(s):

Cuban Ministry of Science, Technology and Environment

Associated Organization(s):

none

Czech Republic

CZR19980001

Title:

Treatment of biological radioactive wastes

Title in Original Language:

Topic Code(s):

123 -Solid Waste Treatment; 167 -Waste Disposal

Abstract:

The study is a continuation of previous works carried out by the former Institute for Research Production and Utilization of Radioisotopes (presently named NYCOM) Prague Czech Republic in the area of management of radioactive waste originating from biological and medical research and applications. Incineration of these waste streams was accomplished in a facility produced in the Czech Republic for combustion of burnable radioactive and non-radioactive residues. During the period of our research contract the facility located in a biological

research center in Prague was operated in batch to incinerate accumulated combustible waste. At these occasions additional tests were carried out with the aim to optimize operation conditions. In addition potential abnormal operation conditions were evaluated and their consequences assessed. To ensure proper further handling with the resulting ash three conditioning options were studied the bituminization process incorporation into cement and embedding of ash into a mixture of bituminous and cementitious materials. As most stringent regulations for sanitary landfill facilities are in force at present in the Czech Republic a near-surface repository was considered as a viable option for final disposal of the resulting product.

WM Descriptor(s): biological wastes; bitumens; ground disposal; incinerators; low-level radioactive wastes; radioactive waste processing; solidification; waste processing plants

Principal Investigator(s):

HOLUB, JAN

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CZ-102 27
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10

Organization Performing the work:

NYCOM A.S.
RADIOVA 1 CZ-102 27 PRAGUE CZECH REPUBLIC

Other Investigators:

Janu M.; Dlouhy Z.

Organization Type:

Other

Program Duration: From: 1994-3-1 To: 1996-11-1

State of Advancement: Research in progress

Sponsoring Organization(s):

NYCOM Radiova 1 Prague 10

Recent publication info:

869

CZR19980002

Title:

Composite absorbers and their use in treatment of liquid radioactive and toxic wastes

Title in Original Language:

Topic Code(s):

112 -Liquid Waste Treatment; 132 -Liquid Waste Treatment; 162 -Liquid Waste Treatment

Abstract:

Composite absorbers consisting of inorganic ion-exchanger incorporated into polyacrylonitrile (PAN) binding matrix were developed. Use of PAN matrix allows to shape powdered inorganic components in the form applicable in columns. The binding polymer was proved to be sufficiently stable in media ranging from 1M alkalies to 1M mineral acids and up to ionizing radiation dose of 10E6 Gy. Some 20 absorbers of various inorganic components have been prepared by now. There is a broad variety of radionuclides that can be separated if suitable inorganic exchanger is used. Main attention is paid to applications of composite absorbers in the treatment of liquid radioactive and toxic wastes. The most important results are: - Nickel hexacyanoferrate-PAN absorber (NiFC-PAN) was prepared for full scale separation of CS-137 from the long term fuel storage pond water at Jaslovske Bohunice (Slovakia). - NiFC-PAN was used for treatment of some 50 cubic metres underground water contaminated with radiocaesium at Grimsel Test Site (Switzerland). - Spent composite absorbers can be safely solidified either by cementation or vitrification prior their final disposal.

WM Descriptor(s): adsorbents; binders; composite materials; inorganic ion exchangers; liquid wastes; nonradioactive wastes; organic polymers; radioactive waste processing; toxic materials

Principal Investigator(s):

SEBESTA, F.

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Organization Performing the work:

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Other Investigators:

John J.; Motl A.

Organization Type:

Other

Program Duration: From: 1994-1-1 To: 1996-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Czech Technical University in Prague Faculty of Nuclear Sciences and Physical Engineering; Brehova 7 11519 Prague 1 Czech Republic

Associated Organization(s):

none

Recent publication info:

870

European Union

CEC19980001

Title:

R and D programme 'Nuclear Fission Safety' 1994-1998 - Area C: radioactive management and disposal and decommissioning

Title in Original Language:

Topic Code(s):

102 -Programme Strategy, Planning and Management; 304 -Safety Assessment and Performance Studies; 401 -D&D Programme Strategy, Planning and Management

Abstract:

The Euratom R and D programme 'Nuclear Fission Safety' (1994-1998) contains i.a. the principal R and D subjects and objectives of the two previous programme lines on 'Management and Disposal of Radioactive Waste' and 'Decommissioning of Nuclear Installations'. As its predecessors the programme is conducted through cost-sharing contracts with research organizations in the EU. Part C of the Programme covers: long-term safety of deep geological disposal waste minimization characterization of waste forms and matrices Quality Assurance for waste packages geometrical behaviour of engineered barriers and host rocks gas generation and transport RN migration studies and models natural analogues palehydrogeology and geoforecasting; the activities in the field of decommissioning include the development of dismantling techniques and the collection of relevant data in the data bases DB-TOOLS and DB-COST.

WM Descriptor(s): coordinated research programs; decommissioning; radioactive waste disposal; radioactive waste processing; radionuclide migration; reactor dismantling; safety; underground disposal; waste forms

Principal Investigator(s):

SIMON, RAINER

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Organization Performing the work:

EUROPEAN COMMISSION
RUE DE LA LOI, 200 B-1049 BRUSSELS BELGIUM

Other Investigators:

Haijtink B.; Hugon M.; McMenamin T.; Pflugrad K.; von Maravic H.

Organization Type:

Other

Program Duration: From: 1994-1-1 To: 1998-12-31

State of Advancement: Research in progress

Sponsoring Organization(s):

European Commission; Rue de la Loi 200 B-1049 Brussels Belgium

Associated Organization(s):

Numerous organizations within the EU

Recent publication info:

871

CEC19980002

Title:

Quality control of nuclear waste packages and waste forms

Title in Original Language:

Topic Code(s):

106 -Quality Assurance Aspects; 135 -Waste Packaging (Canister Types, Materials, Corrosion Studies)

Abstract:

Research actions on quality control of nuclear waste packages and waste forms are part of the European Commission's research programme on Nuclear Fission Safety (1994-1998). They mainly cover: a round robin test for non-destructive assays of 200L radioactive waste packages; the improvement of localisation and quantification of neutron emitters in waste packages by passive and active neutron assay techniques; the development of fast simple and standardized chemical analytical techniques for destructive radioactive waste control; the characterization of accessible surface area of HLW glass monoliths by high energy accelerator tomography. A 'European Network of Testing Facilities for the Quality Checking of Radioactive Waste Packages' has been created on the initiative of the Commission. At present five working groups have been set up on: non-destructive testing-gamma measurements measurement of volatile releases from waste packages Quality Assurance and Quality Control procedures neutron assay for waste packages chemical and radiochemical destructive analyses.

WM Descriptor(s): chemical analysis; coordinated research programs; materials testing; packaging; quality assurance; quality control; radioactive waste disposal; waste forms

Principal Investigator(s):

Hugon, M.
EUROPEAN COMMISSION
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BRUXELLES

Organization Performing the work:

EUROPEAN COMMISSION
200, RUE DE LA LOI B-1049 BRUXELLES BELGIUM

Other Investigators:

McMenamin T.

Organization Type:

Other

Program Duration: From: 1996-1-1 To: 1998-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):
European Commission; (T-61 0/27) Rue de la Loi 200 B-1049 Brussels Belgium

Associated Organization(s):
Various research organisations in the Member States of the European Union

Recent publication info:

872

CEC19980003

Title:
Characterization of waste forms and matrices

Title in Original Language:

Topic Code(s):
144 -Spent Fuel Immobilization/Conditioning; 182 - Waste from form characterization

Abstract:

The behaviour of the waste forms and matrices under the conditions encountered in an underground repository controls the release of the radionuclides and affects the source term for their possible migration through the subsequent engineered barriers. Within the framework of the European Commission's R and D programme on 'Nuclear Fission Safety' multi-partner studies are contributing to the understanding of these phenomena. These studies involve: experimental investigations and development of models to quantitatively evaluate the disposal safety of nuclear waste glass and deep underground facilities; the quantification of processes controlling long-term dissolution/alteration of spent fuel and the associated radionuclide release under conditions which might prevail in underground repositories in granite salt or clay formations; the evaluation of corrosion mechanisms of selected metallic packaging materials for long-lived HLW/spent fuel disposal containers.

WM Descriptor(s): containers; coordinated research programs; glass; high-level radioactive wastes; radioactive waste disposal; radionuclide migration; safety; spent fuels; underground disposal; waste forms

Principal Investigator(s):
MCMENAMIN, T.

EUROPEAN COMMISSION
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Organization Performing the work:
EUROPEAN COMMISSION
RUE DE LA LOI, 200 B-1049 BRUSSELS BELGIUM

Other Investigators:
Hugon M.

Organization Type:
Other

Program Duration: From: 1996-1-1 To: 1998-12-1

State of Advancement: Research planned

Sponsoring Organization(s):
European Commission; Rue de la Loi 200 B-1049 Brussels Belgium

Associated Organization(s):
From E F SE DE ES

Recent publication info:

873

CEC19980004

Title:
Waste volume minimization and partitioning experiments

Title in Original Language:

Topic Code(s):

105 -Waste Minimisation; 412 -Chemical Decontamination Methods

Abstract:

Waste volume minimization and partitioning techniques are topics investigated under the European Commission (CEC) research programme on Nuclear Fission Safety (1994-1998). At present the EC is partly financing four projects: continuation of the demonstration of a mobile wet oxidation pilot plant to treat radioactive waste containing organics; development of novel highly selective inorganic crystalline ion exchange materials for the decontamination of aqueous nuclear waste effluents; synthesis of extractants based on calixarene and crown ether derivatives selective to strontium actinides and lanthanides and actinides only; process development for the separation of minor actinides from very acidic aqueous solutions containing high level waste.

WM Descriptor(s): actinides; coordinated research programs; decontamination; inorganic ion exchangers; liquid wastes; minimization; oxidation; radioactive effluents; radioactive waste processing; rare earths; separation processes; strontium

Principal Investigator(s):

Hugon, M.
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Organization Performing the work:

EUROPEAN COMMISSION
RUE DE LA LOI, 200 B-1049 BRUSSELS BELGIUM

Other Investigators:

Organization Type:

Other

Program Duration: From: 1996-1-1 To: 1998-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

European Commission; Rue de la Loi 200 B-1049 Brussels Belgium

Associated Organization(s):

Various research organisations in the Member States of the European Union

Recent publication info:

874

CEC19980005

Title:

New fuel cycle concepts

Title in Original Language:

Topic Code(s):

800 -Actinide & Transmutation Studies

Abstract:

New fuel cycle concepts are investigated in the framework of the European Commission's Nuclear Fission Safety Research Programme (1994-1998). Multipartner projects on strategy studies are covering such topics as: assessment of possible partitioning and transmutation scenarios (technical feasibility of partitioning target fabrication and transmutation techniques impact of geological barriers); nuclear data working libraries update for scenarios aiming at reducing waste toxicity in MOX recycling schemes; assessment of the thorium fuel cycle to limit nuclear waste production and to burn waste; system studies on accelerator-driven hybrid systems including accelerator technology basic nuclear data and fuel cycle radiotoxicity. A target of "2"4"1Am embedded in an inert matrix will be irradiated in the High Flux Reactor at Petten.

WM Descriptor(s): americium 241; coordinated research programs; fuel cycle; nuclear data collections; partition; sample preparation; systems analysis; transmutation

Principal Investigator(s):

Hugon, M.
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Organization Performing the work:

EUROPEAN COMMISSION
RUE DE LA LOI, 200 B-1049 BRUSSELS BELGIUM

Other Investigators:

Organization Type:

Other

Program Duration: From: 1996-1-1 To: 1998-12-1

State of Advancement: Unknown

Sponsoring Organization(s):

European Commission; Rue de la Loi 200 B-1049 Brussels Belgium

Associated Organization(s):

Various research organisations in the Member States of the European Union

Recent publication info:

875

CEC19980006

Title:

Radionuclide migration in geological environments

Title in Original Language:

Topic Code(s):

201 -Dispersion and Migration of Radionuclides;
322 -Site Survey and Characterization

Abstract:

Investigations on radionuclide migration through geological environments (crystalline and sedimentary rocks) are devoted to real or analogue sites. Studies will be performed in order to obtain reliable information and data on migration processes and parameters which can be used for performance assessment with a view to increase confidence in verification and testing of flow and geochemical transport models considering also uncertainty and sensitivity analyses. Currently the Commission is supporting under this topic within its R and D programme on 'Nuclear Fission Safety' in the area C2.4 and C3.6 three multinational projects: - TRANCOM Clay: Investigating the migration of the organic matter on the migration of RN in the Boom clay formation at the Mol site. It will consist mainly in laboratory and in situ experiments and modelling of the results. - GESAMAC: To tackle areas of uncertainties and develop some conceptual methodological and computational tools which can be used in actual safety analysis. - CARESS: Investigating the critical impact of colloids upon the transport and retention of RN in the geosphere and its consideration in safety assessment calculations.

WM Descriptor(s): clays; coordinated research programs; geochemistry; igneous rocks; organic matter; radionuclide migration; safety; sedimentary rocks

Principal Investigator(s):

VON MARAVIC, H.

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Organization Performing the work:

EUROPEAN COMMISSION
RUE DE LA LOI, 200 B-1049 BRUSSELS BELGIUM

Other Investigators:

Organization Type:

Other

Program Duration: From: 1996-1-1 To: 1998-12-31

State of Advancement: Unknown

Sponsoring Organization(s):

Associated Organization(s):

European Commission; Rue de la Loi 200 B-1049 Brussels Belgium

Numerous organizations from B D E F IT SE UK

Recent publication info:

876

CEC19980007

Title:
Gas generation and gas transport in radioactive waste repositories

Title in Original Language:

Topic Code(s):

203 -Gas Diffusion Studies; 326 -Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

Gas generation and transport in radioactive waste repositories is the subject of Research project C3.5 of the European Commission's R and D programme on Nuclear Fission Safety. As a follow-up of the previous PEGASUS project the Commission is now supporting the project PROGRESS which consists in two subprojects. First GASGEN: Gas generation in radioactive waste repositories. Here research consists of a large gas generation experiment to be carried out in the Olkiluoto research tunnel (Finland). Moreover studies will be performed to investigate correlation between gas generation and waste characteristics. Second GAMERS: Gas migration in European repository systems. Within this subproject laboratory investigations and in-situ gas injection tests will be carried out to study the migration of gas through low permeable fractured hard rock salt and clay.

WM Descriptor(s): gas flow; gaseous diffusion; gases; permeability; radioactive waste disposal; underground disposal; waste-rock interactions

Principal Investigator(s):

HAIJTINK, BERT
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Organization Performing the work:

EUROPEAN COMMISSION
RUE DE LA LOI, 200 B-1049 BRUSSELS BELGIUM

Other Investigators:

Organization Type:

Other

Program Duration: From: 1996-4-1 To: 1998-12-31

State of Advancement: Research in progress

Sponsoring Organization(s):

European Commission; Rue de la Loi 200 B-1049 Brussels Belgium

Associated Organization(s):

Numerous organisations from B D E FIN IT UK

Recent publication info:

877

CEC19980008

Title:
Modelling of geomechanical behaviour of engineered barrier materials

Title in Original Language:

Topic Code(s):

303 -Earth Science Models and Studies; 306 -Barrier Studies and Tests

Abstract:

Modelling of geomechanical behaviour of engineered barrier materials is the subject of Research project C3.4

of the European Commissions R and D programme on Nuclear Fission Safety. Currently the Commission is supporting two international benchmark exercises: CATSIUS CLAY: Calculation and testing of behaviour of unsaturated clays. Three different stages are foreseen resp. one verification exercise on theoretical problems and two validation exercises on laboratory scale tests and in-situ tests. CSCS: Comparative Study on Crushed Salt. This benchmark exercise will be performed for a validation and qualification of the constitutive models developed on crushed salt behaviour. The exercise will further comprise comparative analysis of different user models. It will be performed in three stages like CATSIUS-CLAY above.

WM Descriptor(s): benchmarks; clays; coordinated research programs; geologic models; geology; mechanics; radioactive waste disposal; salts

Principal Investigator(s):

HAIJTINK, BERT
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Organization Performing the work:

EUROPEAN COMMISSION
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Other Investigators:

Organization Type:

Other

Program Duration: From: 1996-1-1 To: 1998-12-31

State of Advancement: Research in progress

Sponsoring Organization(s):

European Commission; Rue de la Loi 200 B-1049 Brussels Belgium

Associated Organization(s):

Numerous organisations from B D E F IT NL SE UK

Recent publication info:

878

CEC19980009

Title:

Safety aspects of waste disposal. Spent fuel performance assessment

Title in Original Language:

Topic Code(s):

140 -SPENT FUEL; 324 -Safety Assessment and Performance Studies

Abstract:

Direct disposal of spent fuel has recently become an alternative to reprocessing of waste and has found interest in some Member States of the European Union. Considering this situation and to develop a consensus on the possible approaches and methodological aspects for evaluating the safety of spent fuel disposal the subject of the research project under C1.1 of the European Commission R and D programme on 'Nuclear Fission Safety' (1994-1998) is to address in the frame of the spent fuel performance assessment project various items such as: review policies packaging plans and repository designs for spent fuel in clay crystalline rock and salt formations; develop models for the simulation of processes in the near field of the spent fuel repository; evaluate the performance and safety of different disposal concepts by carrying out total system performance analyses on spent fuel disposal in clay crystalline rock and salt formations including uncertainty and sensitivity analyses.

WM Descriptor(s): clays; evaluation; igneous rocks; performance; radioactive waste disposal; safety; salt deposits; spent fuels; underground disposal

Principal Investigator(s):

VON MARAVIC, H.

DG XII/F5 EUROPEAN COMMISSION
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Organization Performing the work:

EUROPEAN COMMISSION
RUE DE LA LOI, 200 B-1049 BRUSSELS BELGIUM

Other Investigators:

Organization Type:

Other

Program Duration: From: 1996-1-1 To: 1999-1-1

State of Advancement: Research planned

Sponsoring Organization(s):

European Commission; Rue de la Loi 200 B-1049 Brussels Belgium

Associated Organization(s):

from B D E FIN NL

Recent publication info:

879

CEC19980010

Title:

Field tests in underground research laboratories

Title in Original Language:

Topic Code(s):

326 -Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

Large in-situ tests in underground research laboratories (URL) are the subject of Research project C2 of the European Commission's R and D programme on Nuclear Fission Safety. Currently the Commission is supporting research in three URLs. The Asse salt mine in Germany where research in concentrated on investigation of the behaviour of crushed salt used as backfill material in waste emplacement drifts and boreholes; geotechnical measurements will be performed in the crushed salt as well as investigations on gas permeability. The HADES facility in the Boom clay layer beneath Mol (Belgium) with the projects CERBERUS a combined heating/radiation test to study the effect of heat and radiation on clay and the project RESEAL a large demonstration test on backfilling and sealing of a shaft in clay. The Grimsel Fels Labor (Switzerland) where a full scale experiment (FEBEX) is being implemented to demonstrate the feasability of handling and construction of the engineering barrier components (mainly highly compacted bentonite) of the spanish disposal concept in crystalline host rock. Moreover the thermo-hydro-mechanical processes in the near field will be investigated.

WM Descriptor(s): coordinated research programs; geologic structures; laboratories; radioactive waste disposal; site characterization; underground disposal; underground facilities

Principal Investigator(s):

HAIJTINK, BERT
EUROPEAN COMMISSION
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Organization Performing the work:

EUROPEAN COMMISSION
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Other Investigators:

Organization Type:

Other

Program Duration: From: 1996-1-1 To: 1998-12-31

State of Advancement: Research in progress

Sponsoring Organization(s):

European Commission; Rue de la Loi 200 B-1049 Brussels Belgium

Associated Organization(s):

Numerous organizations from B D E F NL CH

Recent publication info:

880

CEC19980011

Title:

Natural analogue studies

Title in Original Language:

Topic Code(s):

201 -Dispersion and Migration of Radionuclides;
328 -Natural Analogue Studies

Abstract:

Qualification and quantification of specific radionuclide/element release transport and retardation processes along the migration pathway in its time and spatial evolution and the thermo-hydro-mechanical and chemico-mineralogical response of clay formation is the subject of research project of area 3.7 of the European Commission R and D programme on 'Nuclear Fission Safety'. Currently the Commission is supporting three multinational projects: The Palmottu U-Th ore deposit S-Finland provides an analogue site to study the transport of RN from the ore deposits along one or more defined GW pathways in the fractured crystalline rock to develop and to test models used in PA; The Oklo NA project (Gabon W-Africa) focuses on a quantitative assessment of processes of RN migration/retention within the Oklo basin to provide data for repository PA models whereby near field far field and overall PA aspects will be considered; The NA study on the behaviour of clay under increased thermal gradients from the view of geomechanical and chemico-mineralogical alteration will be focusing on sites at Orciatico (I) and Island of Skye (UK).

WM Descriptor(s): clays; environmental exposure pathway; natural analogue; radioactive waste disposal; radionuclide migration; site characterization

Principal Investigator(s):

VON MARAVIC, H.

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Organization Performing the work:

EUROPEAN COMMISSION
RUE DE LA LOI, 200 B-1049 BRUSSELS BELGIUM

Other Investigators:

Organization Type:

Other

Program Duration: From: 1996-1-1 To: 1998-12-31

State of Advancement: Research in progress

Sponsoring Organization(s):

European Commission Rue de la Loi 200 B-1049 Brussels Belgium

Associated Organization(s):

Numerous organizations from: E F FIN IT SE UK

Recent publication info:

881

CEC19980012

Title:

R and D programme 'Nuclear Fission Safety' 1994-1998 - Topic C.4: Decommissioning of nuclear installations

Title in Original Language:

Topic Code(s):

102 -Programme Strategy, Planning and Management; 401 -D&D Programme Strategy, Planning and Management

Abstract:

With the Euratom 'Nuclear Fission Safety Programme' the shared-cost action on decommissioning of Nuclear Facilities aims at the development of the necessary technology and the collection and processing of relevant data. The three research tasks are: 1.Innovative dismantling techniques: development and demonstration of dismantling techniques for LWR pressure vessels at KRB-A (Gundremmingen) BR3 (Mol) and EWN (Greifswald); testing and evaluation of advanced cutting tools (LSI CAMC and Nd-YAG Laser; remote dismantling techniques applied to a graphite/gas reactor the WAGR (Windscale); 2.Collection and processing of technological performance data: further development of the EC-DB-TOOL data base; Data base for Specific Waste Arisings Doses and Costs of Decommissioning: 3.Collection and processing of data in EC-DB-COST.

WM Descriptor(s): coordinated research programs; cost; cutting tools; data processing; information systems; nuclear facilities; reactor decommissioning; reactor dismantling

Principal Investigator(s):

PFLUGRAD, K.

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Organization Performing the work:

EUROPEAN COMMISSION
RUE DE LA LOI, 200 B-1049 BRUSSELS BELGIUM

Other Investigators:

Bisci R.; Wampach R.; Simon R.

Organization Type:

Other

Program Duration: From: 1994-1-1 To: 1998-12-31

State of Advancement: Research in progress

Sponsoring Organization(s):

European Commission Rue de la Loi 200 B-1049 Brussels Belgium

Associated Organization(s):

Numerous organizations within the EU

Recent publication info:

882

Finland

FIN19980001

Title:
Safety and costs of nuclear waste management

Title in Original Language:

Ydinjatehuollon turvallisuus ja kustannukset

Topic Code(s):

104 -Database & Information Systems, including Technology Transfer Systems. Technical Assistance and Costs; 137 -Waste Disposal (including Spent Fuel); 324 -Safety Assessment and Performance Studies

Abstract:

The general objective of the studies in this field at VIT Energy is to develop expertise in safety and cost assessments of nuclear waste management for the needs of Finnish authorities. The specific aims include: (1) Reduction of the conceptual uncertainties associated with safety assessments of the final disposal of nuclear waste; development and validation of assessment models form the bulk of the work. (2) Participation in the Performance Assessment Advisory Group of OECD/NEA. (3) Coordination of the migration related tasks within the international natural analogue project at the Finnish Palmottu site with special emphasis on the

conceptual understanding of rock matrix diffusion in-situ and the PA-relevant conclusions. (4) Participation in the planning of experiments and the interpretation of the results achieved in laboratory-scale migration studies in co-operation with the University of Helsinki and the University of Jyvaskyla. (5) Site evaluation research aims at developing and applying knowledge on modelling the phenomena related to groundwater flow in fractured crystalline rock in view of their relevance to the safety of final disposal of nuclear wastes. The model development efforts are directed to increase the capabilities of the finite element based methodology (FEFLOW) and to handle flow situations coupled to other phenomena such as heat generation and occurrence of saline water layers in the bedrock. One application area is the modelling of the groundwater flow around the Palmottu site. (6) Improvement of knowledge on assessing the costs of nuclear waste management and in particular quantifying the uncertainties. (7) VIT Energy coordinates the Publicity Administrated Nuclear Waste Management Research Programme (JYT) with the aim to concretize the general objectives of the programme in view of the general guidance on the primary aims defined by the authorities funding the research programme.

WM Descriptor(s): cost; geologic models; radioactive waste disposal; radioactive waste processing; risk assessment; safety; safety analysis; site characterization

Principal Investigator(s):

RASILAINEN, K.

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Organization Performing the work:

VIT ENERGY NUCLEAR ENERGY
TEKNIIKANTIE 4C, P.O. BOX 1604 FIN-02040 ESPOO
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Other Investigators:

Vieno T.; Hautojarvi A.; Nordman H.; Koskinen L.; Poteri A.; Lehtila A.

Organization Type:

Other

Program Duration: From: 1994-1-1 To: 1996-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

VIT Energy Nuclear Energy (Tekniikantie 4 C Espoo); P.O.Box 1604 FIN-02044 VIT Finland

Associated Organization(s):

Institutes participating in JYT programme

Recent publication info:

883

FIN19980002

Title:

Groundwater flow modelling in site investigations

Title in Original Language:

Pohjavesivirtausten mallinnus paikkatutkimuksissa

Topic Code(s):

303 -Earth Science Models and Studies

Abstract:

The objective of the studies in this field at VIT Energy is to develop expertise in the numerical groundwater flow modeling for the needs of site investigations aiming to evaluate candidate sites for the final disposal of spent fuel and for the needs of safety analyses. The key interest concerns the flow conditions in the crystalline bedrock at the depth of a repository i.e. hundreds of meters below the ground surface. The ongoing phase of the studies is the continuation of preliminary site investigations of 1987-1992. Specific aims include: (1) Evaluation of the present natural flow characteristics of the candidate sites. While the characterization is important as such this serves a means for testing the ability of the numerical models to predict the flow conditions in general. In this context the numerical simulation results of the former investigation phase are reviewed. (2) Evaluation of the significance of the uncertainties associated with conceptual structure models. (3) Development of numerical methodology for the coupled flow conditions and application of the methodology to real problems. The new methodology is of key importance in resolving the flow conditions at one of the studied sites (Olkiluoto) especially due to the high salinity of groundwater and land uplift. (4) Perform the analyses based on the fracture

networks in order to resolve the distribution of water flow in the intact rock intervening the repository and a nearby fracture zone. (5) Modelling and planning of tracer tests in laboratory. (6) Participation in the Aspo Hard Rock Laboratory project of Sweden. This project serves a unique opportunity for model development and testing. Furthermore one of the application areas is the modelling of the groundwater flow situations around the Palmottu site which is a target area of a joint European multi-disciplinary research project.

WM Descriptor(s): flow models; geologic structures; ground water; radioactive waste disposal; safety analysis; site characterization; spent fuels

Principal Investigator(s):

KOSKINEN, LASSE

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Organization Performing the work:

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Other Investigators:

Laitinen M.; Lofman J.; Meling K.; Meszaros F.; Taivassalo V.; Poteri A.

Organization Type:

Other

Program Duration: From: 1993-1-1 To: 1996-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

VIT Energy Nuclear Energy (Tekniikantie 4 C Espoo); P.O.Box 1604 FIN-02044 VIT Finland

Recent publication info:

884

FIN19980003

Title:

Technology and safety of spent fuel disposal

Title in Original Language:

Kaytetyn polttoaineen loppusijoitus

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 324 - Safety Assessment and Performance Studies

Abstract:

Posiva Oy owned jointly by the TVO and IVO power companies prepares for spent fuel disposal in the Finnish crystalline bedrock. Site investigations are carried out at the three candidate sites (Olkiluoto in Eurajoki Kivetty in Aanekoski and Romuvaara in Kuhmo) selected in 1992. The site of the spent fuel repository shall be selected in the year 2000. By that date Posiva shall also update the technical plans of the encapsulation and repository facilities. Based on the site investigations and technical plans and other R and D site specific safety assessment of spent fuel disposal will be prepared. Within this project VIT Energy contributes to the following areas of Posiva's programme: canister and repository design alternative disposal concepts planning and interpretation of laboratory and field tests performance and safety analysis. An updated copper-iron canister design and an evaluation of alternative repository designs will be presented in 1996. An interim report will be prepared on site specific safety analysis of spent fuel disposal.

WM Descriptor(s): containers; high-level radioactive wastes; radioactive waste disposal; safety; safety analysis; site characterization; spent fuels; underground disposal

Principal Investigator(s):
RAIKO, H.

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Organization Performing the work:
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Other Investigators:
Hautojarvi A.; Nordman H.; Vieno T.

Organization Type:
Other

Program Duration: From: 1994-1-1 To: 1996-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):
VIT Energy Nuclear Energy (Tekniikantie 4 C Espoo); P.O.Box 1604 FIN-02044 VIT Finland

Associated Organization(s):
Institutes participating in Posiva's programme

Recent publication info:
885

FIN19980004

Title:
Speciation of radionuclides Sr-90 and Pu-239

Title in Original Language:

Topic Code(s):
201 -Dispersion and Migration of Radionuclides

Abstract:
The purpose of the work is to develop a universal scheme for the speciation of radionuclides in water ecosystems and to apply to technique to the study of the physicochemical forms of Sr-90 and Pu-239 in different kinds of surface waters. The radionuclides are fractionated into the following categories by filtration: particles colloids light organic and inorganic ions. After that the inorganic ions are categorized according to ionic form and oxidation state by ion exchange. The behaviour of SR-90and Pu-239 in different kinds of waters is studied by laboratory simulations.

WM Descriptor(s): aquatic ecosystems; fractionation; plutonium 239; radionuclide migration; strontium 90; surface waters

Principal Investigator(s):
ROSENBERG, R.J.

VIT KEMIANTEKNIIKKA
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Organization Performing the work:
TECHNICAL RESEARCH CENTRE OF FINLAND VIT CHEMICAL TECHNOLOGY
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Other Investigators:
Kekki T.; Peltonen T.

Organization Type:
Other

Program Duration: From: 1954-12-1 To: 1998-12-31

State of Advancement: Research in progress

Sponsoring Organization(s):
Technical Research Centre of Finland VIT Chemical Technology; P.O.Box 1404 FIN-02044 VIT Finland

Associated Organization(s):
University of Helsinki department of radiochemistry

Recent publication info:
886

FIN19980005

Title:
Sorption of some highly active waste nuclides from groundwater onto Finnish bedrock - a site specific study

Title in Original Language:

Topic Code(s):
201 -Dispersion and Migration of Radionuclides;
305 -Design, Construction, Commissioning

Abstract:

Sorption and desorption of some highly active nuclear waste nuclides (Sr, Ba, Ra, Pa and Pu) from groundwater onto Finnish bedrock is investigated. The study is connected to the safety analysis program of the spent nuclear fuel repository planned in Finland. The aim of the study is to produce experimental data (laboratory scale) of the sorption of these elements onto both near and far field barriers. The experiments are made in ambient atmospheric conditions and also in anoxic conditions.

WM Descriptor(s): barium; ground water; palladium; plutonium; radioactive waste disposal; radionuclide migration; radium; rocks; safety analysis; site characterization; sorption; strontium

Principal Investigator(s):

KULMALA, SEIJA

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Other Investigators:
Hakanen M.; Lindberg A.

Organization Type:
Other

Program Duration: From: 1994-3-1 To: 1996-9-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Laboratory of Radiochemistry Department of Chemistry;
P.O.Box 55 00014 University of Helsinki

Associated Organization(s):
Geological Survey of Finland

Recent publication info:
887

FIN19980006

Title:
Sorption of waste nuclides from groundwater onto Finnish bedrock

Title in Original Language:

Topic Code(s):
201 -Dispersion and Migration of Radionuclides;
305 -Design, Construction, Commissioning

Abstract:

Sorption and desorption of some active nuclear waste nuclides (Cs, Np, U, Ra, Pu, Pa) from groundwater onto Finnish bedrock is investigated. The experiments are made in ambient atmospheric conditions and in anoxic conditions. Sorption ratio R_d was determined for crushed rocks.

WM Descriptor(s): cesium; ground water; neptunium; palladium; plutonium; radioactive waste disposal; radionuclide migration; radium; rocks; sorption; sorptive properties; uranium

Principal Investigator(s):

HUITTI, T.

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Organization Performing the work:

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Other Investigators:

Hakanen M.; Lindberg A.

Organization Type:

Other

Program Duration: From: 1995-9-1 To: 1996-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

none

Associated Organization(s):

Geological Survey of Finland

Recent publication info:

888

FIN19980007

Title:

JYT2 Research Programme 1994-1996. Validation of chemical models for processes in the spent fuel repository

Title in Original Language:

Topic Code(s):

144 -Spent Fuel Immobilization/Conditioning; 303 - Earth Science Models and Studies

Abstract:

The research project concentrates on chemical processes in a repository for spent fuel and especially on four different topics; solubility surface phenomena matrix diffusion and modelling. Solubility: Studies on interactions between compacted bentonite and groundwater by thermochemical interaction experiments. The water/bentonite ratio salinity of water and redox conditions are varied. Microstructure porosity and homogenisation of bentonite as a function of time and the salinity of water as well as mineralogical alterations are to be reported. Surface phenomena: Coprecipitation is studied with calcite as the coprecipitant and Sr and Ni as the coprecipitating trace elements in a system with controlled atmosphere and water solution corresponding to ionic strength comparable of saline groundwater in Finland. Conditional solubility constants are to be calculated for the elements. The values can be used in assessing more realistic solubilities for the elements. Matrix diffusion: Studies on matrix diffusion are conducted with Finnish granitic rocks also with manmade materials because of simpler surface properties. The tracers used are "3H 2 2Na and "3"6Cl. The overall objective is to clarify the anion exclusion and surface diffusion phenomena in the pores of the rock. Modelling: The results of different studies are modelled by using self-developed and other models; LSF64 CHEQDIFF BENTEQ HYDRAQL EQ3/6.

WM Descriptor(s): bentonite; coprecipitation; diffusion; ground water; radioactive waste disposal; rock-fluid interactions; simulation; solubility; spent fuels; underground disposal

Principal Investigator(s):

VUORINEN, U.

VIT FINLAND
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Organization Performing the work:

VIT CHEMICAL TECHNOLOGY
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Other Investigators:
Carlsson T.; Kumpulainen H.; Lehikoinen J.; Muurinen A.; Valkiainen M.

Organization Type:
Other

Program Duration: From: 1994-1-1 To: 1996-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):
VIT Chemical Technology; P.O.Box 1404 FIN-02044 VIT Finland

Recent publication info:
889

FIN19980008

Title:
Radionuclide transport and retardation in rock fractures

Title in Original Language:

Topic Code(s):
201 -Dispersion and Migration of Radionuclides;
306 -Barrier Studies and Tests

Abstract:

Transport and retardation behavior of radionuclides in open rock fractures is studied using rock fracture and crushed rock column methods under laboratory conditions. Static batch method is also introduced to compare retardation values from static and dynamic experiments. Matrix diffusion parameters are determined using the static through-diffusion method. The effect of rock matrix properties is studied using fresh tonalite strongly altered tonalite and mica gneiss samples. The total porosity and the surface areas for sorption and open pore spaces for penetration are determined by the C-14 PMMA method. Flow conditions in the columns are determined using tritiated water and chloride (HTO Cl-36) as non-sorbing tracers. Retardation experiments are performed with different flow rates and sorptive tracers (Na-22, Ca-45, Sr-85, Rb-86). The flow conditions and transport behaviour of tracers is interpreted using a numerical compartment model which calculates the advection and hydrodynamic dispersion in the columns. The effect of matrix diffusion is calculated using an analytic solution to the advection-matrix diffusion problem in which the surface retardation is taken into account. These experiments aim to understand phenomena affecting the transport of solutes in fracture flow and to determine retardation factors for sorbing radionuclides. The main objective is to make different approaches for measuring the interaction between radionuclides and rock matrix to test the compatibility of retardation experiments and transport models used in assessing the safety of the underground waste repositories.

WM Descriptor(s): fluid flow; geologic fractures; matrix materials; radionuclide migration; rocks; sorption; sorptive properties; tracer techniques

Principal Investigator(s):
HOLTTA, PIRKKO

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Other Investigators:
Siitari-Kauppi M.; Hakanen M.; Hautojarvi A.; Lindberg A.

Organization Type:
Other

Program Duration: From: 1995-1-1 To: 1997-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Associated Organization(s):

University of Helsinki Department of Chemistry Laboratory of Radiochemistry; P.O.Box 55 FIN-00014 Finland

Technical Research Centre of Finland
Geological Survey of Finland

Recent publication info:

890

FIN19980009

Title:
Diffusion and sorption of Np in crystalline rock

Title in Original Language:

Topic Code(s):

202 -Dispersion and Migration Models; 306 -Barrier Studies and Tests

Abstract:

Diffusion and sorption studies have been carried out in rocks of two candidate research areas for final disposal of spent nuclear fuel (Olkiluoto Kivetty). Diffusion of Np and tritiated water was investigated in diffusion cells under aerobic conditions and in cylindrical drill core samples under anaerobic conditions. Effective diffusion coefficients D_e were derived from break-through curves and apparent diffusion coefficients D_a for Np from break-through curves (time lag method) and from concentration profiles. Distribution factors (R_d R_a) for Np in Olkiluoto and Kivetty crushed rocks were determined. The correlations between sorption and diffusion coefficients will be examined. This work is a part of the research programme for the years 1993-1996 of Posiva Oy.

WM Descriptor(s): diffusion; heavy water; igneous rocks; neptunium; site characterization; sorption; spent fuels; tritium oxides; underground disposal

Principal Investigator(s):

KAUKONEN, V.

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Hakanen M.; Lindberg A.

Organization Type:

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Program Duration: From: 1993-1-1 To: 1996-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

University of Helsinki Department of Chemistry; P.O.Box 55 FIN-00014 Finland

Associated Organization(s):

Geological Survey of Finland

Recent publication info:

891

FIN19980010

Title:
Anisotropic modelling of the electrical conductivity of fractured bedrock

Title in Original Language:

Topic Code(s):

323 -Earth Science Studies and Models

Abstract:

The plans of disposal of spent nuclear fuel into fractured bedrock introduce us a challenging problem when

conclusions from the characteristics of the bedrock must be drawn. The electrical and electromagnetic geophysical field techniques seem to have many promising properties in the study of fractured bedrock because electrical conductivity is a petrophysical entity which has a wide range of variations and which can be correlated with many other properties of the medium e.g. porosity and water saturation degree. Fractured bedrock is in many ways inhomogeneous and anisotropic in electromagnetic properties. In addition it is fractal in nature i.e. the fractures joints and fissures etc. occur at different geometric scales. Fracturing is one source of anisotropy in electrical conductivity. In the present study an effort has been made to use electromagnetic mixing rules in the definition of an equivalent homogeneous anisotropic conductivity tensor for such fractured rock mass. The subject includes the following topics: effective parameters of electrically inhomogeneous media analogy between the conductivity and permittivity problems mixture with ellipsoidal scatterers disk-oriented system and transformation effective conductivity of fractured rock based on the field observations.

WM Descriptor(s): anisotropy; electric conductivity; geologic fractures; geophysical surveys; rocks; spent fuels; underground disposal

Principal Investigator(s):

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Flykt M.; Sihvola A.; Nikoskinen K.; Lindell I.V.

Organization Type:

Other

Program Duration: From: 1995-1-1 To: 1996-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

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Associated Organization(s):

Helsinki University of Technology
Electromagnetics Laboratory Finland

Recent publication info:

892

FIN19980011

Title:

Transport of radionuclides in a natural flow system at Palmottu

Title in Original Language:

Topic Code(s):

201 -Dispersion and Migration of Radionuclides;
328 -Natural Analogue Studies

Abstract:

The Palmottu Natural Analogue Study was initiated in Finland in the late 80's in order to gain relevant information with respect to the final disposal of high-active nuclear waste in crystalline bedrock. Presently the study forms a medium-size international project sponsored by the European Communities and national organisations in Finland Sweden Spain France and United Kingdom. The project: 'Transport of radionuclides in natural flow system at Palmottu' aims at a more profound understanding of radionuclide migration in fractured crystalline bedrock. The study includes (1) Structural interpretations for hydraulic studies (2) Hydrogeological field studies (3) Flow modelling (4) Characterisation and evolution of various groundwaters (5) Paleohydrogeological studies (6) Studies concerning redox processes of U and Fe (7) Studies on migration of radionuclides: sorption and matrix diffusion studies the role of colloids and microbes on migration and (8) Interpretation of results with respect to repository performance assessment.

WM Descriptor(s): diffusion; flow models; geologic fractures; ground water; hydrology; radioactive waste disposal; radionuclide migration; rocks; site characterization; sorption; underground disposal

Principal Investigator(s):

BLOMQVIST, RUNAR

NUCLEAR WASTE DISPOSAL RESEARCH
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Researchers from the Par. Org.; Bruno J.; Grundfelt B.; Korkealaakso J.

Organization Type:

Other

Program Duration: From: 1996-1-1 To: 1999-6-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Geological Survey of Finland (GTK) Nuclear Waste and Applied Geology Unit 02150 Espoo Finland

Recent publication info:

893

FIN19980012

Title:

Postglacial and present bedrock movements in Finland

Title in Original Language:

Topic Code(s):

303 -Earth Science Models and Studies

Abstract:

The amount and location of the present slow and small bedrock movements indicate zones in the bedrock along which crustal stresses can be released and which will be active in periods of higher rate of bedrock movements related with the next ice age. Geological evidence of postglacial events such as faults fault terrasses and disturbances in sedimentary stratigraphy have been studied. Investigations include geodetic measurements of both horizontal and vertical bedrock movements. Repeated precise levelling measurements have been made in Finland during a time of a hundred years and vertical movements have been indicated along certain old fracture zones. GPS-networks have been founded over some fracture zones as well as on investigation sites for the final disposal of spent nuclear fuel. High fault terrasses have been found in Russian Karelia and Russian geologists have suggested post-glacial movements and periods of heavy earthquakes. Cooperated survey with Finnish geologists have been going on during a couple of years.

WM Descriptor(s): geologic structures; geomorphology; ground motion; rocks; site characterization; underground disposal

Principal Investigator(s):

VUORELA, PAAVO

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Other Investigators:

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Organization Type:

Other

Program Duration: From: 1994-1-1 To: 1996-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Geological Survey of Finland (GTK) Nuclear Waste and Applied Geology Unit 02150 Espoo Finland

Recent publication info:

894

FIN19980013

Title:

High-FeO olivine rock as a potential technical barrier in nuclear waste repositories

Title in Original Language:

Topic Code(s):

303 -Earth Science Models and Studies

Abstract:

The study of the properties and reactions of olivine rock from Lovasjarvi (SE-Finland) with water and redox-sensitive radionuclides is continued. The nature of the alteration products and the distribution of the radionuclides in these are in the focus of interest.

WM Descriptor(s): igneous rocks; iron oxides; olivine; radioactive waste disposal; radionuclide migration; rock-fluid interactions; site characterization; underground disposal

Principal Investigator(s):

HELLMUTH, KARL-HEINZ

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Rauhala E.; Johanson B.; Gijbels R.; Adriaens A.; Siitari-Kauppi M.

Organization Type:

Other

Program Duration: From: 1994-1-1 To: 1995-12-1

State of Advancement: Research in progress

Associated Organization(s):

University of Helsinki University of Antwerp

Recent publication info:

895

FIN19980014

Title:

The electrical and electromagnetic characterizaion of fractured media for geological disposal anisotropic electrical conductivity

Title in Original Language:

Rakoilleen valiaineen sahkoinen ja sahkomagneettinen karakterisointi geologista loppusijoitusta varten anisotrooppinen sahkonjohtavuus

Topic Code(s):

323 -Earth Science Studies and Models

Abstract:

Fractures joints and fissures form an inherent part in rock mass at different geometric scales. In many cases

there are good grounds to assume that the bulk character of the fractured media is anisotropic. When geophysical electrical and electromagnetic methods for studying the detailed structure of the rock mass are used it is necessary to have a clear understanding of the different factors controlling the measured anomalies. One important factor is the anisotropic electrical conductivity of the fractured rock. Owing to the limited knowledge concerning anisotropic field problems an interdisciplinary project was started at the Finnish Centre for Radiation and Nuclear Safety (STUK) in collaboration with the Electromagnetics Laboratory of the Helsinki University of Technology Finland. The aims of the project can be stated as follows: (1) to model mathematically electrical and electromagnetic fields in the case of electrically anisotropic media and (2) to investigate the equivalence between anisotropy and the electrical conductivity of fractured media. The problems solved so far have concentrated on the static fields of point sources by using the exact image principle in the case of dipping anisotropy. The basic geometries include half spaces with perfectly magnetically conducting (i.e. electrically insulating) perfectly electrically conducting and impedance boundaries. Furthermore two-layer and three-layer anisotropic models have been studied. The general conclusion drawn from the results so far achieved is that the peak values of the potentials are shifted from the source position. In addition the anomalies possess non-symmetric properties caused only by the anisotropy but not by e.g. the electrical inhomogeneities. Thus these are the factors that must among other things be considered when analyzing the data of practical measurements.

WM Descriptor(s): anisotropy; electric conductivity; electromagnetism; geologic fractures; geophysical surveys; rocks; site characterization; underground disposal

Principal Investigator(s):

ELORANTA, ESKO

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Lindell I.V.; Ermutlu M.E.; Nikoskinen K.I.; Flykt M.J.

Organization Type:

Other

Program Duration: From: 1991-10-1 To: 1994-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

STUK (Finnish Centre for Radiation and Nuclear Safety); P.O.Box 268 FIN-00101 Helsinki Finland

Associated Organization(s):

Helsinki University of Technology Electromagnetics Laboratory Finland

Recent publication info:

896

FIN19980015

Title:

Tomographic inversion: validity tests and resolution analysis of resulting tomograms

Title in Original Language:

Tomografinen inversio: saadun tomogrammin luotettavuuden analysointi and virheita aiheuttavat tekijat

Topic Code(s):

303 -Earth Science Models and Studies

Abstract:

The aim of this work is to find out factors describing the reliability of the geophysical tomograms. The main interest is focused on the error sources which are possible to take into account in some extent when planning the measurements. The impact of erroneous coordinate data to resulting tomogram and the ability of specific ray geometry to resolve structures in different parts of the image are studied. Parts of the inversion-software package developed by international Stripa-project are used to simulate measured data as well as to perform the

tomographic inversion. The tomographic inversion is calculated by using conjugate gradient method. Some modifications to these programs are made in order to write results needed for calculation of the resolution matrix to an output file. A program to calculate the resolution matrix is written. The matrix inversion is based on the LDLT-decomposition calculated by the Gauss elimination. The programming is done by using Fortran language in MPW environment (Language System Fortran) for Apple Macintosh.

WM Descriptor(s): computer calculations; computer codes; geography; geophysical surveys; geophysics; simulation; tomography

Principal Investigator(s):

HELLA, P.

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Heikkinen E.

Organization Type:

Other

Program Duration: From: 1993-10-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

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Recent publication info:

897

FIN19980016

Title:

ROCK-CAD-3DEC-LINK

Title in Original Language:

ROCK-CAD-3DEC-SIIRTO-OHJELMA

Topic Code(s):

303 -Earth Science Models and Studies

Abstract:

ROCK-CAD-3DEC-Link program converts the three-dimensional geometric data describing rock structures from the geological Rock-Cad database to an input file of 3DEC-program. 3DEC-program performs rock mechanical calculations. Rock-Cad program is supplied by Fintact Ky and 3DEC-program by Itasca Consulting Group. The objects defined in Rock-Cad database are 3-dimensional closed bodies of rock types and fracturing structures. Their shape can be either convex or concave and their need not to be planar. The bedrock surrounding these structures is not defined. In order to run 3DEC-program the model should consist of blocks occupying the whole space. In addition the blocks should be convex and the faces planar. Rock-Cad-3DEC-Link uses a special basefile determining the objects to be transformed. It is also possible to determine the object geometry directly into the basefile. This feature allows the user to form a 3DEC-model independently from Rock-Cad use. It is also possible to write the output file in DXF-format. Rock-Cad-3DEC-Link is written using THINK C 5.0 package for Apple Macintosh.

WM Descriptor(s): computerized simulation; geologic structures; geometry; information systems; r codes; rocks; three-dimensional calculations

Principal Investigator(s):

HELLA, P.

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Other Investigators:

Organization Type:
Other

Program Duration: From: 1993-6-1 To: 1993-9-1

State of Advancement: Unknown

Sponsoring Organization(s):
Fintact Ky Hopeatie 1B SF-00440 Helsinki

Associated Organization(s):
Saanio and Riekkola consulting engineers

Recent publication info:
898

FIN19980017

Title:
Nuclear waste management research of Imatrian Voima Oy (IVO) and Teollisuuden Voima Oy (TVO)

Title in Original Language:

Topic Code(s):
102 -Programme Strategy, Planning and Management

Abstract:

Nuclear Waste Commission of the Finnish Power Companies (YJT) founded by nuclear energy producing Imatran Voima Oy (IVO) and Teollisuuden Voima Oy (TVO) coordinates the research work of the companies on nuclear waste management. The research work covers main topics of nuclear waste management including final disposal of spent fuel intermediate- and low-level wastes and decommissioning.

WM Descriptor(s): coordinated research programs; decommissioning; finnish organizations; radioactive waste disposal; radioactive waste management; radioactive waste processing; radioactive wastes; spent fuels

Principal Investigator(s):
RYHANEN, VEIJO

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Other Investigators:

Organization Type:
Other

Program Duration: From: 1978-1-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
IVO TVO several research institutes and consultants

Associated Organization(s):
IVO TVO

Recent publication info:
899

FIN19980018

Title:
Migration of redox-sensitive waste nuclides in the geosphere

Title in Original Language:

Topic Code(s):
201 -Dispersion and Migration of Radionuclides;
303 -Earth Science Models and Studies

Abstract:

Laboratory experiments are conducted for determination of sorption of redox-sensitive waste nuclides on crystalline rocks. The work is focused on determination of redox conditions of groundwater/rock-system needed for reduction of Tc(VII) to Tc(VI) to U(IV) and Np(V) to Np(IV). Short-lived isotopes of the elements are used in addition to the long-lived isotopes for easy determination by radioactivity especially under low-solubility conditions. Chemical separations are employed in determination of oxidation states of soluble and sorbed Np and U. The results indicate that neptunium and technetium are easily reduced to the lower oxidation states. Also uranium has been reduced to U(IV) under natural groundwater conditions. The present study is focused on reduction mechanisms of U(VI) in the geosphere.

WM Descriptor(s): ground water; igneous rocks; neptunium; radioactive waste disposal; radionuclide migration; redox process; rock-fluid interactions; sorption; technetium; uranium

Principal Investigator(s):

HAKANEN, MARTTI

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Lindberg A.

Organization Type:

Other

Program Duration: From: 1988-1-1 To: 1996-1-1

State of Advancement: Research in progress

Associated Organization(s):

Geological Survey of Finland

Recent publication info:

900

FIN19980019

Title:

Migration of radionuclides in open rock fractures

Title in Original Language:

Topic Code(s):

201 -Dispersion and Migration of Radionuclides;
303 -Earth Science Models and Studies

Abstract:

A column method has been used to study the transport and retardation behavior of radionuclides in open rock fractures under well defined laboratory conditions. A rearranged experimental set-up allowing very low water flow rates has been introduced to distinguish the effects of matrix diffusion from hydrodynamic dispersion which dominates the fracture flow of solutes in conventional laboratory-scale experiments. The total porosity and the pore structure of the rock matrices are determined by the "1"4C-PMMA method. Matrix diffusion parameters of different rock types are determined using the static through-diffusion method. The gas flow method is employed to estimate the diffusion properties of the columns before the water flow experiments. The numerical compartment model for advection and dispersion with and without matrix diffusion included is used to interpret the tracer transport in the fracture. These experiments aim to understand phenomena affecting the transport of solutes in fracture flow and to determine retardation factors for sorbing radionuclides. The main objective is to provide numerical values for the calibration and validation of the radionuclide transport models used in assessing the safety of the underground waste repositories.

WM Descriptor(s): geologic fractures; radioactive waste disposal; radionuclide migration; rocks; safety; underground disposal; waste-rock interactions

Principal Investigator(s):

HOLTTA, PIRKKO

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Siitari-Kauppi M.; Hakanen M.; Hautojarvi A.; Timonen J.

Organization Type:

Other

Program Duration: From: 1994-1-1 To: 1996-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

University of Helsinki Department of radiochemistry; P.O.Box 5 FIN-00014 Finland

Associated Organization(s):

Technical Research Centre of Finland

Recent publication info:

901

FIN19980020

Title:

Size and structure of the pore space in crystalline rock as matrix-diffusion-relevant parameters

Title in Original Language:

Topic Code(s):

303 -Earth Science Models and Studies

Abstract:

The porosity spatial porosity distribution and pore size distribution in fresh and altered crystalline rock is studied by impregnation with carbon-14-polymethylmethacrylate mercury intrusion gas adsorption and scanning electron microscopy. The aim of the study is to understand the influence of various types of alteration and weathering on the porosity diffusivity and the internal surface areas of various rock types common in Baltic shield. The evaluation of the retardation of radionuclides migrating along water conducting fractures by diffusion into the rock matrix is crucial for the assessment of the safety of a deep repository for nuclear waste.

WM Descriptor(s): diffusion; geologic fractures; igneous rocks; porosity; radioactive waste disposal; radionuclide migration; underground disposal

Principal Investigator(s):

SIITARI-KAUPPI, MARJA

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Other Investigators:

Hellmuth K.H.; Meyer K.; Lindberg A.

Organization Type:

Other

Program Duration: From: 1994-1-1 To: 1995-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

University of Helsinki Department of Radiochemistry; P.O.Box 5 (Unioninkatu 35) SF-00014 Finland

Associated Organization(s):

STUK Helsinki-BAM Berlin-GTK Espoo

Recent publication info:

902

FIN19980021

Title:
Effects of alteration on rock matrix properties of tonalite Sievi Finland diffusivity and porosity

Title in Original Language:

Topic Code(s):

201 -Dispersion and Migration of Radionuclides;
303 -Earth Science Models and Studies

Abstract:

Radionuclides released from underground repositories in crystalline rock can reach the biosphere only with groundwater flow in fractures. Non-sorbing radionuclides are dispersed and retarded by dilution due to diffusion into the rock matrix. The migration of sorbing radionuclides is delayed both by interaction with the fracture surfaces and fracture filling materials and by diffusion into the microfissures of the rock. The aim of the study is to understand the effect of alteration on rock matrix properties. The rock samples represent hydrothermal and chemical alteration and weathered tonalite matrices drilled in the middle of Finland at Sievi area. The meaning of spatial porosity distribution and the available rock volume for matrix diffusion and dilution of radionuclides are investigated using "1"4C-polymethylmethacrylate impregnation technique and laboratory scale diffusion experiments.

WM Descriptor(s): diffusion; dilution; environmental exposure pathway; ground water; igneous rocks; porosity; radionuclide migration; site characterization; sorption

Principal Investigator(s):

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Other Investigators:

Lindberg A.; Hellmuth K.H.

Organization Type:

Other

Program Duration: From: 1994-1-1 To: 1995-12-1

State of Advancement: Unknown

Sponsoring Organization(s):

University of Helsinki Department of Radiochemistry; P.O.Box 5 (Unioninkatu 35) SF-00014

Associated Organization(s):

GTK Espoo STUK Helsinki

Recent publication info:

903

FIN19980022

Title:
The sorption of alkaline-earth elements from ground water on crystalline rocks

Title in Original Language:

Topic Code(s):

303 -Earth Science Models and Studies

Abstract:

Sorption and desorption of alkaline-earth elements Ra Ba and Sr is studied by batch method. The sorption is studied from waters with different ionic strength on crystalline rocks from areas in Finland planned for final

repository of spent nuclear fuel. Also the effect of the concentration of the alkaline-earth elements on sorption is investigated. The surface distribution ratios are measured with rock thin sections by autoradiographic method. The effect of the concentration of some alkaline and alkaline-earth elements on the sorption of alkaline-earth elements on thin sections is studied. Also the effect of different ionic strength on the distribution of the sorption between different minerals on thin sections is determined by autoradiography.

WM Descriptor(s): autoradiography; barium; ground water; igneous rocks; radioactive waste disposal; radium; site characterization; sorption; spent fuels; strontium

Principal Investigator(s):

KULMALA, SEIJA

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Other Investigators:

Hakanen M.; Lindberg A.

Organization Type:

Other

Program Duration: From: 1993-1-1 To: 1994-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

University of Helsinki Department of Radiochemistry; P.O.Box 5 FIN-00014 Finland

Associated Organization(s):

Geological Survey of Finland

Recent publication info:

904

FIN19980023

Title:

Diffusion and adsorption of waste nuclides in crystalline rocks

Title in Original Language:

Topic Code(s):

201 -Dispersion and Migration of Radionuclides;
303 -Earth Science Models and Studies

Abstract:

Adsorption and diffusion experiments are carried out under oxic and anoxic conditions for basic plutonic and acidic rocks. Diffusion of Tc Cs Np and tritiated water was determined using diffusion cells and cylindrical drill core samples with a cavity. Effective diffusion coefficients were derived from break through curves and apparent diffusion coefficients from concentration profiles. Adsorption distribution coefficients (R_d R_a) of Cs U Np and Pu were determined for crushed rocks. The specific areas required for calculating R_a values were measured using gas adsorption (N_2)/BET method. The studies are a part of the research programme for the years 1992-1994 of Nuclear Waste Commission of Finnish Power Companies.

WM Descriptor(s): adsorption; cesium; diffusion; igneous rocks; neptunium; plutonium; radionuclide migration; technetium; tritium oxides; uranium; waste-rock interactions

Principal Investigator(s):

KAUKONEN, V.

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Organization Type:
Other

Program Duration: From: 1992-1-1 To: 1994-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):
University of Helsinki Department of Radiochemistry; P.O.Box 5 FIN-00014 Finland

Associated Organization(s):
Geological Survey of Finland

Recent publication info:
905

FIN19980024

Title:
Migration of radionuclides from an underground U deposit to a ground surface in crystalline bedrock at the Palmottu study site

Title in Original Language:
Radionuklidien kulkeutuminen maanalaisesta uraaniesiintymasta maanpintayparistoon kiteisen kallion olosuhteissa Palmottu tutkimusalueella

Topic Code(s):
303 -Earth Science Models and Studies

Abstract:
The distribution of U around fractures between an underground U deposit and ground surface is studied. The purpose of the study is to obtain a sound knowledge of the factors affecting the migration of U in crystalline bedrock and apply it to other redox-sensitive nuclear waste actinides. In particularly efforts have been focused on uranium retardation phenomena sorption and matrix diffusion which are studied by phase selective extractions and U series disequilibrium measurements. This analytical approach provides us with insight into fixation strengths and mechanisms of U the migration routes and the time frames of the processes. The transported uranium phases on fracture surfaces have been identified and separated. An important retardation mechanism of U is incorporation in fracture calcite. This provides also an opportunity of dating the incorporation by the 2 3"0Th/"2"3"4U disequilibrium. The strong enrichment of U on altered rock around fracture and also penetration deeper into the rock have been observed. Mathematical simulations of the measured concentration profiles of U series nuclides have been performed in order to interpret the observed profiles.

WM Descriptor(s): diffusion; geologic fractures; igneous rocks; radionuclide migration; redox process; site characterization; sorption; uranium deposits; uranium isotopes

Principal Investigator(s):
SUKSI, J.

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Organization Performing the work:
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P.O. BOX 5 FIN-00014 HELSINKI FINLAND

Other Investigators:
Ruskeeniemi T.; Rasilainen K.; Saarinen L.

Organization Type:
Other

Program Duration: From: 1988-1-1 To: 1994-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):
University of Helsinki Department of Radiochemistry; P.O.Box 5 FIN-00014 Finland

Associated Organization(s):
Geological Survey of Finland Technical Research Center of Finland

Recent publication info:

906

FIN19980025

Title:

The Siting of High-level Nuclear Waste - The Social and Structural Dimensions of Local Environmental Conflict

Title in Original Language:

Ydinjätteiden loppusijoitus - Paikallisen ympäristöristiriidan sosiaalis-rakenteelliset ulottuvuudet

Topic Code(s):

100 -RADIOACTIVE WASTE - GENERAL; 101 - General policies; 130 -HIGH LEVEL WASTE; 137 - Waste Disposal (including Spent Fuel); 20 - ENVIRONMENTAL IMPACT/ASSESSMENT STUDIES; 30 -FACILITY AND/OR SITE SPECIFIC STUDIES; 70 -PUBLIC INFORMATION/INTERACTION; 704 - Socioeconomic Aspects

Abstract:

The principal goal of the research has been to analyze the social and structural factors affecting to the nuclear waste attitudes and conflicts in three possible disposal localities in Finland. The results of study has been published in various instances. One part of the study has been published in an article in a Journal called Society & Natural Resources in 1996. It deals with environmental conflicts in the three possible disposal localities in Finland. This article suggest that the theory of environmental conflicts should shift in an epistemological and social interactionist direction, toward social constructionist theory. The other part of the study has been reported in Proceedings of International Topical Meeting on Nuclear and Hazardous Waste Management, Spectrum '96, Seattle, Washington. The study of local residents' attitudes toward siting a high-level nuclear waste facility in Finland took place in three municipalities (Eurajoki, Kuhmo and Aanekoski), which are being considered possible host communities for the plant. The survey showed that the NIMBY phenomenon is a common reaction in two of the three municipalities, and in the third a polarization of opinions into two opposing camps is evident. The study of the perception of possible negative impacts (health and safety, environmental, economic and social) showed that residents in Kuhmo and Äänekoski were more concerned about possible hazards than the residents of Eurajoki. The thesis of the article is that in order to understand different opinions about the facility, one must understand the cultural logic of risk perception. People evaluate the risk as individuals, but also as members of different reference groups and in the context of local, national and international circumstances. The results of the third part of the study has been reported on Technical Research Centre of Finland's (VTT) Research Report 434/ 1998. Research was based on a large survey (N = 3600), which concentrated on resident's attitudes towards the nuclear waste disposal EIA. Results show that the residents experience security, health and environmental impacts as the most import ones, but it also show that there were variation in attitudes between the municipalities. The results of the fourth part of the study has been reported in Current Sociology, Journal of International Sociological Association. The article is called "The Social Shaping of Radwaste Management. The Cases of Sweden and Finland." This paper analyses the nuclear waste siting conflicts as struggles between different actors aiming to realize their own perceptions and social definitions of the issue. The empirical objects consist of four recent radwaste conflicts in Finland and Sweden. It is found that ready-made definitions on the national level do not penetrate easily into the local level, but are instead produced and reproduced in mutual interaction between different groups on both local and national levels. The fourth part of the study is still continuing. The aim is to analyze the content of the international protest against nuclear technology from the 1950s to the 1990s. The study has been financed by Academy of Finland and by Ministry of Trade and Industry's Publicly Administrated Nuclear Waste Management Research Programme (JYT2, 1994-1996) and a new five-year research programme (JYT2001, 1997-2001).

WM Descriptor(s): environmental impacts; global aspects; hazardous materials; public opinion; radioactive waste disposal; radioactive waste management; social impact; socio-economic factors

Principal Investigator(s):

Litmanen, Tapio

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

Academy of Finland. Ministry of Trade and Industry, Energy Department, Finland.

Associated Organization(s):

Technical Research Centre of Finland, VTT

FIN19980026

Title:

ELECTROMAGNETIC CHARACTERIZATION OF FRACTURED ROCK FOR GEOLOGICAL DISPOSAL STUDIES OF SPENT NUCLEAR FUEL

Title in Original Language:

RAKOILLEEN KALLION SÄHKÖMAGNEETTINEN KARAKTERISOINTI KÄYTETYN YDINPOLTTOAINEEN GEOLOGISIA LOPPUSIJOITUSTUTKIMUKSIA VARTEN

Topic Code(s):

323 -Earth Science Studies and Models

Abstract:

The geological disposal of spent nuclear fuel deep in the bedrock requires research for structural data of the rock medium. The bedrock is characterized by fracturing on different scales from microscopic hair cracks to deep and long crustal fractures. Also the intact rock has porosity on different scales. Fractures and porosity are the main research areas in the characterization studies because fractures and porosity control the groundwater flow and radionuclide migration. In the electromagnetic characterization of rock, the conductivity and permittivity of the rock medium are utilized. Electric conductivity is an important petrophysical quantity in galvanic and low frequency characterization. When high frequencies are used, permittivity is also an important property. In general, conductivity as well as permittivity are frequency dependent and complex quantities. The electromagnetic properties of fractured and porous media are anisotropic. In this research project, a basic assumption is that the medium is anisotropic in terms of electrical conductivity. The results of a joint research project carried out in 1991-1997 by STUK and the Electromagnetics Laboratory of the Helsinki University of Technology are presented. The main purpose was to create computational models for electric potential responses when the medium is anisotropic and is bounded by (1) a perfect magnetic conductor, (2) a perfect electric conductor, and (3) an anisotropic impedance surface. Furthermore, (4) the geometry of two anisotropic half spaces and (5) a layered medium were considered. The solutions of the problems were made using image theory. For modeling (6) the electric potential in anisotropic medium with inhomogeneities, an integral equation was formulated. Also (7) a wedge structure was treated as an extension to the traditional two parallel plate model of fracture geometry. The equivalentization of fracturing with anisotropy (8) forms quite an extensive area of research. This research work still continues.

WM Descriptor(s): anisotropy; electric conductivity; electromagnetic surveys; geologic fractures

Principal Investigator(s):

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Organization Performing the work:

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Other Investigators:

Ermutlu, Murat; Flykt, Mikko; Lindell, Ismo; Nikoskinen, Keijo; Sihvola, Ari

Organization Type:

Other

Program Duration: From: 1991-6-15 To: 2000-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

none

Associated Organization(s):

Helsinki University of Technology, Electromagnetics Laboratory

FIN19980027

Title:

Site assessment for fuel disposal of spent fuel (PARVI)

Title in Original Language:

Loppusijoituspaikan arvioksi

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 320 - STUDIES FOR GEOLOGICAL REPOSITORIES

Abstract:

The suitability of four candidate sites for fuel disposal of spent fuel in Finland is investigated. The safety of the disposal system in site-specific conditions is evaluated.

WM Descriptor(s): encapsulation; site characterization; spent fuels; waste disposal

Principal Investigator(s):

Hautojärvi, Aimo

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Other Investigators:

Snellman, Margit; Hinkkanen, Heikki; Riekkola, Reijo; Anttila, Pekka; Vieno, Timo

Organization Type:

Private industry

Program Duration: From: 1997-1-1 To: 2000-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

none

Associated Organization(s):

none

FIN19980028

Title:

Technology for fuel disposal of spent fuel (T-2000)

Title in Original Language:

Loppusijoitustekniikan kehittäminen (T-2000)

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 142 - Spent Fuel Packaging (Canisters, Materials. etc.)

Abstract:

The technical plans for encapsulation and final disposal of spent fuel from the Finnish nuclear power plants are updated. Special tasks are performed to demonstrate the feasibility of the technology. Performance of the technical safety barriers is evaluated.

WM Descriptor(s): encapsulation; feasibility studies; performance testing; radioactive waste disposal; spent fuels

Principal Investigator(s):

Salo, Jukka-Pekka

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Other Investigators:

Wikström, Nils-Christian; Riekkola, Reijo; Raiko, Heikki; Kukkola, Tapani; Autio, Jorma

Organization Type:

Private industry

Program Duration: From: 1997-1-1 To: 2000-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

none

Associated Organization(s):

none

France

FRA19980001

Title:

Mineralogy and geochemistry of uranium mill tailings

Title in Original Language:

Topic Code(s):

201 -Dispersion and Migration of Radionuclides

Abstract:

The main purpose of the mineralogical and geochemical study of mill tailings is to predict the migration of radionuclides especially radium and of heavy metals and toxic elements with time. Three sites are studied: Ecarpiere (Vendee) and Jouac (Haute-Vienne) resulting from sulfuric acid treatment of the ore extracted from intragranitic veins and from an episyenitic rock and Lodeve (Herault) resulting from an alkaline process of a sedimentary rock. There is an integrated approach on the solid: uranium series disequilibrium ("2"3"8U 2 3"0Th 2 2"6Ra 2 1"0Pb by gamma spectrometry); alpha and fission track mapping; major and trace elements contents (ICP-MS and AES); petrography and mineralogy (SEM BSE electron microprobe). The location of radium is especially studied by selected leaching. The chemistry of the porewater is studied in fresh and aged tailings. A numerical modeling using computer codes is carried out in order to calculate the saturation index of minerals with respect to the solution chemistry and to predict the evolution of the mill tailings mineralogy.

WM Descriptor(s): geochemistry; mill tailings; mineralogy; radionuclide migration; radium; site characterization; toxic materials; uranium

Principal Investigator(s):

PAGEL, M.

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VANDOEUVRE- LES- NANCY

Organization Performing the work:

CREGU BP 23
F-54501 VANDOEUVRE-LES-NANCY CEDEX
FRANCE

Other Investigators:

Thiry J.; Reyx J.; Pacquet A.; Ruhlmann F.; Somot S.

Organization Type:

Other

Program Duration: From: 1994-4-1 To: 1997-4-1

State of Advancement: Research in progress

Sponsoring Organization(s):

CREGU BP 23 54501 Vandoeuvre Cedex

Associated Organization(s):

COGEMA (France) ENUSA (Spain)

Recent publication info:

907

FRA19980002

Title:

Experimental and numerical prediction of the behaviour of U and metallic elements in waters percolating mine waste tailings

Title in Original Language:

Topic Code(s):

Abstract:

Mine waste tailings are composed of an heterogeneous mixture of blocks and particles of highly variable size and mineralogy (barren enclosing rocks pieces of ore and a matrix of fine grain size composed of crushed rocks and clays) currently submitted to rain waters. The modification of the chemistry of the percolating waters mostly after bio-oxidation of the Fe(As) sulphides is investigated on naturally weathered studied materials as well as by using experimental (static agitated and flow through autoclaves under control of T and bacterial activity) and numerical approaches. The relative role of each mineral forming the tailing as a function of its chemical reactivity specific surface and accessibility to fluids the process at the origin of mineral dissolution and acidification of waters especially the specific role of bacteria in the sulphide oxidation process the kinetics of element leaching under an evolutive fluid-rock interaction within the tailings are especially investigated. The investigated test sites include mine waste tailings from mines in granite type rocks (granites orthogneisses) sediments (Lodeve deposit) and black achists (Fe mine Spain in collaboration with ENUSA). Numerous mineral dissolution textures (sulphides especially pyrite silicates accessory minerals) in the bio-oxidation and acid drainage zone and precipitation of newly formed minerals in a retention zone are observed and interpreted at the light of the laboratory and numerical experiments.

WM Descriptor(s): geochemistry; mine draining; minerals; rain water; rock-fluid interactions; rocks; site characterization; tailings; uranium; uranium mines

Principal Investigator(s):

CATHELINEAU, M.

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Organization Performing the work:

CREGU BP 23
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Other Investigators:

Peiffert Ch.; Guerci A.; Mustin Ch.; Cuney M.

Organization Type:

Other

Program Duration: From: 1994-4-1 To: 1997-4-1

State of Advancement: Research in progress

Sponsoring Organization(s):
CREGU BP 23 - 54501 Vandoeuvre-les-Nancy Cedex - France

Associated Organization(s):
COGEMA (France) ENUSA (Spain)

Recent publication info:
908

FRA19980003

Title:
Organic solvent and resin destruction by electrochemical process

Title in Original Language:

Topic Code(s):
413 -Electrochemical Decontamination Methods

Abstract:
An electrochemical destruction process of spent exchange resins and solvents has been developed to resolve the safety problems of storage of such materials. This process uses strongly oxidizing ions like Co3+. Tests have been undertaken on a pilot with inactive simulated resins and the first results indicate a destruction efficiency of approximately 95% with a mass flow of 200g per hour.

WM Descriptor(s): alpha decay radioisotopes; ion exchange materials; solid wastes; waste processing

Principal Investigator(s):
Babouhot, J.L.

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Organization Performing the work:
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21120 Is Sur Tille FRANCE

Other Investigators:
Rolin, O.

Organization Type:
Other

Program Duration: From: 1996-10-1 To: 2001-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):
none

Associated Organization(s):
none

FRA19980004

Title:
Ultimate decontamination of alpha liquid wastes by new molecules grafted on polymeric resins

Title in Original Language:

Topic Code(s):
413 -Electrochemical Decontamination Methods

Abstract:
This work concerns the study of new molecules aiming to trap radioelements from industrial alpha contaminated solutions.
The real affinity of these original molecules (tetraazamacrocycles) to complex heavy metals (very stable complex: metallation constant > 10 to the power of 20) has been shown and allows to understand the coordination mode of different metals namely the uranium, plutonium and americium. These molecules, after grafting on polymeric materials, has been used in a process of solid-liquid extraction. The so obtained resins are very efficient since the processed liquid wastes (concentration in alpha emitters < 1000 Bq per cubic meter) are totally decontaminated ([U] < 0,1 µg per litre and [Pu] and [Am] <5Bq per cubic meter). The results have been confirmed in using a pilot plant of which capacity is about 1 cubic meter per day.

WM Descriptor(s): alpha decay radioisotopes; decontamination; liquid wastes

Principal Investigator(s):

Chollet, H.

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Organization Performing the work:

CEA Centre d'Etudes de Valduc DTMN/AD
21120 Is Sur Tille FRANCE

Other Investigators:

Barbette, F.; Babouhot, J.L.; Guilard, R.

Organization Type:

Other

Program Duration: From: 1995-6-1 To: 2001-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

H. CHOLLET: PhD Thesis (1994) University of Burgundy - France "Utilisation de macrocycles tétraazotés pour la complexation des actinides en milieu aqueux. Validation pour le retraitement des effluents liquides aqueux"

Associated Organization(s):

University of Burgundy, Faculté des Sciences 6 Bd Gabriel, 21000 Dijon (France)

Germany

GFR19980001

Title:

Development of a method for the analysis of single fluid inclusions in evaporites by laser a ablation ICP-MS

Title in Original Language:

Topic Code(s):

306 -Barrier Studies and Tests; 323 -Earth Science Studies and Models

Abstract:

The analysis of single fluid inclusions in evaporites can give important information about the geochemical past of the rock. Thus these informations are important indicators for the assessment of the integrity of the geological barrier. These methods were applied specially in Gorleben and led to the important conclusion that the rocks in the deeper regions of the salt dome were not geochemically changed after their formation 250 million years ago. A method for the analysis of single fluid inclusions in evaporite minerals with laser ablation ICP-MS will be developed. With this method inclusions up to 10 #mu#m (with older mechanical methods 250 #mu#m) can be isolated by laser ablation and subsequently analyzed quantitatively by ICP-MS. New and important results will be obtained about the chemical composition of brines included in the salt of the disposal rooms.

WM Descriptor(s): ablation; geochemistry; geologic history; Gorleben salt dome; inclusions; mass spectroscopy; quantitative chemical analysis; sedimentary rocks

Principal Investigator(s):

Mengel, Kurt

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Organization Performing the work:

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Other Investigators:

Schmidt. K.H.; Ellendorff B.

Organization Type:

Other

Program Duration: From: 1996-5-1 To: 1998-10-1

State of Advancement: Research planned

Sponsoring Organization(s):

Technische Universitaet Clausthal Fachgebiet Mineralogie Geochemie Salzlagerstatten; A.-Roemer Str. 2A 38678 Clausthal-Zellerfeld

Recent publication info:

909

GFR19980002

Title:

Computer program 'LAUGE' for documentation data storage presentation and genetical interpretation of brines in Gorleben

Title in Original Language:

Topic Code(s):

306 -Barrier Studies and Tests; 323 -Earth Science Studies and Models

Abstract:

Bundesamt fuer Strahlenschutz and Technische Universitaet Clausthal developed in cooperation the computer program LAUGE for the genetical interpretation of brines in Gorleben. It will be used during the site confirmation and the future operation of the confirmation mine and potential repository. The program will enable a computerized storage of data a scientific presentation of results and a clear documentation of all registered brines. Thus it will be a helpful tool for the genetic interpretation of brines.

WM Descriptor(s): brines; data processing; geologic ages; Gorleben salt dome; l codes; site characterization; underground disposal

Principal Investigator(s):

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Fachgebiet Minearlogie Geochemie Salzlagerstatten
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Other Investigators:

Schmidt K.H.

Organization Type:

Other

Program Duration: From: 1995-10-1 To: 1997-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Fachgebiet Minearlogie Geochemie Salzlagerstatten; A-Roemer Str. 2A 38678 Clausthal-Zellerfeld

Recent publication info:

910

GFR19980003

Title:

Literature study on the status of science and technology for radioactive age determination of evaporites and brines

Title in Original Language:

Topic Code(s):

306 -Barrier Studies and Tests; 323 -Earth Science

Studies and Models

Abstract:

In a literature study the actual status of science and technology in the field of radioactive age determination of rocks and solutions will be investigated by the Technische Universitaet Clausthal. The aim of this study is a valuation of the methods for a possible application on evaporites and brines. The radioactive age determination of evaporites and brines will help to confirm qualitative statements (see also fluid inclusions) with a second method and quantitative data.

WM Descriptor(s): age estimation; brines; geologic ages; information; petrogenesis; reviews; sedimentary rocks

Principal Investigator(s):

MENGEL, K.

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Organization Performing the work:

Fachgebiet Minearlogie Geochemie Salzlagerstatten
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Other Investigators:

Organization Type:

Other

Program Duration: From: 1996-5-1 To: 1997-4-1

State of Advancement: Research planned

Sponsoring Organization(s):

Fachgebiet Mineralogie Geochemie Salzlagerstatten; A.-Roemer Str. 2A 38678 Clausthal-Zellerfeld

Recent publication info:

911

GFR19980004

Title:

Thermodynamical modelling of the behavior of trace elements in brines and evaporites with the computer program EQ3/6

Title in Original Language:

Topic Code(s):

306 -Barrier Studies and Tests; 323 -Earth Science Studies and Models

Abstract:

Evaluation of the possibility of a thermodynamical modelling of the behavior of trace elements in natural brines during metamorphic processes. Aim of this study is on one hand the development of a tool for the description of trace elements in brines. Thus it will be possible to calculate the natural retardation of radionuclides because of their fixation in the lattice of crystallizing minerals. On the other hand it will be a helpful tool for a faster genetic interpretation of evaporites found during underground investigation in Gorleben.

WM Descriptor(s): brines; e codes; geologic ages; Gorleben salt dome; metamorphism; radionuclide migration; sedimentary rocks; thermodynamic model; trace amounts

Principal Investigator(s):

Mengel, Kurt

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Organization Performing the work:

Fachgebiet Minearlogie Geochemie Salzlagerstatten
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Other Investigators:

Organization Type:

Other

Program Duration: From: 1996-4-1 To: 1998-10-1

State of Advancement: Research planned

Sponsoring Organization(s):

Fachgebiet Mineralogie Geochemie Salzlagerstaetten; A.-Roemer Str. 2A 38678 Clausthal-Zellerfeld

Recent publication info:

912

GFR19980005

Title:

Genesis mobilization and migration of brines and gases in evaporites as natural analogue for mineral reactions and migration in underground-deposits

Title in Original Language:

Topic Code(s):

326 -Barrier Studies/Tests/Impacts including Near Field Effects; 328 -Natural Analogue Studies

Abstract:

The existing methods for the interpretation of genetic processes in evaporites (mass transport genesis of brines and gases) will be improved. Complete interpretation of the behavior of fluid inclusions will only be possible under consideration of systematic microanalytical investigations of both gases and brines in fluid inclusions. The quantitative analysis of the chemical composition of single fluid inclusions and their ambient evaporites will help to understand the following points: where when and in what range mass transport happened in evaporite bodies in the geological past; the composition of gases and brines that participated at mineral reactions; the influence of temperature (caused by basalt intrusions) on mobilization and on the change of brines and gases; the existence of preferred migration pathways in evaporites; the question if evaporites are closed systems for different isotopic systems and/or different components. As a results of the work a concept for the quantification of brine volumes that were active in the geological past will be generated. That brines and their chemical composition can give informations about possible features and processes in the repository system in the future. The results can thus help to validate the models for the long-term safety assessment.

WM Descriptor(s): brines; chemical composition; disposal wells; fluid flow; gases; geologic history; inclusions; natural analogue; petrogenesis; rock-fluid interactions; sedimentary rocks

Principal Investigator(s):

Mengel, Kurt

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Organization Performing the work:

INSTITUT FUER MINERALOGIE UND MINERALISCHE ROHSTOFFE FACHGEBEIT MINERALOGIE GEOCHEMIE SALTZLAGERSTATTEN

Other Investigators:
Klingenberg I.; Lengelsen H.; Prohl H.; Grishina S.; Siemann M.G.

Organization Type:
Other

Program Duration: From: 1995-10-1 To: 1998-9-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Institut fuer Mineralogie und Mineralische Rohstoffe Fachgebiet Mineralogie Geochemie Salzlagerstatten

Associated Organization(s):
Inst. fuer Geologie und Geophysik. Novosibirsk (GUS)

Recent publication info:
913

GFR19980006

Title:
Evaluation and validation of a thermodynamical standard database for temperatures from 20 to 200 deg C for EQ3/6

Title in Original Language:

Topic Code(s):
323 -Earth Science Studies and Models

Abstract:
In the field of scenario analysis without radionuclides the behavior of natural brines without contact with waste or cask is modeled. The evaluation of a validated standard database for the system Na K Mg Ca Cl SO_4 for temperatures from 20 to 200 deg C is from major interest. The database is a basis for most of the other scientific work. The database will be used for the well-known thermodynamical computer program EQ3/6. Aim of this work is to describe natural systems in a relevant temperature field. Up to now reliable calculations are possible for 25 deg C only. With a validated and correct database the description of the change of chemical composition of migrating brines in the near field will be possible. Thus it will be a helpful and important tool to thermodynamically modelate the composition of brines coming eventually in contact with waste and casks.

WM Descriptor(s): brines; chemical composition; disposal wells; e codes; fluid flow; geologic models; information systems; temperature dependence; thermodynamics

Principal Investigator(s):
VOIGT, W.

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Other Investigators:

Organization Type:
Other

Program Duration: From: 1995-11-1 To: 1998-10-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Arbeitsgruppe Prof. Dr. Voigt; Leipziger Str. 29 09596 Freiberg/Sachschen

Recent publication info:
914

GFR19980007

Title:

Compaction and permeability of crushed salt

Title in Original Language:

Topic Code(s):

323 -Earth Science Studies and Models

Abstract:

The aim of the former generic and now new structured site specific R and D project 'compaction and permeability of crushed salt' by BGR is to define the compaction behavior of crushed salt as backfilling material for repositories in salt domes. For this the interaction of rock and backfilling have to be considerate. Recently the changes of permeability of the backfilling with changing compaction have to be predictable. Herewith the convergence speed of caverns backfilled with crushed salt will be revealed at low rock pressure. Aims of these studies are development of quantitative statements about the interaction between compaction and permeability of the backfilling the deduction of reliable statements about the behavior of crushed salt with added brine (while the backfilling procedure and after as scenario) and about the compaction acceleration. These statements are necessary for the justification of an early permeability decreasing of the backfilling with suitable fluxes in a licensing procedure.

WM Descriptor(s): backfilling; brines; compacting; crushing; permeability; rock-fluid interactions; salt caverns; salts

Principal Investigator(s):

STUERENBERG, D.

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Organization Performing the work:

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Other Investigators:

Zhang

Organization Type:

Other

Program Duration: From: 1994-8-1 To: 1999-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Bundesanstalt fuer Geowissenschaften und Rohstoffe (BGR);
Stilleweg 2 Hannover 30655

Recent publication info:

915

GFR19980008

Title:

Integrated model for the near field. Geochemically founded source term for HAW waste (glass cement spent fuel)

Title in Original Language:

Topic Code(s):

323 -Earth Science Studies and Models; 326 -Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

An integrated model for the near field will be developed. With this model a geochemically founded source term for HAW waste (glass cement and spent fuel) can be defined. For the safety justification of final disposals for HAW as spent fuel borosilicate products or cementated waste the release of radionuclides has to be mathematically describable as source terms. Today's status of science and technology for the release behavior of HAW for the specific nuclide behavior for the expected conditions in Gorleben will be documented. Necessary future R and D will be defined. The geochemical milieu will be influenced by brines cask materials backfilling

materials and their fluxes. The information about material science radiochemistry and geochemistry will be put together for the integrated near field model.

WM Descriptor(s): cements; chemical wastes; geochemistry; geologic models; glass; Gorleben salt dome; high-level radioactive wastes; mixtures; source terms; spent fuels; waste disposal

Principal Investigator(s):
GRAMBOW, B.

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Organization Performing the work:
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Other Investigators:

Organization Type:
Other

Program Duration: From: 1996-1-1 To: 1999-12-1

State of Advancement: Research planned

Sponsoring Organization(s):
Forschungszentrum Karlsruhe Institut fuer Nukleare Entsorgungstechnik; Postfach 3640 76021 Karlsruhe

Recent publication info:
916

GFR19980009

Title:
MAW (Q)- and HTR-fuel research program

Title in Original Language:

Topic Code(s):
323 -Earth Science Studies and Models

Abstract:

In the MAW (Q)-HTR-fuel research program the properties of crushed salt as flame barrier and its load-bearing capacity are as well studied as the generation of hydrogen by corrosion of cask metals. For the calculation of the load-bearing capacity of crushed salt as backfilling characteristic values are developed with special equipment. During these investigations theoretical models for the load-bearing capacity will be tested by experiments. Specially the transferability of experiments to the situation in the repository will be considered. In the program for the investigation of crushed salt as flame barrier it will be revealed if the crushed salt can limit the effects of an ignition of gas mixtures. Those ignitable mixtures of hydrogen and oxygen can be generated by corrosion of metals. The development of producing rates of hydrogen by corrosion is also important for the safety assessment with regard to higher gas pressures.

WM Descriptor(s): backfilling; corrosion; crushing; flammability; hydrogen; ignition; radioactive waste disposal; salt caverns; salts; spent fuels

Principal Investigator(s):
BRUECHER, HEINER

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Other Investigators:
Feuser W.; Barnert E.; Schon. T.

Organization Type:
Other

Program Duration: From: 1993-8-1 To: 1996-11-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Forschungszentrum Juelich Institut fuer Sicherheitsforschung und Reaktortechnik

Recent publication info:
917

GFR19980010

Title:
Post closure safety of nuclear waste repositories

Title in Original Language:

Topic Code(s):
233 -Long Term Environmental Impact; 324 -Safety Assessment and Performance Studies

Abstract:
Long term safety studies carried out on national an international level will be evaluated. Models used in performance assessments to estimate the behavior of the engineering barrier system and of the natural system as well as the risk associated with nuclear waste repositories will be evaluated. Their applicability to real sites will be tested against field measurements and laboratory experiments as well as with results from codes. In this context participation in international expert groups and forums is an essential part of the project. When deficits exist in the models they will be improved accordingly.

WM Descriptor(s): post-closure period; probabilistic estimation; radioactive waste disposal; risk assessment; safety analysis; site characterization; underground disposal

Principal Investigator(s):
BOGORINSKI, PETER

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Other Investigators:
Becker A.; Lambers L.; Poeltl B.; Roehlig K.

Organization Type:
Other

Program Duration: From: 1995-4-1 To: 1998-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Gesellschaft fuer Anlagen- und Reaktorsicherheit (GRS) mbH; Schwertnergasse 1 50667 Koeln

Recent publication info:
918

GFR19980011

Title:
Safety criteria for the disposal of radioactive waste in deep geologic formations

Title in Original Language:

Topic Code(s):

324 -Safety Assessment and Performance Studies

Abstract:

The overall objective of this work is to create a compilation showing the national and international status of the safety criteria relevant to the storage of radioactive waste and to evaluate these criteria and safety requirements insofar as they reflect the state of the art. International criteria and safety requirements regarding construction operation and post-operational phase of nuclear repositories will be employed for the evaluation. This will require expert meetings with representatives from countries actively engaged in the development of criteria finding application for nuclear repositories. Additionally the world's nuclear repositories either planned or already in operation and the underlying safety requirements are subject to the evaluation. The evaluation of the extent to which the safety criteria reflect the state of the art will serve to derive protection goals and the implementation of the safety requirement are currently being worked out.

WM Descriptor(s): evaluation; international regulations; radioactive waste disposal; radioactive waste storage; safety; safety analysis; safety standards; underground disposal

Principal Investigator(s):

BALTES, B.

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Other Investigators:

Organization Type:

Other

Program Duration: From: 1995-4-1 To: 1997-3-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Gesellschaft fuer Anlangen- und Reaktorsicherheit (GRS) mbH; Schwertnergasse 1 506677 Koeln

Associated Organization(s):

Bundesamt fuer Strahlenshutz

Recent publication info:

919

GFR19980012

Title:

Examination of safety questions for long-term storage of radioactive wastes

Title in Original Language:

Topic Code(s):

146 -Spent Fuel Storage; 324 -Safety Assessment and Performance Studies

Abstract:

In Germany one repository for radioactive wastes (Morsleben) is in operation and another one (Konrad) is in the licensing procedure. But there also exist radioactive wastes which do not fulfill the acceptance conditions for these two repositories and therefore have to be stored for a longer time period. Within this project safety relevant aspects of long-term interim storage shall be examined. In particular nuclear and physico-chemical data of the wastes shall be compiled and safety requirements for the wastes and the storage facilities shall be derived. The safety relevant status of existing interim storage facilities for radioactive wastes and spent fuel elements shall be recorded in an electronic database.

WM Descriptor(s): konrad ore mine; morsleben salt mine; radioactive waste disposal; radioactive waste storage; safety analysis; safety standards; spent fuel storage; underground disposal

Principal Investigator(s):

WALTERSCHEIDT, K.H.

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Other Investigators:

Lambers L.

Organization Type:

Other

Program Duration: From: 1994-5-1 To: 1996-6-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Gesellschaft fuer Anlagen- und Reaktorsicherheit (GRS) mbH;
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Associated Organization(s):

Bundesamt fuer Strahlenschutz

Recent publication info:

920

GFR19980013

Title:

Recycling of waste and removal of radioactive waste resulting from decommissioning of nuclear installation

Title in Original Language:

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 404 -
Non-Reactor Facility Decommissioning

Abstract:

Within the scope of the disposal of radioactive waste originating from decommissioning of nuclear installations (including wastes originating from decommissioning of radioactive sources used in the former GDR) the following working program is planned. Characterization of the waste-flow originating from decommissioning with respect to recyclability in compliance with the planned legal regulations for such waste in the Atomic Energy Act; Characterization and evaluation of radioactive waste originating from decommissioning activities with respect to their qualification for disposal in the Konrad and Morsleben final repository in compliance with current repository regulations; Development of recycling processes or development of repository-specific conditioning of special waste (i.e. radioactive sources) from the former new states; Supporting the BMU in designing legal regulations in the Atomic Energy Act in the field of recyclable waste.

WM Descriptor(s): decommissioning; radioactive waste disposal; radioactive waste facilities; radioactive waste management; regional analysis; regulations; reprocessing; underground disposal; waste forms

Principal Investigator(s):

PFEIFER, F.

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Wurtinger W.

Organization Type:

Other

Program Duration: From: 1994-8-1 To: 1997-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Associated Organization(s):

Gesellschaft fuer Anlagen- und Reaktosicherheit (GRS) mbH; Schwertnergasse 1 50667 Koeln

Bundesamt fuer Strahlenschutz

Recent publication info:

921

GFR19980014

Title:

Effects of different scales of soil heterogeneity on the transport of radionuclides in the saturated and unsaturated zone

Title in Original Language:

Enifluss der natuerlichen Bodenvariabilitaet auf den Transport von radioaktiven Stoffen in der ungesaettigten und gesaettigten Bodenzone

Topic Code(s):

201 -Dispersion and Migration of Radionuclides;
303 -Earth Science Models and Studies

Abstract:

Traditional deterministic mathematical ground-water flow and transport models don't take into account the uncertainty caused by the lack of knowledge about the 'true' size and distribution of important soil parameters (e.g. hydraulic conductivity). But effective evaluation of ground-water flow and transport problems requires consideration of the range of possible interpretations of the subsurface given the available data. Knowing that heterogeneity is critical to the movement of contaminants each interpretation will affect ground-water flow and contaminant prediction in different ways. In this R and D-project different approaches are evaluated to tackle this problem. A current approach we focus on is the geostatistical simulation as a measure for interpolation and interpretation of hard data (data with negligible uncertainty such as direct measurements of hydraulic conductivity) in order to get a conceptual model that is usable as a basis for the numerical model calculations. Then different model-input realizations are generated of e.g. the hydraulic conductivity fields. The following repeated application of the numerical modeling (Monte-Carlo simulations) leads to a quantification of the uncertainty in model predictions. Large-scale heterogeneity is considered by geological data concerning the saturated zone while the small scale investigations are done by means of data gained in the unsaturated zone. This approach is going to be tested with a practical application for the area in the vicinity of the nuclear power plant Muelheim-Kaerlich. For this region a sufficient amount of geological data is available. For determining the hydraulic heads in the Monte-Carlo simulations common groundwater model software like SUTRA MODFLOW and MT3D is used.

WM Descriptor(s): computerized simulation; environmental transport; flow models; geologic models; ground water; Monte Carlo method; numerical analysis; radionuclide migration; soils

Principal Investigator(s):

THEIS, H.J.

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Organization Performing the work:

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Other Investigators:

Dr. Bertsch W.

Organization Type:

Other

Program Duration: From: 1995-1-1 To: 1997-12-31

State of Advancement: Research in progress

Sponsoring Organization(s):

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Recent publication info:

922

GFR19980015

Title:
Safety of final repositories for radioactive wastes in the post-operational phase

Title in Original Language:
Sicherheit im Nachbetrieb von Endlagern fuer radioaktive Abfalle

Topic Code(s):
304 -Safety Assessment and Performance Studies; 326 -Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:
The project's aim is to monitor and evaluate the procedures for verifying the long-term safety of final repositories. In the process the current state of the art is taken into account and national as well as international developments and methods are included in the evaluation. The particular objectives are. Geomechanics: Near-field Far-field; Long-term safety analyses: Analysis of scenarios Near-field - final repository mine Geosphere Chemical effects Biosphere Codes and guides Bilateral co-operation EVEREST.

WM Descriptor(s): biosphere; geology; radioactive waste disposal; safety analysis; underground disposal

Principal Investigator(s):
BALTES, B.

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Other Investigators:
Watermeyer V.

Organization Type:
Other

Program Duration: From: 1992-1-1 To: 1995-3-31

State of Advancement: Unknown

Sponsoring Organization(s):
Gesellschaft fuer Anlagen- und Reaktorsicherheit (GRS) mbH;
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Recent publication info:
923

GFR19980016

Title:
Transport of radioactive materials. Safety analyses relevant to radiological protection (St.Sch. 4058/INT 9006)

Title in Original Language:
Befoerderung radioaktiver Stoffe - Sicherheitsanalysen unter Strahlenschutzaspekten

Topic Code(s):
118 -Waste Transportation (Methods, Containers, Transportation Means); 232 -Environmental Risk Assessment

Abstract:
Within the scope of a Government sponsored research project (Ministry for the Environment Nature Conservation and Reactor Safety (BMU) safety analyses have been performed with the objective to assess and evaluate the safety standard of national and international radioactive material transports. The work performed included for example the collection analysis development and application of databases methods and assessment tools for quantifying the radiological risks resulting from routine transportation and potential accidents of radioactive material shipments. Special efforts were devoted to the assessment of the radiological risks associated with the anticipated return of radioactive reprocessing waste materials from France to Germany and in support of the 1996 revision of the IAEA Transport Regulations.

WM Descriptor(s): information systems; radiation protection; radioactive materials; risk assessment; safety analysis; safety standards; transport; waste transportation

Principal Investigator(s):

LANGE, FLORENTIN

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Other Investigators:

Dr. Fett H.J.; Dr. Schwartz G.

Organization Type:

Other

Program Duration: From: 1992-1-1 To: 1995-3-31

State of Advancement: Unknown

Sponsoring Organization(s):

Gesellschaft fuer Anlagen- und Reaktorsicherheit (GRS) mbH; Schwertnergasse 1 D-50667 Koeln

Recent publication info:

924

GFR19980017

Title:

Safety evaluation of R and D activities concerning direct final storage of spent fuel elements and heat-generating radioactive wastes

Title in Original Language:

Sicherheitstechnische Bewertung von F und E Arbeiten zur Endlagernung abgebrannter Brennelemente und waermeentwickelnder Abfaelle

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 145 - Spent Fuel Packaging (Canisters, Materials. etc.)

Abstract:

The aim of the activities of the GRS is to follow and evaluate from a safety point of view the development and performance of R and D work concerning direct final storage of spent fuel elements and heat-generating radioactive wastes. The evaluation of R and D work is to achieve i.a. the following particular objectives: timely discussions of issues relevant to licensing with the bodies concerned independent evaluation and development of R and D work examination of instruments for safety analyses qualification of computer codes consideration of international developments.

WM Descriptor(s): evaluation; radioactive waste disposal; radioisotope heat sources; research programs; risk assessment; safety analysis; spent fuel storage

Principal Investigator(s):

BALTES, B.

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Other Investigators:

Watermeyer V.

Organization Type:

Other

Program Duration: From: 1990-10-1 To: 1994-2-28

State of Advancement: Unknown

Sponsoring Organization(s):

Gesellschaft fuer Anlagen- und Reaktorsicherheit (GRS) mbH;
Schwertnergasse 1 D-50667 Koeln

Recent publication info:

925

GFR19980018

Title:

Safety analysis and further examinations of the Morsleben final repository

Title in Original Language:

Sicherheitsanalysen und weiterfuehrende Untersuchungen zum Endlager Morsleben

Topic Code(s):

324 -Safety Assessment and Performance Studies

Abstract:

Phase I of the safety analysis of the Morsleben final repository carried out by the Gesellschaft fuer Anlagen- und Reaktorsicherheit (GRS)mbH on behalf of Federal Minister of the Environment Nature Conservation and Nuclear Safety (BMU) was completed at the end of February 1991 with a final report. The result of Phase I is the conclusion that the current assessment of the situation of the Morsleben Final Repository for Radioactive Wastes (abbreviation of the German: ERAM) and the safety evaluation do not indicate any hazards which would require the closure of the facility. However some backfitting measures have been identified. The investigations of Phase II will concentrate on the regulatory control of the activities i.e. the monitoring of the implementation of the identified and recommended backfitting measures as well as a detailed analysis with more realistic assumptions for the post-operational phase. Furthermore evaluations of geo-technical issues and concepts (e.g. seismological site conditions hydro-geological models) are to be carried out in agreement with the BMU.

WM Descriptor(s): geologic models; morsleben salt mine; radiation monitoring; radioactive waste disposal; regulations; safety analysis; seismic surveys; underground disposal

Principal Investigator(s):

BALTES, B.

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Other Investigators:

Watermeyer V.

Organization Type:

Other

Program Duration: From: 1990-8-1 To: 1994-4-30

State of Advancement: Unknown

Sponsoring Organization(s):

Gesellschaft fuer Anlagen- und Reaktorsicherheit (GRS) mbH;
Schwertnergasse 1 D-50667 Koeln

Recent publication info:

926

GFR19980019

Title:

Investigation of fundamental safety related aspects during the decommissioning of nuclear facilities. Part 2. Safety inspections and emissions

Title in Original Language:

Untersuchung von grundsaetzlichen sicherheitstechnischen Aspekten bei der Stillegung kerntechnischer Anlagen. Teil 2. Sicherheitsbetrachtungen und Emissionen

Topic Code(s):

402 -Nuclear Power Reactor Decommissioning;
404 -Non-Reactor Facility Decommissioning

Abstract:

The study screens expert opinions concerning German decommissioning projects. It concentrates on the analysis of possible accidents. In order to judge safety considerations generic studies were done too.

WM Descriptor(s): decommissioning; environmental impacts; radiation accidents; radiation doses; radiation protection; safety analysis

Principal Investigator(s):

JOHN, T.

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Organization Performing the work:

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Other Investigators:

Thierfeldt S.

Organization Type:

Other

Program Duration: From: 1993-1-1 To: 1994-1-1

State of Advancement: Unknown

Sponsoring Organization(s):

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Recent publication info:

927

GFR19980020

Title:

Radiological consequences of recycling of #alpha#-contaminated metal scrap and special topics concerning contaminated metal scrap

Title in Original Language:

Ermittlung der radiologischen Konsequenzen der schadlosen Verwertung von #alpha#-haltigem Metalschrott. Sonderpunkte betreffend kontaminierten Metalschrott

Topic Code(s):

159 -Recovery of Radionuclides from the Waste;
163 -Solid Waste Treatment

Abstract:

The study compiles essential data concerning present and future rise of #alpha#-contaminated metal scrap. Its aim was to work out recommendations for exemption levels for the anthropogen activity which ensure that the reuse of the concrete debris or buildings of the former controlled area do not lead to doses above 10 #mu#Sv/a (de 'minimis' dose). For the dose assessment possible exposure scenarios which can appear during the recycling of metal scrap were investigated and the resulting doses were assessed

WM Descriptor(s): alpha-bearing wastes; decontamination; maximum permissible dose; radiation doses; radiation protection; radioactive wastes; recycling; scrap; solid wastes

Principal Investigator(s):

KISTINGER, S.

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Organization Performing the work:

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Other Investigators:

Deckert A.; Graf R.; Goertz R.; Goldammer W.; Thierfeldt S.; John T.

Organization Type:

Other

Program Duration: From: 1990-1-1 To: 1994-1-1

State of Advancement: Unknown

Sponsoring Organization(s):

Brenk Systemplanung; Heider-Hof-Weg 23 D-52080 Aachen Germany

Recent publication info:

928

GFR19980021

Title:

Radiological consequences of recycling and reuse of slightly radioactively contaminated or activated concrete debris and conventional reuse of former buildings of the controlled area

Title in Original Language:

Untersuchung der schadlosen Verwertung bzw. Wiederverwendung von schwach kontaminiertem oder aktiviertem Bauschutt bzw. Gebaeudeteilen

Topic Code(s):

159 -Recovery of Radionuclides from the Waste;
163 -Solid Waste Treatment

Abstract:

The study compiles essential data concerning present and future rise of contaminated concrete debris and the possibilities of its recycling. Its goal was to work out recommendations for exemption levels for the anthropogen activity which ensure that the reuse of concrete debris or buildings of the former controlled area do not lead to doses above 10#mu#Sv/a (de'minimis' dose). For the dose assessment possible exposure scenarios which can appear during the processing and reuse of concrete debris and renovation and use of buildings were investigated and the resulting doses were assessed by deterministic and statistic scenarios.

WM Descriptor(s): buildings; concretes; decontamination; maximum permissible dose; radiation doses; radiation protection; radioactive materials; recycling; remedial action; solid wastes

Principal Investigator(s):

KISTINGER, S.

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Organization Performing the work:

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Other Investigators:

Deckert A.; Graf R.; Goertz R.; Goldammer W.; Thierfeldt S.; John T.

Organization Type:

Other

Program Duration: From: 1990-1-1 To: 1994-1-1

State of Advancement: Unknown

Sponsoring Organization(s):

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Germany

Recent publication info:

929

GFR19980022

Title:
Conservativity analysis of clearance levels for the release of slightly radioactive materials for recycling or disposal

Title in Original Language:

Bewertung von Konservativitaeten bei Grenzwerten fuer die Freigabe schwach radioaktiver Reststoffe zur Rezyklierung oder Deponierung wie gewoehnliche Abfaelle

Topic Code(s):

163 -Solid Waste Treatment; 304 -Safety Assessment and Performance Studies

Abstract:

Assumptions used to calculate clearance levels for slightly radioactive materials for conventional recycling or disposal are chosen conservatively due to radiological reasons. However the level of conservatism is usually different for different sets of clearance levels. This can result in incompatible clearance levels for various release pathways. The research work aims at making the conservatism of clearance levels comparable. The procedure is developed by analysis of clearance levels for recycling of metal scrap from nuclear power plants and clearance levels for landfill disposal of wastes from nuclear installations as conventional waste. Both sets of clearance levels have been incorporated in recommendations of the German Commission for Radiation Protection. In addition the dependence of waste management costs on the clearance levels is analysed for the German situation.

WM Descriptor(s): ground disposal; radioactive materials; radioactive waste disposal; radioactive waste management; recommendations; recycling; safety analysis; safety standards; sanitary landfills

Principal Investigator(s):

THIERFELDT, S.

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Organization Performing the work:

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Other Investigators:

Deckert A.; John T.

Organization Type:

Other

Program Duration: From: 1995-11-1 To: 1997-3-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Brenk Systemplanung; Heider-Hof-Weg 23 D-52080 Aachen
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Recent publication info:

930

GFR19980023

Title:
Transport of radioactive waste to the final repository Morsleben

Title in Original Language:

Topic Code(s):

Abfalltransporte zum Endlager fuer radioaktive Abfaelle Morsleben

118 -Waste Transportation (Methods, Containers, Transportation Means); 232 -Environmental Risk Assessment

Abstract:

A safety analysis has been conducted for the transports of non-heat generating radioactive waste to the final repository MORSLEBEN. The results of the transport study show that no major associated risks would result from the waste transports destined for the final repository MORSLEBEN.

WM Descriptor(s): morsleben salt mine; risk assessment; safety analysis; transport; underground disposal; waste transportation

Principal Investigator(s):

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Other Investigators:

Organization Type:

Other

Program Duration: From: 1994-10-1 To: 1996-4-1

State of Advancement: Unknown

Sponsoring Organization(s):

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Recent publication info:

931

GFR19980024

Title:

Source term for performance of assessment of spent fuel as a waste form

Title in Original Language:

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 304 -Safety Assessment and Performance Studies

Abstract:

For the assessment of the potential performance of directly disposed spent fuel in a nuclear waste repository in salt formations the chemical reactions of the fuel with possibly intruding salt brines must be understood and the associated radionuclide release must be quantified. In this context a large research project is carried out combining experimental approaches (corrosion tests) with modeling techiques. In order to simulate conditions close to the reality of repository situations mainly powdered (diameter approx 3 #mu#m) high burnup UO_2-fuel is being exposed also in the presence of the corroding container and the backfill material to salt solutions under anaerobic static conditions. The behavior of a large quantity of radionuclides released into solution and gas phase is analysed in order to identify general corrosion properties of the fuel itself and element specific secondary processes including contributions of possible colloid formations. For long-term extrapolations of radiolysis effects mass balance of radiolytic oxidant production and consumption by corrosion must be understood.

WM Descriptor(s): brines; corrosion; environmental transport; radioactive waste disposal; radiolysis; radionuclide migration; salt caverns; source terms; spent fuels; underground disposal; waste-rock interactions

Principal Investigator(s):

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Other Investigators:

Grambow B.; Geckeis H.; Mueller N.

Organization Type:

Other

Program Duration: From: 1995-1-1 To: 1998-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Forschungszentrum Karlsruhe INE; Postfach 3640 D-76021 Karlsruhe Germany

Associated Organization(s):

Various EU laboratories

Recent publication info:

932

GFR19980025

Title:

Coprecipitation phenomena during spent fuel dissolution

Title in Original Language:

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 201 - Dispersion and Migration of Radionuclides

Abstract:

Coprecipitation may be a significant process in controlling radionuclide release during spent fuel dissolution in geological disposal. In precipitation tests stable solid phases upper limits for solution concentrations and distribution ratios of radionuclides are expected to be determinable. Solutions of spent UO_2 fuel (dissolved in strong acid) with similar initial U(VI) concentration are neutralized under anaerob conditions. The resulting precipitation of secondary U(VI) phases such as schoepite leads in part to coprecipitation of radionuclides or homologue elements. pH is kept constant at values between 6 and 10 during the precipitation process by adding NaOH. Radionuclides are analyzed radiochemically. The precipitating phases are analyzed by XRD SEM/EDX and ICP/MS to identify whether solid solutions are formed or whether individual radionuclide phases precipitate. Colloid formation is studied by using ultrafiltration techniques. Precipitation of U(VI) solid phases is also studied in granitic waters of various salinity with and without bentonite present.

WM Descriptor(s): coprecipitation; dissolution; isotope ratio; quantitative chemical analysis; radionuclide migration; salt caverns; spent fuels; underground disposal; uranium dioxide

Principal Investigator(s):

GRAMBOW, B.

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Organization Performing the work:

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Other Investigators:

Loida A.; Geckeis H.; Quinones J.

Organization Type:

Other

Program Duration: From: 1995-1-1 To: 1998-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Forschungszentrum Karlsruhe INE; Postfach 3640 D-76021 Karlsruhe Germany

Associated Organization(s):

Various EU laboratories

Recent publication info:

933

GFR19980026

Title:

Radionuclide behaviour during corrosion of borosilicate glass CEA/R7T7

Title in Original Language:

Topic Code(s):

134 -Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies); 201 - Dispersion and Migration of Radionuclides

Abstract:

The objective of this work is to describe the extent to which radionuclides are mobilized from vitrified high-level radioactive waste into the near field of an HLW repository in a salt formation when a hot and concentrated salt solution comes into contact with the glass. Waste form corrosion studies are conducted with a salt solution representing the composition of a fluid phase encountered in drill holes in the Gorleben salt dome. Safety relevant radionuclides considered are "2"3"7Np 2 4"1Am 2 3"8"-"2"4"2Pu 9 9Tc and "1"3"4"-"1"3"7Cs. The glass and its corrosion products will always be surrounded by additional barriers as canister overpacks and backfill materials. Especially the presence of iron has a strong influence on the radionuclide concentration in solution. To take credit for this effect all the concentration controlling factors must be completely understood. Hence corrosion experiments are focused to study multiple material interactions. Radiochemical analyses of leachates are completed by examination on colloid formation and determination of the oxidation states of Pu Np and Tc.

WM Descriptor(s): borosilicate glass; brines; corrosion; Gorleben salt dome; high-level radioactive wastes; isotope ratio; radioactive waste disposal; radionuclide migration; rock-fluid interactions; vitrification

Principal Investigator(s):

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Organization Performing the work:

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Other Investigators:

Luckscheiter B.; Geckeis H.; Loida A.

Organization Type:

Other

Program Duration: From: 1995-1-1 To: 1998-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Forschungszentrum Karlsruhe INE; Postfach 3640 D-76021 Karlsruhe Germany

Associated Organization(s):

Various EU laboratories

Recent publication info:

934

GFR19980027

Title:

Surface analysis of minerals container materials and glass with ESCA and SEM

Title in Original Language:

Topic Code(s):

109 -Waste Characterisation (Radionuclide Inventory Determination), including Computer Codes and Measuring Methods and Techniques; 181 -Methodologies, Analytical Methods, Measurements Instrumentation

Abstract:

ESCA (Electron Spectroscopy for Chemical Analysis) is applied to the elemental and chemical characterization of the top monolayers of solids. Mineral and soil surfaces are analyzed prior to and after sorption experiments with lanthanide and actinide ions to give information about elements involved in sorption processes. Elementary depth profiles of corrosion layers on container materials and simulated HAW glass are obtained by combination of ESCA and sequential removal of material by ion bombardment. SEM (Scanning Electron Microscopy) is used to analyze the structural and elemental composition of the surface of HAW glass and container materials after corrosion experiments or of natural mineral and soil surfaces. Even radioactive material with an activity of about 200 #mu#Sv can be prepared in a glove box and can be handled with the microscope.

WM Descriptor(s): chemical analysis; containers; corrosion; electron spectroscopy; glass; minerals; scanning electron microscopy; sorption; surface contamination

Principal Investigator(s):

ROEMER, J.

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Organization Performing the work:

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Other Investigators:

Schild D.

Organization Type:

Other

Program Duration: From: 1995-1-1 To: 1998-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Forschungszentrum Karlsruhe GmbH INE; Postfach 3640 D-76021 Karlsruhe

Recent publication info:

935

GFR19980028

Title:

Corrosion evaluation of HLW/spent fuel container materials

Title in Original Language:

Korrosionsuntersuchungen an Behaelterwerkstoffen

Topic Code(s):

135 -Waste Packaging (Canister Types, Materials, Corrosion Studies)

Abstract:

Within the 5th research programme of the European Commission (1995-1999) a multinational coordinated corrosion programme has been undertaken aimed at evaluating materials for long-lived HLW disposal containers that could act as a radionuclide barrier in a repository. The participating laboratories are: FZK Karlsruhe (coordinator) and FU-Berlin considering disposal in rock salt ENRESA/INASMET (Spain) covering disposal in rock salt and granite and SCK.CEN (Belgium) considering disposal in clay. Three materials are being investigated which were identified as promising in previous work. These are: Ti99.8-Pd and carbon steels for rock salt and Cr-Ni steels for granite and clay. Essential aspects of the investigations in salt environments

are gamma irradiation and stress corrosion cracking studies. In clay environments detailed electrochemical studies are being conducted.

WM Descriptor(s): carbon steels; chromium steels; containers; coordinated research programs; corrosion; high-level radioactive wastes; radioactive waste disposal; spent fuel storage; titanium base alloys; underground disposal

Principal Investigator(s):

SMAILOS, EMMANUEL

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Organization Performing the work:

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Other Investigators:

Fiehn B.; Weiler R.

Organization Type:

Other

Program Duration: From: 1996-1-1 To: 1998-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Forschungszentrum Karlsruhe INE; P.O.Box 3640 76021 Karlsruhe Germany

Associated Organization(s):

Various EU-laboratories

Recent publication info:

936

GFR19980029

Title:
Model calculations of the 'Thermal simulation of the drift emplacement' - Test

Title in Original Language:

Modellrechnungen zum Demonstrationsversuch 'Thermische Simulation der Streckenlagerung'

Topic Code(s):

323 -Earth Science Studies and Models

Abstract:

The 'Thermal simulation of the drift emplacement' test in a rock salt mine involving thermal loading lithostatic stress and backfill material provides the possibility to assess the capability of the available codes with respect to the numerical modelling of the thermomechanical behaviour of backfill and rock salt under repository conditions. The three dimensional temperature calculations are already performed with the finite element codes FAST and ADINA-T taking into consideration the finite length of the test field. For the thermomechanical investigations both MAUS and ADINA computer codes will be used. Firstly two-dimensional (plane-strain) calculations will be done. The resulting stresses in rock salt after drifts excavation and heating start the loading of the pillar between the drifts and the drift convergence followed by the compaction of the backfill material will be determined. The validation on the numerical results will be performed by comparison with in-situ measurements.

WM Descriptor(s): a codes; computerized simulation; f codes; m codes; mine shafts; positioning; salt caverns; temperature distribution; thermodynamic model; underground disposal

Principal Investigator(s):

PUDEWILLS, A.

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: 1995-6-1 To: 1998-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Institute fuer Nukleare Entsorgungstechnik Forschungszentrum Karlsruhe GMBH; Postfach 3640. D-76021 Karlsruhe Germany

Associated Organization(s):

FZK/PTE; GRS; BGR; DBE

Recent publication info:

937

GFR19980030

Title:

Investigation of thermal hydrologic and mechanical effects in the near field of a repository

Title in Original Language:

Untersuchung der thermo-hydro-mechanischen Vorgaenge im erweiterten Nahbereich eines Endlagers

Topic Code(s):

303 -Earth Science Models and Studies; 326 -Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

The objective of the investigations is the numerical modeling of thermo-hydro-mechanical effects in the near field of a waste repository taking into account the complex geological structure of the host rock. Stratigraphic inhomogeneities like anhydrite layers occurring in the salt formation show a thermomechanical behavior that differs significantly from that of rock salt. The excavation of the waste emplacement fields and the later rise of the temperature cause deformations and stresses in the inhomogeneous layers nearby which if they are large enough might create fractures through which brine or groundwater could flow to the waste or radionuclides could migrate out of the salt formation. First analyses of the thermomechanical influence of a waste emplacement field on the inhomogeneous layers such as anhydrite taking in consideration the failure of the rock salt and anhydrite are underway. Furthermore sensitivity analyses will be performed by varying the material parameters and the geometry of the assumed anhydrite layers. With respect to long-term safety analysis of a waste repository a numerical model involving the coupled processes such as thermal mechanical and hydrologic effects will be developed.

WM Descriptor(s): hydrology; positioning; radioactive waste disposal; rock mechanics; salt caverns; salt deposits; stratigraphy; temperature dependence; underground disposal

Principal Investigator(s):

PUDEWILLS, A.

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Organization Performing the work:

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Other Investigators:

Organization Type:
Other

Program Duration: From: 1995-6-1 To: 1999-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Institut fuer Nukleare Entsorgungstechnik Forschungszentrum Karlsruhe GmbH; Postfach 3640 D-76021 Karlsruhe Germany

Recent publication info:
938

GFR19980031

Title:
Modelling of brine flow and dissolution/precipitation

Title in Original Language:
Modellierung von Laugenstroemungen und Umloesungen

Topic Code(s):
303 -Earth Science Models and Studies

Abstract:

The flow of brine through porous pathways in salt repositories is modelled in 1-dimensional geometry. Two kinds of coupled effects are considered which are affecting porosity/permeability. Thermomechanical convergence and dissolution/precipitation of salt under the influence of temperature gradients and varying mineral composition along the flow path. Pitzer's equations are used to describe the dissolution and precipitation of salt minerals.

WM Descriptor(s): brines; dissolution; flow models; precipitation; rock mechanics; salt caverns; salt deposits; temperature dependence; underground disposal

Principal Investigator(s):
KORTHAUS, E.

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Organization Performing the work:
Forschungszentrum Karlsruhe INE
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Other Investigators:

Organization Type:
Other

Program Duration: From: 1995-1-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
Forschungszentrum Karlsruhe GmbH Institut fuer Nukleare Entsorgungstechnik; Postfach 3640 D-76021 Karlsruhe

Recent publication info:
939

GFR19980032

Title:
Measurements on crushed salt consolidation

Title in Original Language:
Messungen zur Kompaktierung von Salzgrus

Topic Code(s):
306 -Barrier Studies and Tests; 326 -Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

Measurements are performed on the consolidation and deviatoric deformation behaviour of dry crushed salt with use of a true triaxial testing apparatus specially developed for this purpose. Experimental conditions are selected which are relevant for the behaviour of backfill material at nuclear waste disposal in salt formations i.e. stresses up to 20 MPa temperatures up to 150 deg C and consolidation rates between 10"-"9 and 5x10"-"8/s.

WM Descriptor(s): backfilling; compacting; crushing; radioactive waste disposal; salt caverns; salts; underground disposal

Principal Investigator(s):

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: 1996-1-1 To: 1998-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Forschungszentrum Karlsruhe GmbH Institut fuer Nukleare Entsorgungstechnik; Postfach 3640 D-76021 Karlsruhe

Recent publication info:

940

GFR19980033

Title:

Natural analogues. Mobilisation and retention of REE Th U by alteration of basaltic glass in salt deposits

Title in Original Language:

Topic Code(s):

134 -Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies); 328 - Natural Analogue Studies

Abstract:

Basaltic glasses in salt deposits are natural systems which can be regarded as natural analogues to vitrified radioactive waste staying for millions of years in a corrosive salt repository. The evaporites of the Werra-Fulda district in Germany were intruded by basaltic dykes 10 to 20 million years ago. The investigated two dykes still contain glass though they have been intruded by brines and are corroded. The element exchange between glass and brine was very low due to a very low water content. The REE content (chemical homolog to the three-valent actinides) in a corroded dyke was the same between rim and center and the same as in another uncorroded dyke outside the evaporites. This may be due to the stability of the main REE-bearing minerals. The mobilisation of REE Th U in the glass phase and the retention of these elements in new-formed phyllosilicates in the basalts are under investigation.

WM Descriptor(s): basalt; brines; geologic models; glass; mobility; natural analogue; rare earths; salt deposits; sedimentary rocks; thorium; underground disposal; uranium

Principal Investigator(s):

BERNOTAT, W.

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Other Investigators:

Organization Type:

Other

Program Duration: From: 1996-1-1 To: 1998-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Forschungszentrum Karlsruhe I.N.E. Postfach 3640 Germany D-76021 Karlsruhe Germany

Recent publication info:

941

GFR19980034

Title:

Study of mechanisms of radionuclide retention by sorption on mineral surfaces

Title in Original Language:

Topic Code(s):

201 -Dispersion and Migration of Radionuclides;
303 -Earth Science Models and Studies

Abstract:

Sorption data of radionuclides on natural mineral surfaces are available in the literature mostly in terms of Kd-values which are valid only for the special system under the chosen conditions. A thermodynamically better founded quantification of the interaction of the dissolved metal ions with the surface sites is possible by the surface complexation model. However only a limited set of sorption data for this model is available. Furthermore most of the data are derived from fitting sorption experiments without independent validation of the postulated surface complexes. The objective of this study is to characterize and quantify the sorbed metal ion species by laser spectroscopic methods like time-resolved laser fluorescence spectroscopy or laser-induced photoacoustic absorption spectroscopy. These methods are sensitive enough to detect sub-monolayers of sorbed actinide ions and allow a differentiation between dissolved sorbed and precipitated actinide ion species. Additionally the speciation of sorbed "1"8"1Hf which is a chemical homologue for tetravalent actinide ions is analyzed by time differential perturbed angular correlation (TDPAC). Until now the sorption on silica was studied by laser-fluorescence spectroscopy for U(VI) Eu(III) and Cm(III). Future work will include the interaction with other mineral surfaces including the influence of humic substances.

WM Descriptor(s): curium ions; europium ions; fluorescence spectroscopy; hafnium 181; laser spectroscopy; minerals; sorption; sorptive properties; surfaces; uranium ions

Principal Investigator(s):

KLENZE, R.

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Organization Performing the work:

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Other Investigators:

Geckeis H.; Paviet P.; Degering D.; Bublitz D.; Rabung Th.

Organization Type:

Other

Program Duration: From: 1995-1-1 To: 1999-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Forschungszentrum Karlsuhe INE P. O. Box 3640 D-76021
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Recent publication info:

942

GFR19980035

Title:

Influence of colloids on the radionuclide migration in the near and far field of a nuclear waste repository

Title in Original Language:

Topic Code(s):

201 -Dispersion and Migration of Radionuclides;
303 -Earth Science Models and Studies

Abstract:

The objective of this research programme is to get a better understanding of the relevance of colloid facilitated transport of radionuclides which is discussed controversially in performance assessment of nuclear waste disposal. The work is addressed to the most relevant properties of colloids: (1) their generation in the near and far field of a repository (2) their quantification and size distribution (3) their chemical and physico-chemical characterization (4) their stability (5) their interaction with the geomatrix and (6) their transport in the geological formation. Generation of true actinide colloids are studied under simulated conditions of dissolution of spent fuel elements. The activities in the far field are related to the formation of pseudo colloids by interaction of actinide ions with natural organic (humic) colloids. Laser-induced breakdown detection (LIBD) was developed recently for quantification of colloids with diameter >20 nm in the sub ppb concentration range. Column experiments are performed in order to study the stability of colloids their interaction with mineral surfaces and their transport properties. To predict the colloid influence on the radionuclide migration a geochemical transport model will be developed.

WM Descriptor(s): actinide complexes; colloids; radioactive waste disposal; radionuclide migration; underground disposal

Principal Investigator(s):

GECKEIS, H.

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Organization Performing the work:

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Other Investigators:

Klenze R.; Marquardt Ch.; Scherbaum F.; Hauser W.;
Knopp R.; Bundschuh T.

Organization Type:

Other

Program Duration: From: 1996-1-1 To: 1999-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

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Recent publication info:

943

GFR19980036

Title:

Migration of radionuclides. Aquatic chemistry and thermodynamics of redox sensitive actinides and fission products

Title in Original Language:

Topic Code(s):

201 -Dispersion and Migration of Radionuclides;
221 -Environmental Transfer Models

Abstract:

Np-237 and Tc-99 are of considerable interest for the safety of nuclear waste disposal because of their long half lifes and their relative large abundance in nuclear waste. The modelling of radionuclide migration in geological aquifers requires the knowledge of the aquatic chemistry (speciation) a reliable thermodynamic database and appropriate model parameters. Experimental studies are performed in dilute to concentrated salt solutions to investigate the following reactions and thermodynamic quantities: the formation and stability of solid phases; solid-liquid equilibria (solubilities); hydrolysis reactions; complexation reactions with carbonate chloride and other ligands occurring in natural systems; redox equilibria Np(V)/Np(IV) and Tc(VII/Tc(IV); activity coefficients of the species in solution. The experimental data are used to evaluate the chemical potentials of the solid and dissolved radionuclide species and to evaluate the ion interaction Pitzer parameters for the species in solution. The Pitzer equations are applied for thermodynamic modelling of radionuclides as trace components in electrolyte solutions (e.g. in EQ3/6).

WM Descriptor(s): actinides; aquifers; fission products; neptunium 237; radioactive waste disposal; radionuclide migration; redox potential; solubility; technetium 99; transport modes; underground disposal

Principal Investigator(s):

NECK, V.

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Other Investigators:

Fanghaenel Th.; Koennecke Th.; Kim J.I.

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

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Recent publication info:

944

GFR19980037

Title:

Development and application of coupled migration/speciation codes. Application on the migration of americium in columns.

Title in Original Language:

Topic Code(s):

202 -Dispersion and Migration Models; 303 -Earth Science Models and Studies

Abstract:

A one-dimensional coupled transport/speciation code has been developed which can be used as a tool in evaluating flow-through column experiments. TRANSEQL is based on a one-dimensional diffusion/advection code which is coupled iteratively with the MINEQL code. Sorption processes can be modeled by surface

complexation or by ion exchange. The code was applied to column experiments which were performed to investigate the sorption behavior of americium in the presence of humic acid in the groundwater. Different speciation models were considered assuming the existence of hydroxo or carbonato complexes. The computed migration behavior of Am depended on the choice of the speciation model on the concentration of surface complexation sites and on the stability constants of the surface complexes. Under consideration of hydroxo surface complexes Am was mainly complexed with humate resulting in a computed migration behavior similar to a nonsorbing tracer. This finding corresponded well to the experimental results.

WM Descriptor(s): americium; americium complexes; computerized simulation; environmental transport; extraction columns; humic acids; sorption; t codes

Principal Investigator(s):

Kienzler, B.

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: 1992-1-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

Forschungszentrum Karlsruhe P.O.Box 3640 D-76021
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Recent publication info:

945

GFR19980038

Title:

Elemental and isotopic analyses of radioactive wastes using ICP-MS

Title in Original Language:

Topic Code(s):

109 -Waste Characterisation (Radionuclide Inventory Determination), including Computer Codes and Measuring Methods and Techniques

Abstract:

Conditioning of solid and liquid radioactive wastes with a view of safe intermediate and final storage calls for the assay of their content in fissible uranium and plutonium. For this purpose the isotopic compositions of both elements are measured and their concentrations determined by isotopic dilution analyses with mass spectrometry (IDA) using U-233 and Pu-244 as spikes. The uranium isotopes 234 235 236 and 238 and the plutonium isotopes 238 239 240 241 and 242 are measured. A modified ICP mass spectrometer connected to a glove box is used for measurement. As isobars such as U-238 and Pu-238 cannot be differentiated on account of the limited resolution of the ICP-MS plutonium has to be separated from the uranium in excess. This also excludes disturbance in the mass spectrum of Pu-239 by U-238. After specific conversion of plutonium into the oxidation state +IV it is separated from uranium by sorption on a column using didecyl octyl methyl ammonium nitrate. Uranium is not retained in this process. Plutonium is eluated with a mixture of 0.1 M HCl/0.1 M HF and the e uate is analyzed. In addition Pu-238 is assayed by alpha-spectroscopy in an aliquot of the plutonium fraction.

WM Descriptor(s): isotope dilution; isotope ratio; mass spectroscopy; plutonium; plutonium isotopes; radioactive wastes; separation processes; uranium; uranium isotopes

Principal Investigator(s):

Gompper, K.

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Other Investigators:

Geckeis H.; Hentschel D.

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Unknown

Sponsoring Organization(s):

Forschungszentrum Karlsruhe INE P.O. Box 3640 D-76021
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Recent publication info:

946

GFR19980039

Title:

Radiolytic effects and gas production in the near field of a waste disposal

Title in Original Language:

Strahlenchemische Effekte und Gasproduktion im Endlagernahbereich

Topic Code(s):

134 -Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies); 326 - Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

High level waste disposed in rock salt irradiates its surrounding. Penetrating water produces radiolytic compounds which can undergo redox and complexation reactions with dissolved radionuclides thus changing their mobility. The objective of this program is to investigate such radiolytic effects and to study the impact of gaseous radiolytic products. The project was started with the dissolution of gamma-irradiated solid NaCl and MgCl_2 centre dot 6 H_2O in water. The yield of radiolytic compounds (hydrogen oxygen hypochlorite chlorite and chlorate) is determined. Their influence on the pH and Eh of the resulting brines is measured.

WM Descriptor(s): chemical reaction kinetics; chlorine compounds; high-level radioactive wastes; hydrogen; oxygen; radiation chemistry; radioactive waste disposal; radiolysis; underground disposal

Principal Investigator(s):

KELM, MANFRED

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Other Investigators:

Bohnert E.

Organization Type:

Other

Program Duration: From: 1992-1-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

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Recent publication info:

947

GFR19980040

Title:

Migration of radionuclides. Aquatic chemistry and thermodynamics of trivalent actinides

Title in Original Language:

Topic Code(s):

201 -Dispersion and Migration of Radionuclides;
221 -Environmental Transfer Models

Abstract:

The main objective of the project is the determination of the thermodynamic properties of trivalent actinides in natural multicomponent systems particularly in concentrated electrolyte solutions. For this purpose the aquatic chemistry the standard chemical potentials of all species involved (aqueous solid) as well as activity coefficients are determined. Cm(III) was chosen as representative for the trivalent actinides. The aquatic chemistry of Cm(III) in trace amounts is investigated by means of Time Resolved Laser Fluorescence Spectroscopy (TRLFS). The fluorescence spectroscopic sensitivity of curium enables speciation at submicro-mole concentration ranges. The interaction of Cm(III) with the main inorganic ligands (OH"- CO_3"2"- SO_4"2"- and Cl"-) is investigated in diluted to concentrated salt solutions and the appropriate thermodynamic data are determined. The data are used for developing thermodynamic/geochemical model capable of predicting the behavior of actinides in natural aquatic systems.

WM Descriptor(s): aqueous solutions; curium; fluorescence spectroscopy; geochemistry; laser spectroscopy; ligands; quantitative chemical analysis; radionuclide migration; thermodynamics

Principal Investigator(s):

FANGHAENEL, TH.

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Organization Performing the work:

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Other Investigators:

Paviet P.; Weger H.; Schubert G.

Organization Type:

Other

Program Duration: From: 1993-1-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

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Recent publication info:

948

GFR19980041

Title:

Migration of radionuclides. Development of geochemical/thermodynamic models for actinides and fission products in aquatic systems

Title in Original Language:

Topic Code(s):

201 -Dispersion and Migration of Radionuclides; 221 -Environmental Transfer Models

Abstract:

Thermodynamic models are the basis for the prediction of the behavior of long-lived actinides and fission products in natural multicomponent electrolyte solutions. The ion interaction (Pitzer) approach combined with association concepts is employed to describe the main homogeneous and heterogeneous equilibria of the actinides and fission products in aquatic systems in the relevant concentration range (diluted to saturated salt solutions). The main objective is the development of a data bank containing interaction coefficients and chemical potentials of the important species. Literature data are compiled and critical evaluated the models are parametrized and appropriate software is developed. Correlations between analogue systems properties and parameters are determined and introduced in the models.

WM Descriptor(s): actinides; aqueous solutions; electrolytes; fission products; geochemistry; geologic models; radionuclide migration; thermodynamic model

Principal Investigator(s):

FANGHAENEL, TH.

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Organization Performing the work:

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Other Investigators:

Koennecke Th.

Organization Type:

Other

Program Duration: From: 1996-1-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

Forschungszentrum Karlsruhe; P.O.Box 3640 D-76021 Karlsruhe/Germany Institut fuer Nukleare Entsorgungstechnik

Recent publication info:

949

GFR19980042

Title:

Thermal simulation of drift emplacement (TSDE)

Title in Original Language:

Thermische Simulation der Streckenlagerung (TSS)

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 323 - Earth Science Studies and Models

Abstract:

To demonstrate the suitability of direct disposal of heat generating spent fuel in drifts of a salt repository a large-scale field test 'Thermal Simulation of Drift Emplacement (TSDE)' is being carried out in the Asse salt mine in a cooperation between FZK GRS DBE and BGR. The objective is to investigate the thermomechanical behaviour of the host rock and of the crushed salt used for backfilling of the drifts. The test field includes two drifts each containing three heater casks. The R and D project carried out by the BGR comprises the following geotechnical investigations: development and testing of geomechanical measurement techniques; determination of initial rock stress and measurement of stress change induced by excavation and by heating; measurement of rock deformability and of rock temperature; measurement of permeability of the host rock and the backfilling; model calculations to analyze the measured data.

WM Descriptor(s): Asse salt mine; backfilling; compacting; mine shafts; positioning; rock mechanics; salt caverns; salts; spent fuels; underground disposal

Principal Investigator(s):

Heusermann, Stefan, Dr.

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FEDERAL INSTITUTE FOR GEOSCIENCE NATURAL RESOURCES
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Other Investigators:

Koss S.; Sprado K.H.; Gloeggler W.

Organization Type:

Other

Program Duration: From: 1994-7-1 To: 1996-1-1

State of Advancement: Unknown

Sponsoring Organization(s):

Fed. Inst. for Geosciences and Nat. Resources (BGR)

Associated Organization(s):

FZK GRS DBE

Recent publication info:

950

GFR19980043

Title:

Mass transport in fractured rock and characterization of the zone distributed by excavation (EDZ) of the tunnel

Title in Original Language:

Stofftransport in geklueftetem Fels und Gebirgscharakterisierung im Stollennahbereich

Topic Code(s):

322 -Site Survey and Characterization; 324 -Safety Assessment and Performance Studies

Abstract:

To analyse and judge the safety of the radioactive wastes deposited in hard rock the German Federal Institute for Geosciences and Natural Resources has conducted numerous geological and hydrogeological investigations at the Grimsel Test Site in Switzerland in cooperation with Nagra (Swiss National Cooperative for the Disposal of Radioactive Waste) for more than ten years. The main activities in the previous project phases have been development of the concepts methods models and equipment: for two-phase flow and transport experiments in the fracture network around nearfield of the tunnel; for large-scale tracer experiments in the fractured rock; for geological studies to characterize the Zone Disturbed by Excavation.

WM Descriptor(s): excavation; fluid flow; geology; hydrology; mass transfer; radioactive waste disposal; rock-fluid interactions; safety analysis; tracer techniques; tunnels; underground disposal

Principal Investigator(s):

LIEDTKE, LUTZ

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Other Investigators:

Dr. Braeuer V.; Dr. Alheid J.

Organization Type:

Other

Program Duration: From: 1994-7-1 To: 1997-6-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Federal Institute for Geosciences and Natural Resources

Associated Organization(s):

NAGRA GSF (Research Centre for

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Environmental Sciences Germany

Recent publication info:

951

GFR19980044

Title:

Investigations on modeling density-dependent groundwater movement with regard to verification and validation of a fast computer code under development

Title in Original Language:

Topic Code(s):

323 -Earth Science Studies and Models

Abstract:

The deep groundwater movement especially in the vicinity of salt deposits which are considered as disposal sites for radioactive and other toxic wastes is often strongly influenced by salinity-dependent water density. This influence has to be taken into account in realistic model calculations describing the recent flow situation as well as in similar model calculations to examine the long term safety of permanent repositories. Because it is not possible to model such three-dimensional heterogeneous groundwater systems with the existing codes (requiring very long computing times and large amount of computer storage) a fast computer code is being developed in Germany. The objective of this project is firstly to support the development of this new computer code. Secondly test calculations with the new code and comparative calculations with existing codes some of which will be done within national or international cooperation projects will be carried out with regard to verification and validation of the new computer code. The investigations will help in preparing a validated model for the quantitative description of regional density-dependent groundwater movement in heterogeneous porous media.

WM Descriptor(s): computer codes; computerized simulation; flow models; ground water; rock-fluid interactions; salinity; salt deposits; underground disposal

Principal Investigator(s):

SCHELKES, KLAUS

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Other Investigators:

Dehn T.; Vogel P.

Organization Type:

Other

Program Duration: From: 1995-8-1 To: 1998-7-1

State of Advancement: Research in progress

Sponsoring Organization(s):

BGR; Postfach 510153 D-30631 Hannover Germany

Associated Organization(s):

GRS BfS

Recent publication info:

952

GFR19980045

Title:

Dam constructions in radioactive waste repositories in salt formations - long-term sealing system

Title in Original Language:

Topic Code(s):

325 -Design, Construction, Commissioning

Abstract:

The main objective of the project 'Dam constructions in radioactive waste repositories in salt formations' was to

prove the long-term sealing capability of an entire dam construction. The long-term seal which is responsible for the long-term safety of a dam construction was to be subjected to an in-situ test. The objectives of the in-situ test were to provide proof of the tightness and to predict the long-time tightness via model calculations. The technical components of the test constructions in the Asse salt mine were designed and the test field was prepared. The devices to perform pressurization tests were designed and fabricated as well as the instrumentation for the in-situ measurements. Due to a decision in 1992 the in situ construction of the long-term seal was stopped. The permeability of the host rock surround the test field has been investigated by well pressure tests. The material behaviour of salt briquettes and mortar the main components of the long-term seal were investigated in laboratory experiments. This included mineralogical and chemical investigations. Due to the mechanical consistency of the salt briquettes a planned in-situ experiment in the Amelie mine was stopped. In order to predict the long-term behaviour the multiphase flow computer code CODE BRIGHT was developed and verified.

WM Descriptor(s): Asse salt mine; c codes; closures; construction; dams; flow models; radioactive waste disposal; safety; salt deposits; seals; underground disposal

Principal Investigator(s):

BOLLINGERFEHR, W.

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Other Investigators:

Laurens J.F.; Sureau J.F.; Huertas F.; Alonso E.E.; Carrera J.; Stockmann N.

Organization Type:

Other

Program Duration: From: 1991-4-1 To: 1995-3-1

State of Advancement: Unknown

Sponsoring Organization(s):

Deutsche Gesellschaft zum Bau und Betrieb von Endlagern fuer Abfallstoffe mbH (DBE); Woltorfer Str. 74 D-31224 Peine

Associated Organization(s):

ANDRA ENRESA GSF

Recent publication info:

953

GFR19980046

Title:

Building the safety case for a hypothetical repository in crystalline rock

Title in Original Language:

Topic Code(s):

304 -Safety Assessment and Performance Studies;
602 -Facility/Site Licensing Process

Abstract:

Within the framework of an EU study the licensing procedure for a hypothetical repository for all kinds of radioactive waste in crystalline rock will be simulated. Agencies and safety authorities from Belgium France Germany Netherlands and Spain are involved in the project. As a basis for the study a safety file has been prepared by the agencies and submitted to the safety authorities for evaluation. By extensive dialogue between the safety authorities and the agencies all license relevant requirements of a safety file will be identified and the corresponding document completed. Differences between the agencies and the safety authorities as well as between the different countries in the understanding of safety requirements for a repository will be recognized and discussed. A consensus on the most important items will be aspired.

WM Descriptor(s): igneous rocks; international cooperation; licensing procedures; national organizations; radioactive waste disposal; safety analysis; safety standards; simulation; underground disposal

Principal Investigator(s):

ENGELMANN, HANS-JUERGEN

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Other Investigators:

Biurrun E.; Jobmann M.; Lommerzheim A.; Popp F.; Raitz v.Frentz R.; Wahl A.

Organization Type:

Other

Program Duration: From: 1993-12-1 To: 1996-5-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Deutsche Gesellschaft zum Bau und Betrieb von Endlagern fuer Abfallstoffe mbH (DBE); Woltorfer Str.74 D-31224

Associated Organization(s):

ANDRA AVN COVRA CSN DBIS/SPRI DTVKI ENRESA GRS Ministerie VROM ONDRAF/NIRAS

Recent publication info:

954

GFR19980047

Title:

Investigations on the retrievability of emplaced fuel elements during the post-closure period of an underground repository

Title in Original Language:

Untersuchung der Rueckholbarkeit von eingelagertem Kernmaterial in der Nachbetriebsphase eines Endlagers

Topic Code(s):

404 -Non-Reactor Facility Decommissioning; 523 - Waste Retrieval, Emplacement of Barriers

Abstract:

An analysis has shown that indirect diversion by excavation of a new mine is the only convenient pathway for the diversion of POLLUX casks after repository decommissioning. The boundary conditions for retrieval were defined by thermal and thermomechanical calculations. The present state of mining technique is analysed to look for the required equipment. At present the maximum rock temperature which can be handled by special ventilation air conditioning systems drift walling and machines with air conditioned cabins or remote controlled machines is 100-100 deg C. Already 10 years after closure of the repository a significant amount of POLLUX casks shows a surface temperature below 100 deg C. Therefore retrieval is possible but it would require a significant technical and economical effort. The mining facilities needed for retrieval can be easily detected by surface surveillance.

WM Descriptor(s): closures; decommissioning; radioactive waste disposal; shaft excavations; spent fuel casks; temperature distribution; underground disposal; waste retrieval

Principal Investigator(s):

ENGELMANN, HANS-JUERGEN

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Other Investigators:

Biurrun E.; Hubert R.; Lommerzheim A.; Poehler M.

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Other

Program Duration: From: 1991-1-1 To: 1994-3-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Deutsche Gesellschaft zum Bau und Betrieb von Endlagern fuer Abfallstoffe mbH (DBE); Woltorfer Str. 74 D-31224 Peine

Recent publication info:

955

GFR19980048

Title:

Comparison of final disposal concepts in salt formations and crystalline rock

Title in Original Language:

Gegenueberstellung von Endlagerkonzepten in Salz und Hartgestein

Topic Code(s):

322 -Site Survey and Characterization

Abstract:

Aim of the project is to work out the major differences between a generic final disposal concept in salt formation and generic final disposal concept in crystalline rock for spent fuel. The comparison focuses on the topics operational safety and economical aspects. The planning is carried out taking into account the result of the R+D project 'System Analysis Dual-Purpose Repository'. The major differences between the disposal concepts salt/crystalline rock are the lay-out of the underground facilities the type of canisters and the thermal behaviour of the geological formation.

WM Descriptor(s): comparative evaluations; containers; economic analysis; igneous rocks; safety analysis; salt deposits; underground disposal

Principal Investigator(s):

ENGELMANN, HANS-JUERGEN

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Organization Type:

Other

Program Duration: From: 1994-11-1 To: 1995-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Associated Organization(s):

Deutsche Gesellschaft zum Bau und Betrieb von Endlagern fuer Abfallstoffe mbH (DBE); Woltorfer Str. 74 D-31224 Peine

BGR BAF GNS GNB KfK-INE

Recent publication info:

956

GFR19980049

Title:

Demonstration experiments for direct disposal of LWR-fuel. Active handling experiment with neutron sources

Title in Original Language:

Direkte Auslagerung ausgedienter Brennelemente. Aktives Handhabungsexperiment mit Neutronenquellen

Topic Code(s):

144 -Spent Fuel Immobilization/Conditioning; 231 - Radiological Assessment Models

Abstract:

The objective of the AHE experiment is to investigate radiological aspects of handling high level waste (either spent fuel or vitrified high level waste) in an underground repository. Neutron dose rates are measured resulting from direct radiation and from neutrons scattered by the surrounding host rock (rock salt). Computer codes and model calculations are to be verified by these experiments. Thus an experimentally validated tool will be available for future detailed repository planning with emphasis on minimizing the radiation exposure of the operating personnel. POLLUX casks will be used for drift emplacement and transfer casks will be used for handling canisters with chopped spent fuel pins or with vitrified reprocessing waste in a repository with the aim of emplacing the waste canisters into boreholes. The AHE project is planned to compare the calculated dose-rates of a POLLUX cask and a transfer cask with and without salt environment with the measured dose-rates of a smaller experimental shielding cask with "2"5"2Cf neutron sources.

WM Descriptor(s): cwr type reactors; demonstration programs; dose rates; high-level radioactive wastes; lwgr type reactors; neutron dosimetry; radiation doses; spent fuel casks; spent fuels; underground disposal

Principal Investigator(s):

ENGELMANN, HANS-JUERGEN

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Other Investigators:

Khamis M.; Niehues N.

Organization Type:

Other

Program Duration: From: 1986-7-1 To: 1995-6-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Deutsche Gesellschaft zum Bau und Betrieb von Endlagern fuer Abfallstoffe mbH (DBE); Woltorfer str. 74 D-31224 Peine

Associated Organization(s):

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Recent publication info:

957

GFR19980050

Title:

Destructive assay of long-lived alpha- and beta-emitting nuclides in radioactive wastes with negligible heat generation

Title in Original Language:

Entwicklung und Erprobung radiochemischer Verfahren fuer die Bestimmung reiner Alpha- und Beta-Strahler im Radionuklidinventar radioaktiver Abfaelle

Topic Code(s):

181 -Methodologies, Analytical Methods, Measurements Instrumentation

Abstract:

On the basis of waste acceptance requirements quality control of radioactive waste has to be performed prior to final disposal. One of the most important criteria is the activity of the radioactive waste product. Alpha- and beta-emitting radionuclides which do not emit gamma-radiation can only be determined by destructive chemical procedures. Radiochemical methods for the assay of long-lived alpha- and beta-emitting radionuclides in low- and intermediate-level radioactive waste have to be selected and an efficient analytic program has to be established. Microwave digestion methods are developed for dissolution of the samples. The clear sample solutions are divided in several fractions. Each fraction is analyzed for different nuclides using extensively the method of extraction chromatography.

WM Descriptor(s): alpha decay radioisotopes; beta decay radioisotopes; extraction; radioactive wastes; radiochemical analysis

Principal Investigator(s):

AUMANN, DIETER C.

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Bohnstedt A.; Langer-Lueer M.; Stuhlfauth H.

Organization Type:

Institution of higher education

Program Duration: From: 1993-10-1 To: 1996-9-1

State of Advancement: Research in progress

Associated Organization(s):

Bundesministerium fuer Bildung Wissenschaft Forschung und Technologie

Recent publication info:

958

GFR19980051

Title:

Transport mechanisms of radioactive substances inn the Arctic Ocean - numerical and experimental studies on the example of the Kara and Barents Sea

Title in Original Language:

Topic Code(s):

201 -Dispersion and Migration of Radionuclides

Abstract:

Large quantities of solid and liquid radioactive wastes have been dumped in the Kara and Barents Seas by the former USSR. The German project is a contribution to the international effort to assess the potential risk to the environment and to human beings. With the project numerical hydrodynamic models will be used to simulate the potential drift and dispersion of released radioactive materials from the locations of dumping on the shelf and in the Arctic Ocean and finally into the North East Atlantic. The possible transport by means of sea ice will be included. Parallel to the model development experimental environmental data on water and sediment contamination will provide hints for model validation.

WM Descriptor(s): arctic ocean; environmental exposure pathway; hydrodynamic model; marine disposal; north sea; radioactive waste disposal; radionuclide migration

Principal Investigator(s):

NIES, HARTMUT

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Organization Performing the work:

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Other Investigators:

Prof. Dr. Backhaus J.; Dr. Karcher M.; Dr. Harms I.

Organization Type:

Other

Program Duration: From: 1995-1-1 To: 1998-5-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Bundesamt fuer Seeschiffahrt und Hydrographie; Postfach 30 12 20 D-20305 Hamburg Germany

Associated Organization(s):

University Hamburg

Recent publication info:

959

GFR19980052

Title:

Decommissioning and building demolition. Hazardous materials and heavy metals arising during decommissioning of nuclear facilities

Title in Original Language:

Stillegung und Rueckbau: Schadstoffe und Schwermetalle bei der Stillegung kerntechnischer Anlagen

Topic Code(s):

163 -Solid Waste Treatment; 430 -MANAGEMENT OF DECOMMISSIONING WASTE

Abstract:

The aim of this work is the compilation and characterisation of hazardous materials and heavy metals arising during the decommissioning of nuclear plant and the disposal and recycling of the resulting wastes or residual materials. The list thus compiled serves as a basis for making statements concerning the toxic or radiological behaviour of harmful substances arising during current and future projects in the area of decommissioning. The early recognition of potential dangers and the determination of necessary protective measures for personnel and the environment is also thereby possible.

WM Descriptor(s): decommissioning; demolition; hazardous materials; nuclear facilities; solid wastes; waste forms; waste management; waste product utilization

Principal Investigator(s):

SIMON, G.

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Organization Performing the work:

NUKEM GMBH
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Other Investigators:

Roellig H.; Niese S.

Organization Type:

Other

Program Duration: From: 1994-7-1 To: 1996-2-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Associated Organization(s):

NUKEM GmbH; Industriestrasse 13 D-63755 Alzenau

Verein fuer Kernverfahrenstechnik und Analytik Rossendorf (VKTA)

Recent publication info:

960

GFR19980053

Title:

Decommissioning and demolition penetration of radionuclides into unprotected concrete surfaces

Title in Original Language:

Topic Code(s):

240 -ENVIRONMENTAL MONITORING; 430 - MANAGEMENT OF DECOMMISSIONING WASTE

Abstract:

The objective for the current R and D project is the development of a monitoring technique for the investigation of radioactive contaminated concretes permitting a considerable reduction of the number of samples that have to be analyzed by means of conventional destructive monitoring methods. To achieve this objective it is necessary to know: the typical patterns of exposure of concrete surfaces against dissolved radionuclides in nuclear power plants as well as in other nuclear facilities; the kinetics of the migration process of radionuclides into concrete an its dependence on the conditions of exposure; the relation between the depth profile of contamination and the superficially detectable radiation field. Special attention is paid to unprotected surface areas which have been contaminated by the accidental release of e. g. radioactive effluents. For this reason the penetration of "6"0Co 8 5Sr 1 3"7Cs and "2"3"8U into unprotected concrete surfaces is examined in greater detail. Based on the experimental result a kinetic model is developed that permits to describe the dependence of the rate and the final depth of penetration from the conditions of exposure. By means of radiation measurements at the surface of contaminated concrete samples before and after the consecutive abrasion of thin concrete layers the relation between the contamination profile and the superficially detectable radiation field is established.

WM Descriptor(s): concretes; decommissioning; demolition; environmental exposure pathway; penetration depth; radiation monitoring; radionuclide migration; solid wastes; surface contamination

Principal Investigator(s):

FRIEDRICH, H.J.

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Organization Performing the work:

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Other Investigators:

Fleischer K.; Heinzelmann B.

Organization Type:

Other

Program Duration: From: 1995-10-1 To: 1997-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Verein fuer Kernverfahrenstechnik und Analytik; Rossendorf e.V. PF 510 119 01314 Dresden

Recent publication info:

961

GFR19980054

Title:

Realistic assessment of radiation damage in rock salt upon borehole disposal of HAW

Title in Original Language:

Realistische Abschatzung der Strahlenschaedigung von Steinsalz bei Einlagerung von HAW in Bohrloechern

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 233 -Long Term Environmental Impact

Abstract:

According to the German concept high-level radioactive wastes are vitrified and the glass canisters are disposed of in boreholes in rock salt repositories. The host rock is subjected to high radiation doses and temperatures of up to 200 deg C. Rock salt is radiolytically decomposed into molecular chlorine and metallic sodium in colloidal form. A number of radiation damage studies with rock salt which were performed in Russia and had not been published have now become available. These data will be newly evaluated in order to see whether they can provide new informations for radiation damage models. Also recent modelling results are available for the German disposal concept in which realistic boundary conditions for the temperature and dose distribution and their changes with regard to space and time were taken into account. On the basis of these model calculations and all pertinent data on radiation damage formation in rock salt this investigation will provide a final statement as to the significance of this effect which occurs even under normal conditions upon the disposal of vitrified high-level radioactive waste in a rock salt repository.

WM Descriptor(s): boreholes; environmental impacts; formation damage; high-level radioactive wastes; physical radiation effects; radiation doses; salt deposits; underground disposal; waste-rock interactions

Principal Investigator(s):

MOENIG, J.

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Other Investigators:

Organization Type:

Private industry

Program Duration: From: 1995-7-1 To: 1996-6-1

State of Advancement: Research in progress

Recent publication info:

962

GFR19980055

Title:

Scientific basis for the assessment of the long-term safety of underground waste repositories

Title in Original Language:

Wissenschaeftliche Grundlagen zum Nachweis der Langzeitsicherheit von Endlagern

Topic Code(s):

324 -Safety Assessment and Performance Studies

Abstract:

The main objective of this project is the scientific evaluation of national and international research projects which are related to the long term safety of a repository for radioactive wastes. The following topics are specially treated: developing techniques and methods for the safety assessment especially for very long times; completion of the considered scenarios; consideration of relevant long-term effects; range and reference to reality of safety relevant geological and geotechnical data; improvement of models for salt repositories for the application on waste repositories in other geological formations; concepts for the validation of models for long-term prognoses like Natural Analogues. On the basis of new scientific results concepts for more advanced R and

D projects of the BMBF in basic research are developed. These projects are partly performed by the GRS and partly by other institutions. Essential work within this project is: evaluation of data concerning the colloid facilitated nuclide transport; selection an adaptation of suitable computer codes of other countries in order to perform long-term safety assessment calculations for a potential German repository in a granitic formation; technical attendance of projects dealing with Natural Analogue studies for the actualization or validation of models; compilation of possible future evolutions of the repository system like climatic changes or erosion processes; development of conceptional models for different scenarios.

WM Descriptor(s): coordinated research programs; geologic formations; natural analogue; radioactive waste disposal; safety analysis; site characterization; underground disposal

Principal Investigator(s):

BREWITZ, WERNT

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Organization Performing the work:

Gesellschaft für Anlagen und Reaktorsicheit (GRS) mbH, Endlagersicherheitsforung
Theodor-Heuss Str. 4 D-38122 Braunschweig GERMANY

Other Investigators:

Fein E.; Buhmann D.; Kuehle T.; Noseck U.; Storck R.; Tix C.

Organization Type:

Private industry

Program Duration: From: 1996-3-1 To: 1999-3-1

State of Advancement: Research in progress

Recent publication info:

963

GFR19980056

Title:

Further development of the computer code EMOS for long-term safety assessments

Title in Original Language:

Weiterentwicklung des Rechenprogramms EMOS zur Durchfuehrung von Langzeitsicherheitsanalysen

Topic Code(s):

201 -Dispersion and Migration of Radionuclides;
304 -Safety Assessment and Performance Studies

Abstract:

Performance assessment of the release of radionuclides from an underground repository the radionuclide transport through the overburden and the radiation exposure to the population are calculated with the EMOS computer code. The code is used for deterministic as well as for probabilistic assessments. The near-field module LOPOS of EMOS has been modified with respect to the calculation of brine flow and radionuclide transport within the repository. The program will be generalized to handle arbitrarily connected drifts and disposal locations in repositories. The generation and transport of gases in a repository in salt formations and the consequences on long term safety are investigated. Simplified models will be developed and implemented into the EMOS code. To accelerate the calculation speed and to be able to take into account more sophisticated sorption models a new submodule CHET of EMOS is developed which models a one-dimensional radionuclide transport. The code uses a more efficient algorithm for the numerical solution. In its second version a nonlinear sorption model is implemented. In its next version colloid-facilitated contaminant transport will be implemented. Postprocessors have been developed to handle the output of the EMOS code to analyse results of a probabilistic assessment and to generate figures and tables.

WM Descriptor(s): brines; computerized simulation; e codes; radiation doses; radionuclide migration; safety analysis; underground disposal

Principal Investigator(s):

Storck, R.

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Other Investigators:

Buhmann D.; Hirsekorn R.P.; Kuehle T.; Luehrmann L.

Organization Type:

Other

Program Duration: From: 1996-1-1 To: 1998-12-1

State of Advancement: Research in progress

Recent publication info:

964

GFR19980057

Title:

Update of long-term safety assessment of heat producing waste in salt formations

Title in Original Language:

Aktualisierte Langzeitssicherheitsanalyse fuer waermeerzeugende Abfaelle im Salinar

Topic Code(s):

201 -Dispersion and Migration of Radionuclides;
304 -Safety Assessment and Performance Studies

Abstract:

The object of the project is to perform long term safety assessments of heat producing wastes for an envisaged repository in salt. On the basis of new developments applied to the computer code EMOS performed in the parallel project 'Continuation of the development of the computer code EMOS for long-term safety assessment' the following subjects are treated: detailed investigation of near field effects considering simplified repository structures: load distribution due to backfill plugs in a borehole prevention of rock convergence by strongly supporting backfill in drifts simplified container concepts; transmutation and separation of actinides; gas generation and transport in the near field; colloid facilitated transport through the overburden; variation of the intersection between near field and far field; network-shaped structure of the near field. Deterministic and probabilistic approaches will be applied.

WM Descriptor(s): backfilling; computerized simulation; e codes; radionuclide migration; safety analysis; salt deposits; underground disposal

Principal Investigator(s):

Storck, R.

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Other Investigators:

Buhmann D.; Boese B.

Organization Type:

Private industry

Program Duration: From: 1996-1-1 To: 1998-12-1

State of Advancement: Research in progress

Recent publication info:

965

GFR19980058

Title:

Development of a fast three-dimensional computer code for modelling of density driven groundwater flow

Title in Original Language:

Entwicklung eines schnellen Programms zur Modellierung von Grundwasserstroemungen mit variabler Dichte

Topic Code(s):

323 -Earth Science Studies and Models

Abstract:

Modelling of the radionuclide transport through the overburden of an underground repository requires the knowledge of the groundwater flow field. In the case of rocksalt as host rock it is necessary to take into account the effect of salinity on the groundwater flow. For this purpose a three-dimensional computer program is developed. In order to make it feasible to model complex hydrogeological structures which cover regions up to approximately 300 km"3 considering the effects of variable density due to salinity one has to take advantage of the fastest numerical algorithms and of the most recent hardware. A porous-medium approach is used and advection diffusion and dispersion are taken into account where the latter can be modelled in a classical (Scheidegger-approach) or in a stochastical way. The nonlinear coupled partial differential equations describing the density driven groundwater flow are analyzed with respect to consistency and subsequently discretized by methods of finite volumes. An adaptive scheme is applied both in time and space to reduce the number of variables. The resulting equations are solved by means of multigrid techniques. The developed computer code can be run on workstations as well as on massive parallel computers. Additionally pre- and postprocessors are developed to set up and visualize the hydrogeological model and to provide with particle tracking and graphical tools to show the final results.

WM Descriptor(s): computer codes; flow models; geologic models; ground water; liquid flow; radionuclide migration; salinity; salt deposits; three-dimensional calculations; underground disposal

Principal Investigator(s):

FEIN, E.

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Organization Performing the work:

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Other Investigators:

Schneider A.

Organization Type:

Other

Program Duration: From: 1995-1-1 To: 1998-3-1

State of Advancement: Research in progress

Recent publication info:

966

GFR19980059

Title:

Validation of special effects in groundwater models

Title in Original Language:

Validierung von Einzeleffekten in Grundwassermodellen

Topic Code(s):

323 -Earth Science Studies and Models

Abstract:

To assess long-term safety one has to rely on models. This holds also for predictions of models concerning the movement of the groundwater. To increase the confidence in such predictions the applied models have to be validated i. e. it has to be shown that the models are able to describe the physical processes to be examined. This is usually done by comparison of model predictions with field observations and experimental measurements. Fundamental investigations are gradually performed to validate at least special effects and their interactions in groundwater models. These effects are among others the hydrodynamical dispersion the generalized Darcy's law and the coupling of flow and transport through density effects due to salinity. For that conceptual models are worked out for various laboratory and field experiments and the accompanying calculations are performed. In several steps the formulations of the special effects are investigated. In addition the effects of heterogeneity and an advanced modelling of the hydrodynamic dispersion are examined.

WM Descriptor(s): flow models; ground water; hydrodynamic model; liquid flow; radionuclide migration; safety analysis; salinity; validation

Principal Investigator(s):

FEIN, E.

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Other Investigators:

Birthler H.

Organization Type:

Other

Program Duration: From: 1996-4-1 To: 1999-3-1

State of Advancement: Research planned

Sponsoring Organization(s):

Gesellschaft fuer Anlagen- und Reaktorsicherheit (GRS) mbH Endlagersicherheitsforschung Theodor-Heuss-Str. 4 D-38122 Braunschweig Germany

Recent publication info:

967

GFR19980060

Title:

Determination of physical processes and parameters of an unsaturated zone in the near field of an underground repository. Physical aspects of two phase flow in low permeable hard rock

Title in Original Language:

Untersuchung physikalischer Prozesse und Parameter zum Fluid- und Gastransport im Nachbereich von Endlagern

Topic Code(s):

322 -Site Survey and Characterization; 323 -Earth Science Studies and Models

Abstract:

In cooperation with NAGRA and BGR GRS has carried out investigations in the rock laboratory at Grimsel Test Site (GTS) to determine the two-phase-flow behaviour in the near field of drift. While BGR and NAGRA tests are performed in more or less fractured zones of the crystalline rock - GRS work is focussed on the relative tight rock matrix. All of the experimental work is supported by numerical studies. Within in situ tests relevant physical parameters of the two phase flow as gas threshold pressure and effective permeabilities are determined by hydraulic borehole methods. A special objective is the influence of capillary drainage and inhibition on the pressure distribution. Using geoelectrical techniques the development and extension of an unsaturated area around a drift - caused by ventilation - is examined. By means of infrared thermography water bearing structures and dried up areas on the drift surface are distinguished. Structural parameters of potential pathways in the crystalline matrix as intergranular and intragranular pore spaces (micro cracks) were determined by special microscopic techniques. In further laboratory studies the relative permeability of water and nitrogen and

the capillary pressure curve of the low permeable granite are investigated. Calibration curves are set up for the electrical conductivity versus water content. In numerical 1-D- and 2-D models the measured physical properties of the rock matrix and especially the influence of capillary forces on two phase flow behaviour are studied.

WM Descriptor(s): coordinated research programs; geologic fractures; igneous rocks; rock-fluid interactions; site characterization; two-phase flow; underground disposal

Principal Investigator(s):

KULL, HERBERT H.

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GESELLSCHAFT FUER ANLAGEN-UND REAKTORSICHERHEIT (GRS) MBH THEODOR-HEUSS-STRASSE 4 D-38122 BRAUNSCHWEIG GERMANY

Other Investigators:

Flach D.; Graefe V.; Komischke M.

Organization Type:

Other

Program Duration: From: 1994-6-1 To: 1997-9-1

State of Advancement: Research in progress

Sponsoring Organization(s):

GRS-Gesellschaft fuer Anlagen- und Reaktorsicherheit Bereich Endlagersicherheitsforschung; Theodor-Heuss-Str.4 38122-Braunschweig Germany

Associated Organization(s):

Nagra/International Cooperative for the Disposal of Radioactive Waste Wettingen Switzerland; BGR - Bundesanstalt fuer Geowissenschaften und Rohstoffe Hannover

Recent publication info:

968

GFR19980061

Title:

Direct disposal of LWR-fuel elements. Part 1. Thermal simulation of drift emplacement (TSS-project)

Title in Original Language:

Arbeiten zur direkten Endlagerung von Brennelementen. Teil. 1: Thermische Simulation der Streckenlagerung (TSS)

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 323 - Earth Science Studies and Models

Abstract:

The R and D programme of the TSS project concerns the direct disposal of spent fuel elements contained in self shielding Pollux casks in emplacement drifts in a salt repository. The remaining volume of the drifts is backfilled with crushed salt immediately after the emplacement of the cask. The 'Thermal Simulation of Drift Emplacement' large scale test is being performed in the Asse salt mine to study the thermomechanical effects between heated casks backfill and surrounding rock salt for the validation of computer models. The test field is designed similar to a real repository. It comprises two parallel test drifts in each of which three dummy casks are deposited. The casks are equipped with electrical heaters with a thermal power output of 6.4 kW each. A large number of boreholes extending from several observation drifts into the vicinity of the test drift as well as the backfill and the surface of the dummy casks are equipped with different measuring gauges. The geotechnical investigation programme involves temperature deformation and stress measurements. The backfill compaction and porosity are determined by geophysical methods. Further studies comprise the water and gas release from the backfill material due to heating. The test is in operation since September 1990.

WM Descriptor(s): Asse salt mine; lwgr type reactors; mine shafts; positioning; salt caverns; simulation; spent fuel casks; spent fuels; underground disposal

Principal Investigator(s):

ROTHFUCHS, TILMAN

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Other Investigators:

Droste J.; Feddersen H.K.

Organization Type:

Other

Program Duration: From: 1985-1-1 To: 1998-12-1

State of Advancement: Unknown

Sponsoring Organization(s):

Gesellschaft fuer Anlagen- und Reactorsicherheit (GRS) mbH;
Theodor-Heuss-Str. 4 38122 Braunschweig Germany

Associated Organization(s):

FZK/PTE; BGR; DBE

Recent publication info:

969

GFR19980062

Title:

Investigation of the long-term effectiveness of borehole seals of crushed salt (DEBORA II)

Title in Original Language:

Untersuchung der Langzeit-Dichtwirkung von
Bohrlochverschluessen aus Salzgrus (DEBORA II)

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 326 - Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

A theoretical desk study has been performed between 1991 and 1995 in regard of the development of borehole seals for high level radioactive waste (DEBORA). The study included a literature review on suitable sealing materials. Crushed salt was identified as the most suitable sealing material in a salt repository. Model calculations have been performed to analyse the temperature stress and deformation fields in and around the seal section in order to quantify the requirements of a borehole seal. The compaction behaviour of the crushed salt was predicted by the use of different constitutive equations. According to these calculations the crushed salt in the annulus of a HLW disposal borehole will reach the properties of the surrounding undisturbed rock mass within very few years (<10 years). The gas production and the gas pressure increase in a HLW borehole have been estimated too. Because of the initially high porosity of the buffer material the gas pressure will be limited to approximately 3 MPa. For the validation of used models two in situ experiments will be performed between 1996 and 1998 in the Asse salt mine in Germany. In the first experiment the compaction behaviour of the crushed salt in the annulus between the canister stack and the borehole wall will be investigated whereas in the second experiment the behaviour of the buffer material in the seal section above the canister stack will be investigated. The time needed to conduct representative experiments was determined through appropriate model calculations and was determined to be about eighteen months.

WM Descriptor(s): Asse salt mine; boreholes; compacting; crushing; high-level radioactive wastes; radioactive waste disposal; salts; seals; simulation; underground disposal

Principal Investigator(s):

ROTHFUCHS, TILMAN

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Organization Performing the work:

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BRAUNSCHWEIG GERMANY

Other Investigators:

Kroehn K.P.; Wieczorek K.

Organization Type:

Other

Program Duration: From: 1991-1-1 To: 1998-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Gesellschaft fuer Anlagen- und Reaktorsicherheit (GRS) mbH; Theodor-Heuss-Strasse 4 38122 Braunschweig Germany

Associated Organization(s):

Energy Research Foundations of the Netherlands (ECN)

Recent publication info:

970

GFR19980063

Title:
Investigations of fluid flow in fractures in rock salt formations

Title in Original Language:

Untersuchungen der Flussigkeitsausbreitung in klueftigem Salinargestein.

Topic Code(s):

323 -Earth Science Studies and Models

Abstract:

Certain relevant values such as the elastic and hydraulic rock parameters of anhydrite and saliferous clay were determined in a previous project. Anhydrite and saliferous clay behave elastically unlike rock salt which reacts visco-plastically. The origin of joints due to stress reliefs has to be considered because they represent pathways of gases and fluids. The investigations will therefore be focussed on the dependence of permeability on joining to elucidate the barrier effect of rock mass consisting of rock salt anhydrite and saliferous clay especially in the boundary layers. The objectives of the project are: to study joining systems and weak boundary areas of rock salt and anhydrite by applying geophysical exploration methods developed and to investigate into fluid propagation in joined saliferous rock. The laboratory permeability and seismic measurements have been started. The development of the acoustic emission network is brought to an end. It consists as before of ten 3-component seismic 25 kHz sensors distributed uniformly around the test field. Remote computer control and data transfer have been added. The in situ permeability measurements are in preparation.

WM Descriptor(s): anhydrite; fluid flow; geologic fractures; geophysics; rock mechanics; salinity; salt caverns; salt deposits

Principal Investigator(s):

FLACH, D.

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Organization Performing the work:

GESELLSCHAFT FUER ANLAGEN- UND
REAKTORSICHERHEIT (GRS) MBH
THEODOR-HEUSS STRASSE 4 D-38122
BRAUNSCHWEIG GERMANY

Other Investigators:

Miehe R.; Wieczorek K.; Zimmer U.

Organization Type:

Other

Program Duration: From: 1995-9-1 To: 1998-8-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Gesellschaft fuer Anlagen- und Reaktorsicherheit (GRS) mbH;
Theodor-Heuss-Strasse 4 D-38122 Braunschweig

Recent publication info:

971

GFR19980064

Title:
Electro-optical sensing systems for long-term monitoring in waste disposal sites

Title in Original Language:

Elektro-optische Messverfahren zur Endlagerueberwachung

Topic Code(s):

302 -Site Survey and Characterization

Abstract:

The purpose of this study was to give an overview of the state of the art of existing fibre optic principles sensors and multiplexing designs where some of the technologies are still in a laboratory prototype stage. A comparison of the fibre optic techniques with conventional sensing methods emphasized the inherent advantages for sensing purpose. Particularly attractive for surveillance of disposal sites are systems that permit the monitoring of not only the magnitude of a physical parameter or measurand but also its variation along the length of a continuous uninterrupted optical fibre. Based on this distributed optical sensors complex and reliable monitoring systems for underground nuclear waste disposal sites are possible and getting more economically realistic.

WM Descriptor(s): fiber optics; measuring methods; monitoring; optical systems; radioactive waste disposal; site characterization; underground disposal

Principal Investigator(s):

JOBMANN, M.

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Organization Performing the work:

DEUTSCHE GESELLSCHAFT ZUM BAU UND
BETRIEB VON ENDLAGERN FUER ABFALLSTOFFE
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Other Investigators:

Voet M.R-H.

Organization Type:

Other

Program Duration: From: 1995-5-1 To: 1995-11-1

State of Advancement: Unknown

Sponsoring Organization(s):

Deutsche Gesellschaft zum Bau und Betrieb von Endlagern fuer
Abfallstoffe mbH (DBE); Woltorfer Str. 74.

Associated Organization(s):

Identity (Belgium)

Recent publication info:

972

GFR19980065

Title:
Geochemical retention modeling of radioactive Sr Cs U Am Se and Ni under water saturated conditions

Title in Original Language:

Topic Code(s):

Geochemische Modellierung der Rueckhaltung von Radionukliden der Elemente Sr Cs U Am Se und Ni in wassergesattigten Aquiferen

202 -Dispersion and Migration Models; 303 -Earth Science Models and Studies

Abstract:

The distribution equilibria of the radionuclides of Sr Cs U Am Se and Ni between natural sediment and groundwater samples should be interpreted by use of geochemical equilibrium codes (e.g. MINEQL). Within this work the sorption should be understood as a surface complexation reaction in the context with the geochemical equilibrium of the sediment groundwater system.

WM Descriptor(s): americium isotopes; cesium isotopes; equilibrium; geochemistry; ground water; isotope ratio; m codes; nickel isotopes; sediments; selenium isotopes; strontium isotopes; uranium isotopes

Principal Investigator(s):

LANG, H.

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Organization Performing the work:

GSF-FORSCHUNGSZENTRUM FÜR UNWELT UND GESUNDHEIT GMBH INSTITUT FÜR HYDROLOGIE
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Other Investigators:

Organization Type:

Other

Program Duration: From: 1995-10-1 To: 1998-9-1

State of Advancement: Research in progress

Sponsoring Organization(s):

GSF-Forschungszentrum fuer Umwelt und Gesundheit Institut fuer Hydrologie

Recent publication info:

973

GFR19980066

Title:

Quantification of gas generation and modeling of gas transport for a salinary repository

Title in Original Language:

Ermittlung der Gasbildung und Beschreibung des Gastransportes fuer ein salinares Endlager

Topic Code(s):

323 -Earth Science Studies and Models

Abstract:

Based on variety of experimental measurements on individual gas generating processes as well as global gas generation measurements on real waste packages the aims of the project are to develop a correlation between measurement results for gas generation and characteristic parameters of the waste to interpret and analyse the experimental data and to develop a tool to enable predictions of gas generation within individual waste packages. The aims for the gas transport modeling are: to derive design requirements for a salinary repository as a function of available amount of brine waste specification repository design concept brine composition and backfill humidity; to provide necessary input data for realistic calculations of the consequences of gas generation and to complete code development by including geochemical effects such as convergence in the modelling of two-phase flow.

WM Descriptor(s): environmental transport; flow models; gas flow; salt caverns; underground disposal; waste forms; waste-rock interactions

Principal Investigator(s):

MUELLER, WOLFGANG

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Organization Performing the work:

ISTec GmbH
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Other Investigators:

Kannen H.; Thelen D.

Organization Type:

Other

Program Duration: From: 1996-1-1 To: 1999-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

ISTec GmbH; Schwertnergasse 1 D-50667 Koeln Germany

Recent publication info:

974

GFR19980067

Title:

German contribution in the European EVEGAS Project

Title in Original Language:

Deutscher Beitrag an dem europaeischen EVEGAS Projekt

Topic Code(s):

303 -Earth Science Models and Studies

Abstract:

The project aims at the verification and validation of numerical codes suitable for simulating gas flow phenomena in low permeability porous media. The overall performance of alternative programs was assessed by benchmark calculations for three different cases: a problem with an analytical solution (Buckley Leverett problem) a blind prediction of a laboratory experiment and the simulation of a repository scenario. The project has confirmed the reliance in the TOUGH2 code used for the quantification of the gas transport in a potential salinary repository in Germany.

WM Descriptor(s): analytical solution; benchmarks; computerized simulation; gas flow; international cooperation; porous materials; salt caverns; site characterization; t codes; underground disposal; validation

Principal Investigator(s):

THELEN, D.

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Organization Performing the work:

ISTec GmbH
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Other Investigators:

Organization Type:

Other

Program Duration: From: 1994-1-1 To: 1995-12-1

State of Advancement: Unknown

Sponsoring Organization(s):

ISTec GmbH; Schwertnergasse 1 D-50667 Koeln Germany

Recent publication info:

975

GFR19980068

Title:
Radionuclide release from ALU-MTR fuel elements in concentrated salt brines

Title in Original Language:
Untersuchungen zur Radionuklidfreisetzung durch Einwirkung konz. Salzlaugen auf ALU-MTR-Brennelemente

Topic Code(s):
137 -Waste Disposal (including Spent Fuel); 201 - Dispersion and Migration of Radionuclides

Abstract:

In future direct final disposal of aluminium MTR fuel elements may possibly be effected in a salt mine because reprocessing abroad cannot be guaranteed in the medium term. In the 'Water ingress' accident scenario contact between brine and the fuel elements cannot be ruled out. No studies have yet been carried out anywhere in the world on the effect of concentrated brines on aluminium MTR fuel elements. Within the framework of this project basic data are to be gathered to describe the behaviour of the aluminium MTR fuel elements under the influence of concentrated brines. To this end fundamental studies on the corrosion behaviour of Al 99.5 AlMg AlMg_2 and unirradiated fuel elements are being performed in a first subprogramme. The mass loss and electrochemical corrosion parameters will be determined to describe the corrosion process. Basic studies on the release behaviour of radionuclides from aluminium MTR fuel elements into the brine and gas phase are the subject of a second subprogramme. Fuel element sections from an FRJ-2-type fuel element (DIDO) are available for these experiments. In addition the electrochemical corrosion parameters of the irradiated fuel elements will also be determined. The data obtained from the two subprogrammes will then be processed so that they can be used to define a source term for long-time safety analyses.

WM Descriptor(s): aluminium; brines; chemical reactions; corrosion; mtr reactor; radioactive waste disposal; radionuclide migration; salt caverns; spent fuels; underground disposal

Principal Investigator(s):

FACHINGER, J.

FORSCHUNGSZENTRUM JUELICH GMBH
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Organization Performing the work:

FORSCHUNGSZENTRUM JUELICH GMBH
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Other Investigators:
Rainer H.; Nau K.; Kaiser G.

Organization Type:
Other

Program Duration: From: 1994-4-1 To: 1998-5-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Forschungszentrum Juelich GmbH; Institut fuer Sicherheitsforschung und Reaktortechnik

Recent publication info:
976

GFR19980069

Title:
Optimizing the reuse of radioactively contaminated metals

Title in Original Language:
Optimierung der Reststoffverwertung von radioaktiv kontaminierten Metallen

Topic Code(s):
415 -Decontamination by Melting

Abstract:

Radioactively contaminated steel can be decontaminated by melting and reused for the production of castings. Due to the chemical analysis and remaining specific activity of the melted material only special castings can be

produced. It is especially difficult to reuse high-alloyed steel scrap in high-quality ductile castings. On the other hand more and more high-alloyed metals have to be recycled. Aim of the project is to find a metallurgical way to increase the recycling portion of these metals while maintaining the material properties. Furthermore a method for describing the demands of sensitive structural members in a more realistic way will be developed.

WM Descriptor(s): castings; decontamination; materials recovery; melting; optimization; recycling; scrap; steels; waste product utilization

Principal Investigator(s):

HOLLAND, D.

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Other Investigators:

Kleinkroeger W.; Sappok M.

Organization Type:

Other

Program Duration: From: 1995-4-1 To: 1997-3-1

State of Advancement: Research in progress

Sponsoring Organization(s):

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Associated Organization(s):

GNS BAM

Recent publication info:

977

GFR19980070

Title:

Analysis of Russian experiments regarding the stability of rock salt domes after the release of an extremely high quantity of energy within the salt domes

Title in Original Language:

Topic Code(s):

326 -Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

The project deals with the underground nuclear explosions carried out in the former USSR in rock salt to get caverns. According to first informations from the Russian specialists the geological barriers keep intact after the underground nuclear explosions. In co-operation with the responsable specialists and institutions in Russia and the other CIS-states the existing data about the observed changes in rock salt and in salt domes caused by the underground nuclear explosions shall be analysed. The aim of the project is to describe the facts which help to accomplish the discussions about the sudden energy release in a final repository.

WM Descriptor(s): Russian Federation; salt caverns; salt deposits; stability; underground disposal; underground explosions

Principal Investigator(s):

SCHNEIDER, LUTZ R.

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Other Investigators:

Krause H.

Organization Type:

Other

Program Duration: From: 1995-10-1 To: 1997-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Stoller Ingenieurtechnik GmbH; Schlueterstrasse 38 D-01277 Dresden Germany

Recent publication info:

978

GFR19980071

Title:

Status of investigation and development in Russia and the other CIS-states in the field of disposal of heat-generating radioactive wastes in deep geologic formations

Title in Original Language:

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 321 - General Planning and Management

Abstract:

The investigators compiled in co-operation with Russian institutes the conceptions and projects for underground disposals for high-level radioactive wastes in Russia and the other states of the former USSR. The final report contains an overview about: the jurisdiction and competence of ministeries and research institutes regarding the disposal of radioactive wastes; the characteristic and yield of wastes; the conditioning storage and disposal of high-level liquid and solid wastes and spent fuels; concepts and projects for disposals for high-level wastes including site selection criteria suitable geologic formations and provided places; investigations concerning the site selection geologic formations disposal safety long-term behaviour of the wastes and natural analogue for waste repositories. Resulting of the project there are shown the necessity of further research preparing the establishment of disposals and possibilities for co-operations with Russian institutions. It is referred to the usability of the results for the German disposal concept.

WM Descriptor(s): geologic formations; high-level radioactive wastes; international cooperation; radioactive waste disposal; Russian Federation; site selection; underground disposal; waste forms

Principal Investigator(s):

SCHNEIDER, LUTZ R.

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Organization Performing the work:

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Other Investigators:

Liebscher B.; Herzog C.

Organization Type:

Other

Program Duration: From: 1994-10-1 To: 1995-7-1

State of Advancement: Unknown

Sponsoring Organization(s):

Stoller Ingenieurtechnik GmbH; Schlueterstrasse 38 D-01277 Dresden Germany

Recent publication info:

979

GFR19980072

Title:

Electrochemical and radiochemical investigations on corrosion of UO_2 in solutions relevant for waste disposals

Title in Original Language:

Elektrochemische und Radiochemische Korrosionsuntersuchungen an Urandioxid in endlagerrelevanten Electrolytsystemen

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 183 -Waste packages characterization

Abstract:

With respect to the direct disposal of spent fuel in salt diapirs and granite detailed investigations are necessary in order to hinder the radioactive waste to contact the biosphere. A hypothetical event to be taken into consideration is the intrusion of water into the waste repository. In this case corrosive solutions can be formed. The consequence of this intrusion is the corrosion of container material and the dissolution of the radioactive material the caskets contain. The aim of this project is to examine the influence of this event on the deposited UO_2. Electrochemical investigations combined with radiochemical ones are carried out. Within the frame of this project priority was given to the analysis of surface properties. Impedance measurements make the surface thickness of UO_2 samples positioned in brines and granitic ground waters be determined and in addition the conductivity of these oxide layers as function of time. Moreover the corrosion reactions which directly occur at the UO_2 surface can be measured. The kinetics of the formation of top layers can be simultaneously obtained from current measurements vs. time at various potentials applied.

WM Descriptor(s): brines; chemical reaction kinetics; containers; corrosion; electrochemistry; granites; radioactive waste disposal; radiochemical analysis; salt caverns; underground disposal; uranium dioxide; water influx

Principal Investigator(s):

MARX, GUENTER

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Other Investigators:

Engelhardt J.; Feldmaier F.; Kupfer A.

Organization Type:

Other

Program Duration: From: 1995-4-7 To: 1997-7-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Freie Universitaet Berlin Forschungsgruppe Radiochemie Institut fuer Analytische und Anorganische Chemie; Fabeckstr. 34-36; 14195 Berlin

Associated Organization(s):

Kernforschungszentrum Karlsruhe

Recent publication info:

980

GFR19980073

Title:

Investigation of the barrier function of the rock compound halite/anhydrite/grey salt pelite

Title in Original Language:

Untersuchung der Barrierewirksamkeit des Gesteinsverbandes Steinsalz/Anhydrit/Salzton

Topic Code(s):

322 -Site Survey and Characterization; 326 -Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

The 'Hauptanhydrit'(main anhydrite A3) and the 'Grauer Salzton' (grey salt pelite T3) are two widespread

structural layers in the 'Leine'-series (Z3) of the North-German Zechstein salt formations. As comparatively stiff bodies in the normally plastic salt they exhibit a brittle reaction under tectonic stress so that hydraulic conducting fissures may possible occur. In the past this occasionally led to brine inflow providing that these layers contacted the salt table. In the course of safety analysis for a repository of hazardous wastes a brine inflow via the 'Hauptanhydrit' therefore can not be ruled out with absolute certainty. For the scenarios to be modelled in later safety analysis therefore hydraulical behaviour investigations of A3 and T3 are required. Under this aspect the 'Institut fuer Gebirgschmechanik GmbH' in Leipzig was commissioned to investigate the geological structure of halite anhydrite and grey salt pelite the geotechnical behaviour (deformation and stress fields around the mining openings) the fluid migration in fissures with dependence of stress field the geophysical detection of the fluid zone around boreholes; and to carry out labor permeability and hydrofrac tests under differential stress conditions and computerized simulations of brine spreading in interfaces (hydraulical and mechanical coupling). In the salt mine Bernburg of 'Kali und Salz GmbH' the necessary investigation chambers are ordered.

WM Descriptor(s): anhydrite; brines; geologic models; geologic structures; rock mechanics; salt deposits; site characterization; underground disposal; waste disposal; water influx

Principal Investigator(s):

Kamlot, P.

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Other Investigators:

Menzel W.

Organization Type:

Other

Program Duration: From: 1995-9-1 To: 1998-8-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Institut fuer Gebirgsmechanik GmbH; 04279 Leipzig Friederikenstr. 60.

Associated Organization(s):

GRS Braunschweig

Recent publication info:

981

GFR19980074

Title:

Shutdown and decommissioning. Dismantling of thick-walled steel components by means of the thermal boring and sinking technique

Title in Original Language:

Stillegung und Rueckbau. Zerlegung dickwandiger Stahlkomponenten mit Hilfe der thermischen Bohr- und Senktechnik

Topic Code(s):

421 -Dismantling Techniques

Abstract:

It is the goal of this R and D project to develop a technique based upon Contact-Arc-Metal-Cutting (CAMC) for dismantling of thick-walled steel components from NPP. This thermal drilling and sinking technique shall be used to reduce the cross section of massive components under water up to a residual wall thickness which is then to be cut in atmosphere by means of another technique. On the other hand blind-end bores shall be brought into the wall for adaption of fixing components. Main advantages underwater technique are the reduction of collective dose uptake as well as the amount of airborne particles and the possibility for remote handling. To qualify the technique for industrial application a handling head and systems for the measurement of the borehole depth and electrode wear as well as for remote operated electrode change shall be developed and manufactured.

WM Descriptor(s): boreholes; cutting; drilling; mechanical structures; reactor decommissioning; reactor dismantling; steels; underwater operations

Principal Investigator(s):

ING, DR.

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: 1995-8-1 To: 1997-10-31

State of Advancement: Research in progress

Sponsoring Organization(s):

Institut fuer Werkstoffkunde Universitaet Hannover;
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Recent publication info:

982

GFR19980075

Title:

Decommissioning and dismantling. Development of assessment methods for transport and storage containers with higher content of metallic recycling material.

Title in Original Language:

Stillegung und Rueckbau. Entwicklung von Beurteilungsmethoden fuer Transport- und Lagerbehaelter mit erhoehten metallischen Reststoffanteilen

Topic Code(s):

430 -MANAGEMENT OF DECOMMISSIONING WASTE

Abstract:

The addition of metallic recycling material to the production process of cast iron containers for radioactive waste may result in negative effects to the safety relevant material properties. The main objectives of this project are at first the identification of the most critical mechanical effects to container structures as a result of different accident scenarios and the identification of the limiting requirements for the relevant material properties. With that accurate methods of quantitative numerical stress analysis for cubically shaped reference containers will be developed. Finally the results will be discussed under consideration of fracture mechanics safety assessment concepts for ductile cast iron containers.

WM Descriptor(s): cast iron; containers; mechanical properties; radioactive waste management; radioactive waste storage; safety; waste transportation

Principal Investigator(s):

DROSTE, BERNHARD

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Other Investigators:

Voelzke H.; Zencker U.

Organization Type:

Other

Program Duration: From: 1995-4-1 To: 1997-8-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Bundesanstalt fuer Materialforschung und pruefung (BAM) D-12200 Berlin

Associated Organization(s):

Siempelkamp Giesserei GmbH and Co

Recent publication info:

983

GFR19980076

Title:

Evaluation of quality management during the development of a fast groundwater code testing and verification

Title in Original Language:

Topic Code(s):

303 -Earth Science Models and Studies

Abstract:

Within the framework of a research project a ground water code for the modelling of density-dependent flow shall be developed by a team consisting of five university institutes. This code shall be based on the use of modern numerical solution methods and computer architectures. Support on all issues concerning software quality management is being given to the code development team. The quality management of the development team will be evaluated. Furthermore test and verification calculations will be performed.

WM Descriptor(s): computer codes; flow models; ground water; quality assurance; verification

Principal Investigator(s):

ROEHLIG, K.J.

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Other Investigators:

Bogorinski P.; Poeltl B.

Organization Type:

Other

Program Duration: From: 1995-8-1 To: 1998-7-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Gesellschaft fuer Anlagen- und Reaktorsicherheit (GRS) mbH; Schwertnergasse 1 50667 Koeln Germany

Recent publication info:

984

GFR19980077

Title:

Determination of solubility products of uranyl and iron phosphates in saturated NaCl and MgCl_2 brine

Title in Original Language:

Topic Code(s):

303 -Earth Science Models and Studies; 326 -Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

Phosphate ions form thermodynamically stable minerals with actinides lanthanides and many transition elements

as well as with main group metals. These minerals have very low solubilities in neutral and alkaline solutions. One of the most important natural phosphate containing mineral is hydroxylapatite (HAP) which is very cheap and available in a billion ton scale. Due to these facts HAP could be useful as an additive to the backfill material of a radioactive waste repository being an additional security barrier in the nearfield of a nuclear waste storage site. With regard to the German conception for a radioactive waste repository in a salt dome we have investigated the precipitation of different actinide phosphates from concentrated salt solutions and natural brines. For uranium we have found the formation of different micas like autunite Ca [UO_2/PO_4] #centre dot# 6 H_2O and saleeite Mg [UO_2/PO_4]_2 #centre dot# 6 H_2O or triuranylphosphate (UO_2)_3 (PO_4)_2 #centre dot# 8 H_2O depending on temperature and brine system. In addition to that the corrosion of the canister materials will cause a release of iron ions into the leaching brines. Due to the fact that Fe"2"+ or Fe"3"+ ions do also form phosphates with low solubilities we started experiments in order to investigate the competition of uranyl and iron phosphate precipitation in different brine systems. The solubility products of mixed sodium-calcium-magnesium-iron-uranium phosphates will be detected using radioactive tracer elements or ICP-OES.

WM Descriptor(s): backfilling; brines; iron; leaching; phosphates; radioactive waste disposal; rock-fluid interactions; salt deposits; solubility; underground disposal; uranium

Principal Investigator(s):

GAUGLITZ, R.

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Other Investigators:

Marx G.; Franke W.; Holterdorf M.

Organization Type:

Other

Program Duration: From: 1994-7-1 To: 1998-4-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Freie Universitaet Berlin Institut fuer Anorganische und Analytische Chemie FG. Radiochemie; Fabeckstrasse 34-36

Recent publication info:

986

GFR19980078

Title:

Influence of humic substances on the migration behaviour of radioactive and non-radioactive harmful substances under conditions close to nature

Title in Original Language:

Einfluss von Huminstoffen auf das Migrationsverhalten radioaktiver und nichtradioaktiver Schadstoffe unter naturnahen Bedingungen

Topic Code(s):

202 -Dispersion and Migration Models; 303 -Earth Science Models and Studies

Abstract:

Investigations of the complexation of neptunium plutonium and americium with humic acids at very low metal concentrations have been carried out under conditions close to nature by continuous electrophoretic ion focusing and ion exchange chromatography combined with radiometric or laser spectroscopic detection. Determination of the complex stability constants of Np Pu Am for various humic acids is one of the goals of the research. Large-scale column experiments with sediments characterization of humic substances by means of electrophoretic and chromatographic methods and complexation behaviour of technetium and heavy metals (Pd

Cd Zn) with humic acids in dependence of pH value ionic strength and temperature are discussed. Studies under anaerobic conditions modelling of the obtained data are under way.

WM Descriptor(s): americium complexes; chemical analysis; chromatography; electrophoresis; environmental transport; hazardous materials; humic acids; neptunium complexes; palladium complexes; plutonium complexes; technetium complexes; zinc complexes

Principal Investigator(s):

TRAUTMANN, N.

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Kratz J.V.; Beck H.P.; Wagner H.

Organization Type:

Other

Program Duration: From: 1995-11-1 To: 1998-10-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Institute fuer Kernchemie Universitaet Mainz; D-55099 Mainz Germany

Associated Organization(s):

Universitaet Saarbruecken

Recent publication info:

987

GFR19980079

Title:

Influence of humic substances on the migration behavior of radioactive and nonradioactive pollutants under natural-like conditions - Synthetic humic acids for complexation and migration studies

Title in Original Language:

Komplexierung synth. Huminsaeuren

Topic Code(s):

202 -Dispersion and Migration Models; 303 -Earth Science Models and Studies

Abstract:

Humic substances are naturally occurring polyelectrolytes. Depending on their origin and the conditions prevailing during their formation they have different chemical and structural properties. Humic substances play an important role in the migration and retardation of radionuclides and heavy metal ions. The complexation behavior of these substances is mainly influenced by their functionality especially the carboxylic and phenolic groups. We are developing functional models for humic acids (HA's). HA's are the alkali soluble part of natural humic substances which precipitate in acidic media. We synthesize humic acid functional models from reducing sugars and #alpha#-amino acids. These model substances have a chemical behavior similar to natural HA's but a considerably simpler overall structure and a well-defined functionality that can be varied through changing the preparation conditions. Using these model substances and HA's isolated from natural sources we will study the complexation behavior of HA's with uranyl and other heavy metal ions depending on different conditions e.g. pH and ionic strength. In our studies we will determine the humic acid functional groups with radiometric methods. Chemically modified synthetic and natural HA's with blocked or labeled functional groups will be synthesized to investigate the complexation at specific humic acid binding sites. Our studies including also humic acid tracer synthesis with "1"3C 1 4C and "3H. These HA's will be useful for model experiments of the migration behavior of HA complexes.

WM Descriptor(s): complexes; environmental transport; functional models; hazardous materials; humic acids; radiometric analysis; synthesis

Principal Investigator(s):
BERNHARD, G.

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Heise K.H.; Pompe S.

Organization Type:
Other

Program Duration: From: 1995-11-1 To: 1998-9-30

State of Advancement: Research in progress

Sponsoring Organization(s):
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Associated Organization(s):
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Recent publication info:
988

GFR19980080

Title:
Recycling of steel scrap contaminated with mercury and radioactivity of natural origin

Title in Original Language:

Topic Code(s):
415 -Decontamination by Melting

Abstract:
Large amounts of steel scrap contaminated with mercury and radioactivity of natural origin are stored in Germany; most of it originating from natural gas production industry. So far there was no economic recycling concept. During the past three years an economic and ecological recycling concept by melting has been developed and tested on large scale. For melting in an inductively heated furnace the material has to be cut into small pieces. The melting furnace is tightly encapsulated. The crude gas with mercury contaminations up to 200 mg/m"3 is cleaned by a newly developed filter system. All processes are performed in restricted areas. Whereas iron and slag resulting from the melting process are suitable for free release the filter dust has to be dumped.

WM Descriptor(s): contamination; decontamination; industrial wastes; materials recovery; melting; mercury; natural radioactivity; recycling; scrap metals; steels; waste processing

Principal Investigator(s):
HOLLAND, D.

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Organization Performing the work:
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Other Investigators:
Quade U.; Sappok M.

Organization Type:
Other

Program Duration: From: 1993-1-1 To: 1995-9-1

State of Advancement: Unknown

Sponsoring Organization(s):
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Recent publication info:

989

GFR19980081

Title:
Heavy aggregate shielding made of recycled steel granules

Title in Original Language:

Topic Code(s):

415 -Decontamination by Melting

Abstract:

Radioactively contaminated steel can be decontaminated by melting and reused for the production of castings. Due to the chemical analysis and remaining specific activity of the melted material only special castings can be produced. It is especially difficult to reuse high alloyed steel scrap in high-quality ductile castings. A new technique for reuse of this steel scrap has recently been developed successfully. The liquid metal scrap is poured into a specifically defined water jet for production of steel granules. These granules can be used for heavy aggregate shieldings. Two prototype heavy aggregate shieldings for 200-l drums have been produced with very good results. 50 weight-% of concrete can be substituted by steel granules. Compression strength of the concrete is high (above 45 MPa) density and radiation shielding are homogeneous. Quality of high-density concrete is independent from the granule quality. A new recycling path for high-alloyed contaminated steel scrap is thus available.

WM Descriptor(s): biological shields; castings; contamination; decontamination; materials recovery; melting; recycling; reinforced concrete; scrap metals; shielding materials; steels

Principal Investigator(s):

HOLLAND, D.

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Organization Type:

Other

Program Duration: From: 1994-1-1 To: 1995-8-1

State of Advancement: Unknown

Sponsoring Organization(s):

Siempelkamp Giesserei GmbH and Co.; P.O.Box 2570 D-47725 Krefeld

Associated Organization(s):

Metalltechnik Schmidt Boschert

Recent publication info:

990

GFR19980082

Title:
Melting plant Chernobyl

Title in Original Language:

Topic Code(s):

113 -Solid Waste Treatment; 415 -Decontamination by Melting

Abstract:

The erection of a waste handling centre in the area of Chernobyl power plant is to become a first milestone toward the removal of damages caused by the accident of reactor unit 4 and to lead to restoration of the

restricted area. A central element is a melting plant for radioactively contaminated metallic materials (so-called 'SURF') by means of which the waste volume can be drastically reduced and the largely decontaminated materials can be recycled. The on-site evaluation showed an overall mass of metal scrap of min. 100 000 Mg with a maximum specific activity of 400 Bq/g (mainly 1 3"7Cs and "9"0Sr) based on 48 open depositories within the restricted area. Design work for the melting plant which will be equipped with an induction type as well as an electric arc furnace led to a throughput of approx. 10 000 Mg/a. The recycling concept includes the manufacture of casks and containers for waste storage and disposal as well as the production of shielding equipment.

WM Descriptor(s): chernobylsk-4 reactor; containers; decontamination; furnaces; materials recovery; melting; radioactive waste facilities; radioactive waste processing; recycling; scrap metals; waste processing plants

Principal Investigator(s):

STEINWARZ, W.

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Weiss E.; Zunk H.; Leitsin W.

Organization Type:

Other

Program Duration: From: 1993-10-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

Siempelkamp Giesserei Gmbh and Co.; P.O.Box 2570 D-47725 Krefeld

Associated Organization(s):

SEAG UNA Kiev-Energoprojekt

Recent publication info:

991

GFR19980083

Title:

Recycling of slightly radioactively contaminated metal scrap

Title in Original Language:

Topic Code(s):

404 -Non-Reactor Facility Decommissioning; 415 - Decontamination by Melting

Abstract:

From decommissioning of nuclear fuel cycle facilities large amounts of beta/gamma- as well as alpha-contaminated scrap will arise. Recycling of slightly beta/gamma-contaminated scrap by melting and the reuse of the material for production of waste containers or shielding equipment has been developed. Alpha-contaminated scrap can be decontaminated by melting which allows for free release of the material for general use. Due to the small amount of waste from melting (i.e. slag filter dust) the necessary final storage volume is drastically reduced.

WM Descriptor(s): biological shields; containers; contamination; decommissioning; decontamination; materials recovery; melting; radioactive wastes; recycling; scrap metals

Principal Investigator(s):

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Other Investigators:

Sappok M.; Kreh R.

Organization Type:

Other

Program Duration: From: 1989-1-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

Siempelkamp Giesserei Gmbh and Co.; P.O.Box 2570 D-47725
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Recent publication info:

992

GFR19980084

Title:

U-Th isotopes as natural analogues for actinide mobility in granitic rocks

Title in Original Language:

U-Th-Isotope als natürliche Analoga zur Mobilität von Actiniden in granitischen Gesteinen

Topic Code(s):

323 -Earth Science Studies and Models; 328 - Natural Analogue Studies

Abstract:

The geochemical behaviour of U and Th in granitic rocks serves as a natural analogue for the mobility of actinides. The short-lived U-238 to U-234 to Th-230 decay series in secondary carbonate veins is a potential tool for deciphering mother/daughter isotope fractionations within the past 500,.000 years. Secondary carbonates occur in veins of many granitic formations. In drill cores from granites of the Äspö Hard Rock Laboratory calcite veins have been sampled. Microanalytical investigations yielded U and Th contents between 0.1 and 2 ppm. These elements have been incorporated into the calcite structure from hydrous fluids circulating through the Äspö granite and have been stored there ever since. More recent chemical interactions of different types of underground water with pre-existing calcite veins might have disturbed the secular equilibrium of the U-decay series. It is the aim of the study to investigate mother/daughter-isotope relations in representative calcite veins from the Äspö HRL tunnel including drill cores. If secular equilibrium has been maintained in the calcite to date, it can be concluded that U and Th behaved immobile in this part of the rock over the last 500,000 years. In the case of isotope disequilibrium the time of mother/daughter fractionation can be established precisely. Isotope measurements employing Therm-Ion-Mass Spectrometry are currently underway. First results are expected within the next six months.

WM Descriptor(s): geochemistry; isotope dating; isotope ratio; mineralogy

Principal Investigator(s):

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Organization Performing the work:

Institute of mineralogy and mines Technical University Clausthal
38678 Clausthal-Zellerfeld GERMANY

Other Investigators:

Organization Type:

Other

Program Duration: From: 1997-10-1 To: 1999-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Bundesministerium für Bildung, Forschung und Wissenschaft

Associated Organization(s):
none

GFR19980085

Title:
Mobilization and immobilization of elements relevant to final repositories in granites and hydrothermal fluids.

Title in Original Language:
Mobilisierung und Immobilisierung endlagerrelevanter Elemente in Granit und hydrothermalen Fluiden.

Topic Code(s):
322 -Site Survey and Characterization; 323 -Earth Science Studies and Models; 326 -Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:
The products of reactions between hydrothermal solutions in the geological past (temperature range from 20°C to 250°C) and granitic rocks of the Äspö area were used as a natural analogue for radionuclide transport through the geological barrier. A total of 51 granite and granodiorite samples taken from drill cores, HRL tunnel and surrounding outcrops have been collected for geochemical bulk-rock analysis, optical investigations, and microprobe analysis. Characterization of non-magmatic variations have been carried out for major and trace elements during alteration using common variation diagrams for the major elements and normalized element-patterns for the trace elements. Results of this characterization were applied to mass balances of element distributions in a simplified 1 cubic km reference block of Äspö granites. The results of these model calculations indicate that very few samples show distinct mobilization of major and trace elements outside the primary magmatic trends. The vast majority lies within the primary range of rock composition. This implies that elements mobilized by mineral reactions on a grain-size scale are immobilized by formation of secondary minerals on a dm-scale. Among the 30 chemical elements analyzed it is only Si, Fe, Ca, Na, and K which reveal gain or loss on a cubic km scale. The percentage values for gain and loss on this reference volume are +0.1% (Fe), +0.2% (K), and -0.05% (Si), +0.25% (Ca) and -0.25% (Na) respectively. All other elements are within a range of +0.01% (Sr) and +0.4 x 10 to the power of -10 % (Lu). It is concluded that despite the fact that intensive mass transport occurred by water/rock reactions on a mm-scale, in a large volume of granite all elements dissolved during hydrothermal reactions are immobilized due to precipitation of secondary minerals. Microprobe analyses on major- and trace-elements are currently underway.

WM Descriptor(s): geochemistry; mineralogy; petrology; quantitative chemical analysis

Principal Investigator(s):
Mengel, Kurt

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Other Investigators:

Organization Type:
Other

Program Duration: From: 1996-7-1 To: 1999-3-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Bundesministerium für Bildung, Forschung und Wissenschaft

Associated Organization(s):
none

GFR19980086

Title:
Backfill Behaviour in Emplacement Drifts and Boreholes in a Salt Repository (BBDB/BAMBUS) - Experimental and Numerical Investigations of the Behaviour of Crushed Salt

Title in Original Language:

Verhalten von Versatz in Einlagerungsstrecken und -bohrlöchern in einem Endlager im Salzgebirge - Experimentelle und numerische Untersuchungen zum Verhalten von Salzgrus

Topic Code(s):

127 -Waste Disposal; 324 -Safety Assessment and Performance Studies; 326 -Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

To demonstrate the suitability of direct disposal of heat generating spent fuel in drifts of a salt repository a large-scale in-situ test "Thermal Simulation of Drift Storage (TSS)" is being carried out at the Asse salt mine. The objective is to investigate thermal and thermomechanical processes in backfilled drifts, to increase the data basis required for repository design and safety assessments, and to develop and validate constitutive models which describe the compaction behaviour of crushed salt used as backfill material. The work carried out by BGR comprises the following geotechnical investigations:
- in-situ measurement of initial rock stress, of thermally induced stress change, and of rock temperature,
- in-situ measurement of permeability of the host rock and the backfilling,
- development, testing, and demonstration of geotechnical measurement techniques,
- performance and scientific organization of an international benchmark exercise on different user codes and constitutive models to predict the compaction behaviour of crushed salt,
- laboratory creep tests on rock salt to quantify parameters used for thermomechanical calculations.

WM Descriptor(s): Asse salt mine; backfilling; benchmarks; computer codes; field tests; finite element method; permeability; radioactive waste disposal; rock mechanics; stresses

Principal Investigator(s):

Heusermann, Stefan, Dr.

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Other Investigators:

Heemann,Ulrich,Dr.; Koss,Stefan,Dr.

Organization Type:

Other

Program Duration: From: 1996-1-1 To: 1998-12-31

State of Advancement: Research in progress

Sponsoring Organization(s):

Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie (BMBF), Germany
European Community

Associated Organization(s):

Forschungszentrum Karlsruhe, Projektträger des BMBF für Entsorgung (FZK/PTE), Germany
Netherlands Energy Research Foundation, Nuclear Energy (ECN), Netherlands
Empresa Nacional de Residuos Radioactivos (ENRESA), Spain
Gesellschaft für Anlagen- und Reak

GFR19980087

Title:

Testing geostatistical software to improve cpu-load for 3-d modeling of heterogeneous and anisotropic hydrogeologic flow-models. 1. Micro- macro-fractures

Title in Original Language:

Erprobung geostatistischer Programme zur Rechenzeitverkürzung bei der 3-D Modellierung von Heterogenitäten und Anisotropien in ausgedehnten hydrogeologischen Strömungsmodellen. 1. Mikro-Makroklüfte

Topic Code(s):

202 -Dispersion and Migration Models; 241 -Monitoring Programmes; 242 -Monitoring Techniques; 306 -Barrier Studies and Tests; 316 -Barrier Studies/Tests/Impacts

Abstract:

After the selection and definition of a test-case for a fracture-matrix system a fine-scale geologic flow-model has been setup and simulated with ECLipse-software. Various upscaling-methods will be performed and the results from these large-scale models will be compared with the initial model to validate this methods for modeling groundwater-flow in fracture-matrix systems.

WM Descriptor(s): aquifers; computerised simulation; flow models; fluid flow; fractured reservoirs; fractures; simulation; water

Principal Investigator(s):

ZEMKE, Jochen

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Organization Performing the work:

Inst. of Petroleum Engineering Technical University Clausthal
38678 Clausthal-Zellerfeld GERMANY

Other Investigators:

Organization Type:

Institution of higher education

Program Duration: From: 1998-1-1 To: 1998-12-31

State of Advancement: Research in progress

Sponsoring Organization(s):

Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie (BMBF)

Associated Organization(s):

none

GFR19980088

Title:

Development of a reliable overall methodology for performance assessment of engineered barriers in radioactive waste repositories

Title in Original Language:

Ein neuer Ansatz zur Bewertung der Wirksamkeit von Barrieren im Englager

Topic Code(s):

326 -Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

Multi-barrier systems are accepted as the basic approach of long term environmental safe isolation of long term environmental safe isolation of radioactive waste in repositories. Performance assessment particularly of engineered barriers is one of the major difficulties producing evidence of environmental safety of any radioactive waste disposal facility. This difficulty arises because the performance assessment shall consider with certain acceptable level of confidence all relevant but in some extent uncertain undue impacts to the performance capabilities of engineered barriers caused by different geological processes and/or the nature of the waste. By experience a classic strongly conservative and deterministic worst case approach concludes in extremely negative non-realistic assessment results avoiding the evidence of the required performance capabilities. Currently, a common and accepted methodology for barrier performance assessment, which

resolves the above-mentioned conflict and which could be introduced in licensing procedures for radioactive waste repositories does not exist. Similar conflicts regarding the assessment of technical safety of complex facilities considering relevant but in some extent uncertain undue impacts with an acceptable level of confidence are subject of concern in other areas, too. In this context, advanced methodologies for the assessment of technical safety became an important area of interest. They presently found their most adequate implementation in the series of "Structural Eurocodes" comprising a group of standards for the structural and geotechnical design of buildings in civil engineering works. These Eurocodes are based on the so called Methodology of partial Safety Factors. The objective of the proposed project is to develop a methodical approach for assessing barrier performance analogous to the Methodology of Partial Safety Factors implemented in the Structural Eurocodes. Therefore the adequate provisions regarding structural stability should be reviewed and transformed into provisions for the assessment of barrier performance. The outcome of the project will be a reliable overall methodology for assessing the performance of engineered barriers in radioactive waste repositories based on advanced safety assessment concepts, which could serve as design basis and which could be introduced in licensing procedures.

WM Descriptor(s): backfilling; buffers; construction; encapsulation; engineered safety systems; high-level radioactive wastes; safety; safety analysis; safety standards; salt deposits

Principal Investigator(s):

MULLER-HOEPPE, NINA

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Organization Performing the work:

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Other Investigators:

None.

Organization Type:

Private industry

Program Duration: From: 1997-10-1 To: 1999-6-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Bundesministerium für Bildung, Wissenschaft, Forschung und Tecnologie

Associated Organization(s):

none

GFR19980089

Title:

Two-phase flow and gas transport in fractured rock

Title in Original Language:

Zwei-Phasen Fluß und Gas Transport in gelüftetem Gestein

Topic Code(s):

201 -Dispersion and Migration of Radionuclides; 202 -Dispersion and Migration Models; 203 -Gas Diffusion Studies; 320 -STUDIES FOR GEOLOGICAL REPOSITORIES; 511 -Site Characterization

Abstract:

As a supplement to the investigations for the exploration of a potential disposal site in rock salt for all types of radioactive waste, the German Federal Institute for Geosciences and Natural Resources (BGR) is involved in international research programmes on nuclear waste disposal. Within the framework of German/Swedish cooperation at the ÄSPÖ Hard Rock Laboratory (Sweden), emphasis is placed on the investigation of groundwater flow and solute transport processes in fractured granite under water saturated and unsaturated conditions. The main activities in the above project are development of a conceptual model, numerical

programme, in-situ experimental techniques for the interpretation of two-phase flow and transport phenomena in fractured rock.

WM Descriptor(s): computerised simulation; equipment; fractures; geochemistry; geologic surveys; geophysics; hydrology; igneous rocks; international co-operation; tracer techniques; two-phase flow

Principal Investigator(s):

LIEDTKE, LUTZ

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Organization Performing the work:

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Other Investigators:

H. Shao; M. Fiene; D. Schäfer

Organization Type:

Other

Program Duration: From: 1997-7-1 To: 2000-6-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Federal Ministry for Education, Sciences, Research and Technolgy (BMBF)

Associated Organization(s):

SKB (Sweden), GRS (Germany)

GFR19980090

Title:

Experimental and theoretical investigation of physical-chemical processes by access of salt-discharge to storage underground facilities - experimental part

Title in Original Language:

Experimentelle und theoretische Untersuchung physikalisch-chemischer Vorgänge beim Laugenzutritt in Einlagerungsstrecken - experimenteler Teil -

Topic Code(s):

136 -Waste Storage; 137 -Waste Disposal (including Spent Fuel); 143 -Spent Fuel Storage

Abstract:

When heat-generating radioactive waste is being disposed of in rock salt, it is not alwas possible to exclude the possibility of brine influxes. The present research aims to examine the courses of events when an occlusion route offset with salting slack is filled. Both experimental and theoretical approaches are required, and the results of short-term bench-scale experiments should be checked by means of numeric models.

WM Descriptor(s): casks; chemical properties; chemical reactions; experiment planning; heat transfer; high-level radioactive wastes; laboratory equipment; materials; measuring methods; monitoring; physical properties; porous materials; salt deposits; storage; underground storage

Principal Investigator(s):

SCHNEIDER, LUTZ R.

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Organization Performing the work:

STOLLER INGENIEURTECHNIK GMBH
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Other Investigators:

Nele-Margret Bremer, Klaus-Jürgen Richter

Organization Type:

Private industry

Program Duration: From: 1996-7-1 To: 1999-6-1

State of Advancement: Research in progress

Sponsoring Organization(s):
none

Associated Organization(s):
none

GFR19980091

Title:
Investigation of the influence of fluid dynamic, deformation and solubility on the brine transport in rock salt and compacted granular salt

Title in Original Language:
Durchlässigkeitsverhalten von Steinsalzversatz gegenüber Laugen unter Berücksichtigung von zeitlich veränderlichen Überlagerungsdrücken und Lösimgsvprgängen

Topic Code(s):
117 -Waste Disposal; 167 -Waste Disposal; 221 -Environmental Transfer Models; 306 -Barrier Studies and Tests; 326 -Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

The present study consists of an investigation into the permeability behaviour of brine in rock salt and compressed salt-backfill. It is experimentally based and intends to explain the influence of fluid dynamic, deformation and solubility on the permeability of rock salt. Test devices for measuring permeability in the range <1.10-18 m² were designed and tested. Laboratory experiments are in progress. In conclusion, the present results show that the use of brine, compared with the use of gas, as measuring fluid leads to large decrease in permeability. The project is a joint task of Batelle Ingenieurtechnik GmbH, Eschborn; Technische Universität Darmstadt and Technische Universität, Bergakademie Freiberg.

WM Descriptor(s): brines; granular materials; permeability; porosity; salts; solubility; waste disposal

Principal Investigator(s):
FROEHLICH, HANSKURT

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Organization Performing the work:
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GERMANY

Other Investigators:
Oliver Conen; Jörg Von der Bruck

Organization Type:
Private industry

Program Duration: From: 1996-2-1 To: 1999-4-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Bundesministerium für Forschung, Bildung, Wissenschaft und Technologie

Associated Organization(s):
TU-Darmstadt, TU-Bergakademie Freiberg

GFR19980092

Title:
Development and testing of redundant fibre optic sensing systems with self-operating control for nuclear waste disposal sites

Title in Original Language:
Entwicklung und Erprobung redundanter faseroptischer Meßsysteme mit Selbkontrolle zur Endlagerüberwachung

Topic Code(s):
242 -Monitoring Techniques

Abstract:

On the basis of know-how and experience on fibre optic technology compiled in a previous study, fibre optic measuring tools with self control for monitoring in a final repository will be constructed and tested. These tools

will be used as the elements of a high redundancy monitoring network designed to reliably fulfill expected requirements for long term monitoring and surveillance in an underground repository mine. Sensors have been selected for further development, which are expected to be able to measure typical parameters to monitor the stability of underground openings, as, e.g., temperature, displacement and strain, as well as to detect moisture and gases potentially harmful for the repository operation like carbon dioxide and hydrogen. Such monitoring results, appropriately interfaced to numerical codes, will constitute a powerful simulation and surveillance tool, rendering possible to compare during a significantly long period the actual evolution with the forecasted one used for licensing the repository. In case of safety relevant deviations the simulation and surveillance tool will serve as an early warning system; additional protective measures can be timely taken. In the course of the project a modular monitoring system will be developed. The system will consist of a network of modules devised to be operated during the operational phase with a minimum or with no maintenance.

WM Descriptor(s): gases; humidity; hydrogen; measuring instruments; measuring methods; mechanical properties; monitoring; on-line measurement systems; optical fibres; pH value; rock mechanics; stability; temperature measurement; well logging

Principal Investigator(s):

JOBMANN, MICHAEL

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Marc Voet

Organization Type:

Private industry

Program Duration: From: 1996-10-1 To: 2000-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie, Postfach 20 02 40, D-53170 Bonn, Germany

Associated Organization(s):

Identity (Belgium)

GFR19980093

Title:

Determination of physical processes and parameters in the nearfield of an underground repository - two-phase flow properties of crystalline matrix

Title in Original Language:

Untersuchung physikalischer Prozesse und Parameter zum Fluid - und Gastransport im Habbereich von Endlagern

Topic Code(s):

231 -Radiological Assessment Models; 326 -Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

At the Grimsel Test Site/Switzerland (GTS) investigations were carried out to determine two-phase flow properties of tight crystalline matrix areas. Drift ventilation had been expected to alter water and/or gas flow in the excavation damaged zone in the near field in a drift significantly. While performing clima controlled hydrotests at distances of up to 250 cm from the drift surface effective hydraulic parameters as hydraulic gradient, permeability, gas threshold pressure and pore pressure were determined. Improved methods of electrical resistivity measurements were used to monitor and to interpret dynamic desaturation behaviour of homogeneous rock matrix. Based on saturation related functions as relative permeability and capillary pressure the desaturation of homogeneous rock matrix was simulated in a one dimensional model with the code ROCKFLOW. Experimental and numerical results were interpreted in order to assess gas and water flow in the tunnel near field.

WM Descriptor(s): evaporation; granites; hydraulic conductivity; permeability; two-phase flow

Principal Investigator(s):

KULL, HERBERT

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Organization Performing the work:

Gesellschaft für Anlagen- und Reaktorsicherheit (GRS) mbH
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Other Investigators:

Dieter Flach; Volkmar Graefe

Organization Type:

Other

Program Duration: From: 1994-7-1 To: 1998-6-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie

Associated Organization(s):

BGR/Bundesanstalt für Geowissenschaften und Rohstoffe, Hannover, Germany

GFR19980094

Title:

Experimental investigations on the backfill behaviour in disposal drifts in rock salt (TSS-Projetc)

Title in Original Language:

Experimentelle Untersuchungen zum Verhalten von Versatz in Endlagerstrecken im Salinar

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 326 -Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

The R&D programme of the TSS-project concerns the direct disposal of spent fuel elements contained in self shielding Pollux casks in emplacement drifts in a salt repository. The remaining volume of the drifts is backfilled with crushed salt immediately after the emplacement of casks. This large scale test is being performed in the Asse salt mine in Germany to study the thermo mechanical effects due to heating in the rock salt around the drifts and the corresponding compaction behaviour and sealing function of the backfill. The test field is designed similar to a real repository. It comprises two parallel test drifts in each of which three dummy casks are deposited. The casks are equipped with electrical heaters with a thermal power output of 6.4 kW each. A large number of boreholes extending from several observation drifts into the vicinity of the test drifts as well as the backfill and the surface of the dummy casks are equipped with different measuring gauges. The geotechnical investigation programme involves temperature, deformation and stress managements. The backfill compaction and the remaining porosity are determined by drift closure measurements. Further studies comprise the heat induced water and gas release from the backfill material due to heating. The test is in operation since September 1990. According to current planning, the heat power will be shut down in the beginning of 1999. A post-heating investigation programme will be carried out from 1999 to 2001.

WM Descriptor(s): backfilling; casks; deformation; gases; porosity; salt deposits; spent fuel elements; stresses; temperature distribution

Principal Investigator(s):

ROTHFUCHS, TILMANN

INSTITUT FUER TIEFLAGERUNG
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Organization Performing the work:

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Other Investigators:
Johannes Droste; Hans-Karl Feddersen

Organization Type:
Foundation or laboratory for research and/or development

Program Duration: From: 1985-1-1 To: 1998-12-31

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):
BMBF, EC

Associated Organization(s):
FZK/PTE, BGR, DBE

GFR19980095

Title:
Update of long-term safety assessment of heat producing waste in salt formation

Title in Original Language:
Aktualisierte Langzeitsicherheitsanalyse für wärmeerzeugende Abfälle im Salinar

Topic Code(s):
137 -Waste Disposal (including Spent Fuel); 324 - Safety Assessment and Performance Studies; 800 - Actinide & Transmutation Studies

Abstract:

The object of the project is to perform long term safely assessments of heat producing wastes for an envisaged repository in salt. On the basis of new developments applied to the computer code EMOS performed in the parallel project "Continuation of the development of the computer code Emos for long term safety assessments" the following subjects are treated:
Detailed investigation of near field effects considering simplified repository structures:
- load distribution due to backfill plugs in a borehole;
- prevention of rock convergence by strongly supporting backfill in drifts;
- simplified container concepts.

Transmutation and separation of actinides,
Gas generation and transport in the near field,
Colloid facilitated transport through the overburden,
Variation of the intersection between near field and far field,
Network-shaped structure of the near field.
Deterministic and probabilistic approaches will be applied.

WM Descriptor(s): backfilling; colloids; containers; gas flow; performance; probabilistic estimation; radioactive waste disposal; safety analysis; transmutation

Principal Investigator(s):
STORCK, Richard

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Other Investigators:
D. Buhmann; B. Boese

Organization Type:
Private industry

Program Duration: From: 1996-1-1 To: 1999-12-31

State of Advancement: Research in progress

Sponsoring Organization(s):
BMBF, EC

Associated Organization(s):
FZK/PTE, BGR; DBE

GFR19980096

Title:

Experimental and theoretical investigation of physical and chemical processes during brine intrusion to emplacement drifts - theoretical part

Title in Original Language:

Experimentelle und theoretische Untersuchung der physikalisch-chemischen Vorgänge beim Laugenzutritt in Einlagerungsstrecken - Theoretischer Teil

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 324 - Safety Assessment and Performance Studies

Abstract:

Brine intrusions into emplacement drifts with heat-producing wastes cannot be completely excluded. Existing long-term safety assessment models assume that the backfill properties in the drift are not changed by the brine, although this is unrealistic. The project's aim is to investigate the processes in a Pollux cask emplacement drift, backfilled with crushed salt, after the beginning of brine intrusion, and to make them accessible to modelling. This requires experimental as well as theoretical work. The results of small-scale experiments in space and time are to be calculated with numerical models in order to enhance understanding. This will allow extrapolation to real scale in space and time. The process of convection, solution and crystallisation in totally or partially saturated backfill are to be understood theoretically.

WM Descriptor(s): computerised simulation; high-level radioactive wastes; mathematical models; safety analysis; salt deposits; waste disposal

Principal Investigator(s):

STORCK, Richard

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Other Investigators:

Dirk Becker

Organization Type:

Private industry

Program Duration: From: 1996-7-1 To: 1999-6-30

State of Advancement: Research in progress

Sponsoring Organization(s):

Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie

Associated Organization(s):

none

GFR19980097

Title:

Further development of the computer code EMOS for long-term safety assessments

Title in Original Language:

Weiterentwicklung des Rechenprogramms EMOS zur Durchführung von Langzeitsicherheitsanalysen

Topic Code(s):

324 -Safety Assessment and Performance Studies

Abstract:

Performance assessment of the release of radionuclides from an underground repository, the radionuclide transport through the overburden and the radiation exposure to the population are calculated with the EMOS computer code. The code is used for deterministic as well as probabilistic assessments. The near-field module LOPOS of EMOS has been modified with respect to the calculation of brine flow and radionuclide transport within the repository. The program will be generalized to handle arbitrarily connected drifts and disposal

locations in repositories. The generation and transport of gases in a repository in salt formations and the consequences on long term safety are investigated. Simplified models will be developed and implemented into the EMOS code. To accelerate the calculation speed and to be able to take into account more sophisticated sorption models a new sub-module CHET of EMOS is developed, which models a one-dimensional radionuclide transport. The code uses a more efficient algorithm for the numerical solution. In its second version, a nonlinear sorption model is implemented. In its next version colloid-facilitated contaminant transport will be implemented. Post processors have been developed to handle output of the EMOS code, to analyse results of a probabilistic assessment and to generate figures and tables.

WM Descriptor(s): creep; diffusion; dispersions; e codes; mathematical models; performance; permeability; porosity; precipitation; probabilistic estimation; radioactive waste disposal; radionuclide migration; retention; safety analysis; salt deposits

Principal Investigator(s):

BUHMANN, D.

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Organization Performing the work:

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Other Investigators:

R.P. Hirsekorn; T. Kühle; L. Lührmann; R. Storck.

Organization Type:

Other

Program Duration: From: 1996-1-1 To: 1998-12-31

State of Advancement: Research in progress

Sponsoring Organization(s):

Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie

Associated Organization(s):

none

GFR19980098

Title:

Development of a fast three dimensional computer code for modelling of density driven groundwater flow

Title in Original Language:

Entwicklung eines schnellen Programms zur Moddellierung von Grundwasserströmungen mit variabler Dichter

Topic Code(s):

323 -Earth Science Studies and Models

Abstract:

Modelling of radionuclide transport through the overburden of an underground repository requires the knowledge of the groundwater flow field. In the case of rock salt as host medium it is necessary to take into account the effects of salinity on the groundwater flow. For this purpose a three-dimensional computer program has been developed. To make it feasible to model complex hydrogeological structures which cover regions up to approximately 300 cubic km considering the effects of variable density due to salinity, one has to use the fastest numerical algorithms and modern hardware. A porous-medium approach is used and advection, diffusion and dispersion are taken into account where the latter can be modelled in a classical (Scheidegger's approach) or in a stochastical way. The nonlinear coupled partial differential equations describing the density driven groundwater flow are analyzed with respect to consistency and discretized using the finite volumes method. An adaptive scheme is applied both in time and space to reduce the number of variables. The resulting equations are solved by means of multigrid techniques. The developed computer code can be run on workstations as well as on massively parallel computers. Additionally pre- and post-processors have been developed to set up and visualize the hydrogeological model and to provide particle tracking and graphical tools to analyze and depict the final results.

WM Descriptor(s): computer codes; dispersions; flow models; geologic deposits; ground water;

mathematical models; salinity; salt deposits

Principal Investigator(s):

FEIN, E.

Gesellschaft fuer Anlagen- und Reactorsicherheit (GRS)
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Organization Performing the work:

Gesellschaft für Anlagen- und Reaktorsicherheit (GRS) mbH
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Other Investigators:

A. Schneider

Organization Type:

Other

Program Duration: From: 1995-1-1 To: 1998-8-31

State of Advancement: Research in progress

Sponsoring Organization(s):

Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie

Associated Organization(s):

none

GFR19980099

Title:

Validation of special effects in groundwater models

Title in Original Language:

Validierung von Einzeleffekten in Grundwassermodellen

Topic Code(s):

323 -Earth Science Studies and Models

Abstract:

To assess long term safety one generally has to rely on models. This also holds for predictions of models concerning the movement of the groundwater. To increase the confidence in such predictions the applied models have to be validated i.e. it has to be shown that the models are able to describe the physical processes to be examined. This is usually done by comparison of model predictions with field observations and experimental measurements. Fundamental investigations are performed to validate at least special effects and their interactions in groundwater models. These effects are among others, the hydrodynamical dispersion, the generalized Darcy's law, and the coupling of flow and transport through density effects due to salinity. For that, conceptual models have been worked out for various laboratory and field experiments and the corresponding calculations have been performed. In several steps the formulations of the special effects have been investigated. In addition the effects of heterogeneity have been examined.

WM Descriptor(s): computer codes; diffusion; dispersions; ground water; mathematical models; salinity; validation

Principal Investigator(s):

FEIN, E.

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Other Investigators:

H. Birthler

Organization Type:

Other

Program Duration: From: 1996-1-1 To: 1998-12-31

State of Advancement: Research in progress

Sponsoring Organization(s):
Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie

Associated Organization(s):
none

GFR19980100

Title:
Contaminated sites and uranium ore mining - proposals for amending legislation by the federal government to replace still valid radiation protection law of the former GDR

Title in Original Language:
AAltlasten und Uranerzbergbau-Vorschäge für ein Novellierungsvorhaben der Bundesregierung zur Ablösung des fortgeltenden Strahlenschutzrechts der früheren DDR

Topic Code(s):
60 -LEGAL, REGULATORY AND GOVERNMENTAL ISSUES

Abstract:

Uranium ore mining effected after the second world war in areas of the former German Democratic Republic resulted in a considerable legacy. With Germany's unification the shares of Wismut company became property of the Federal Republic of Germany. The present study paper serves preparation of planned amending legislation of the federal government. Such legislative basis for human activities in areas with an increased natural radioactivity is to be established. Simultaneously this new legislation is to implement the new basic standards on radiation protection of the European Union. Its focus is first of all on regulating contaminated sites. In this context provisions do not serve precautionary monitoring of planned activities but rather aim at curbing existing risk potentials. Another focus of the new legislation is on regulating the mining area. Here, problems concerning closure of mining companies are addressed. Finally, the third focus is on regulating the issue of radioactive tipped materials and industrial waste products.

WM Descriptor(s): legislation; mining; uranium; uranium ores

Principal Investigator(s):
RENGELING, Hans-Werner

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Organization Performing the work:
Institut für Europarecht Universität Osnabrück
GERMANY

Other Investigators:

Organization Type:
Institution of higher education

Program Duration: From: 1996-2-1 To: 1996-11-30

State of Advancement: Research planned

Preliminary report(s) available: Yes

Sponsoring Organization(s):
Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie

Associated Organization(s):
none

GFR19980101

Title:
Non-destructive methods for the determination of fissile materials in waste packages

Title in Original Language:
Zerstörungsfreies Meßverfahren zur Bestimmung von kernbrennstoffen in Abfällgebindern und Transportbehältern

Topic Code(s):
181 -Methodologies, Analytical Methods, Measurements Instrumentation

Abstract:

Passive and active gamma- or neutron-based measurements are the most commonly applied nondestructive

methods for the determination of fissile material in waste packages. For the selection of an appropriate assay system it is very important to know the properties of the waste and the package. Gamma scanning is the best choice, if the matrix density is low and only small amounts of fission or activation products are present. Passive neutron counting detecting spontaneous fission neutrons and (alpha,neutrons) events is used for the determination of fissile material, especially of plutonium, in high-density waste containing fission/activation products. If it is necessary to determine in addition to plutonium uranium, active neutron assay utilizing external radiation sources to induce fission is applied.

WM Descriptor(s): fissile materials; gamma spectroscopy; measuring methods; non-destructive analysis; plutonium; uranium

Principal Investigator(s):
WIMMER, Hannes

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Organization Performing the work:
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Other Investigators:
Johann Zech; Claudia Schauer

Organization Type:
Private industry

Program Duration: From: 1996-5-1 To: 1997-1-1

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):
Bundesministerium für Strahlenschutz

Associated Organization(s):
none

GFR19980102

Title:
Safety indicators for long term safety assessment of repositories for radioactive wastes

Title in Original Language:
Sicherheitsindikatoren zur Bewertung der Langzeitsicherheit bei Endlagern für radioaktive Abfälle

Topic Code(s):
233 -Long Term Environmental Impact

Abstract:

The objective of this project is to inform the Federal Ministry for Environment, Nature Conservation and Reactor Safety (BMU), in the framework of its federal supervising function related to management of radioactive waste, on the contribution of safety indicators for the long term safety assessment of repositories for radioactive wastes. The project supports the BMU in assessing the safety of repositories and contributes towards further development and updating of safety criteria for disposal. The following are the main tasks:
- the assessment of safety indicator concepts developed in international framework;
- the assessment of implementation of these concepts in other countries on application in safety analysis; and
- the working out concrete suggestions which safety indicators should be used for the assessment of repositories in Germany

WM Descriptor(s): radioactive waste management; risk assessment; safety analysis; safety standards; waste disposal

Principal Investigator(s):
BALTES, B.

GESELLSCHAFT FUER ANLANGEN UND REAKTORSICHERHEIT (GRS) MBH
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Organization Performing the work:
Gesellschaft für Anlagen- und Reaktorsicherheit (GRS) mbH
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Other Investigators:

Organization Type:
Private industry

Program Duration: From: 1998-1-1 To: 2000-12-31

State of Advancement: Research in progress

Sponsoring Organization(s):
Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (BMU)

Associated Organization(s):
Bundesamt für Strahlenschutz

GFR19980103

Title:
Post closure safety of repositories for radioactive wastes

Title in Original Language:
Sicherheit im Nachbetrieb von Endlagern für radioaktive Abfälle

Topic Code(s):
233 -Long Term Environmental Impact

Abstract:
The main objective of this project is the evaluation of long term safety studies of repositories for radioactive wastes carried out on national and international level. Models used in performance assessments to estimate the behaviour of the engineered barrier system and of the natural system as well as the risk associated with radioactive waste repositories have to be evaluated. Their applicability to real sites has to be tested against field measurements and laboratory experiments as well as with results from codes. In this context participation in international expert groups and fora is an essential part of the project. The following tasks have been identified:
- development of considerations for the use of additional safety indicators (supplementary to dose limitation);
- demonstration of post closure safety;
- bilateral cooperation and exchange of know how with expert groups; and
- participation in international projects and working groups.
Most of these activities are in progress and results have been obtained. A report on the conclusions related to the approach in the international EVEREST project has been prepared. The applicability of geostatistical methods on the Gorleben site data could be demonstrated.

WM Descriptor(s): calibration; computer codes; evaluation; mathematical models; radioactive waste disposal; risk assessment; safety analysis; safety standards

Principal Investigator(s):
Röhling, K.-J.

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Organization Performing the work:
Gesellschaft für Anlagen- und Reaktorsicherheit (GRS) mbH
D-50667 Köln GERMANY

Other Investigators:
P. Bogorinski; L. Lambers; A. Becker; B. Pöltl

Organization Type:
Private industry

Program Duration: From: 1995-4-1 To: 1998-12-31

State of Advancement: Research in progress

Sponsoring Organization(s):
Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (BMU)

Associated Organization(s):
Bundesamt für Strahlenschutz (BfS)

GFR19980104

Title:

Evaluation and follow-up of developments in the field of modelling geochemical influences on the transport of radionuclides from a repository

Title in Original Language:

Bewertung und Begleitung der Entwicklungen im Bereich der Modellierung geochemischer Einflüsse auf den Radionuklid-transport aus einem Endlager

Topic Code(s):

323 -Earth Science Studies and Models

Abstract:

The aim of this project is to review the main results of available studies on geochemical behaviour of radionuclides for its possible importance to safety analyses for long term performance of repositories of radioactive wastes. The current general status of science and technology will be considered in this process and the international developments and procedures will be included in the evaluation. The following will be the main topics of the study:

- Status of development in geochemistry;
- Review of source term modelling;
- Review of sorption approaches; and
- Validation strategy.

Work on the first topic has been started with an extensive literature study on general chemistry of actinides, characterization of colloids and modelling approaches for the description of sorption reactions.

WM Descriptor(s): colloids; geochemistry; mathematical models; radioactive waste disposal; radionuclide migration; safety analysis; sorption; source terms

Principal Investigator(s):

LARUE, J.

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Organization Performing the work:

Gesellschaft für Anlagen- und Reaktorsicherheit (GRS) mbH
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Other Investigators:

H. Buhlenbruck

Organization Type:

Private industry

Program Duration: From: 1995-4-1 To: 1998-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (BMU)

Associated Organization(s):

Bundesamt für Strahlenschutz (BfS)

GFR19980105

Title:

Recycling of waste and removal of radioactive waste resulting from decommissioning of nuclear installation

Title in Original Language:

Verwertung von Restoffen und Beseitigung von radioaktiven Abfällen aus der Stillegung kerntechnischer Anlagen

Topic Code(s):

430 -MANAGEMENT OF DECOMMISSIONING WASTE

Abstract:

Within the scope of the disposal of radioactive waste originating from decommissioning of nuclear installations, the recycling of wastes and the removal of radioactive waste resulting from decommissioning of nuclear installation were investigated. In particular, the waste originating from decommissioning of nuclear power plants in the former GDR were taken into consideration. The studies emphasized the characterization of the

waste flow originating from decommissioning with respect to its recyclability in compliance with planned legal regulation for such waste as well as the characterization and the evaluation of radioactive waste originating from decommissioning activities with respect to their qualification for disposal in the Konrad and Morsleben final repository in compliance with current repository acceptance requirements. Furthermore, specific conditioning process was developed for the disposal of special waste. The BMU was supported in designing legal regulations concerning the field of recyclable waste.

WM Descriptor(s): radioactive wastes; reactor decommissioning; recycling; removal

Principal Investigator(s):

PEIFFER, F.

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Organization Performing the work:

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Other Investigators:

W. Wurtinger

Organization Type:

Private industry

Program Duration: From: 1997-5-1 To: 1999-12-1

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):

Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (BMU)

Associated Organization(s):

Bundesamt für Strahlenschutz (BfS)

GFR19980106

Title:

Safety evaluation of advanced conditioning processes for radioactive waste

Title in Original Language:

Sicherheitstechnische Bewertung von fortschrittlichen Konditionierungsverfahren für radioaktive Abfälle

Topic Code(s):

114 -Waste Immobilization (Bituminization, Cementation, Including Tests of Properties, Leaching Studies)

Abstract:

The aim of application of conditioning processes for radioactive wastes is the fulfillment of requirements for safe storage, transportation and disposal in compliance to the regulations. The conditioning processes used are characterized as well as the waste products are evaluated concerning the waste acceptance requirements of the Konrad and Morsleben repositories. A result of the studies is a proposal for the categorization of the primary waste and the conditioned waste in compliance with the regulations concerning the requirements with respect to the documentation and the treatment of radioactive wastes. The advanced conditioning processes for radioactive wastes were characterized and the application described.

WM Descriptor(s): radioactive wastes; safety; waste processing

Principal Investigator(s):

KLÖCKNER, J.

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Organization Performing the work:

WISSENSCHAFTLICH-TECHNISCHE INGENIEURBERATUNG GMBH (WTI)
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JUELICH GERMANY

Other Investigators:

A. Braun; R. Dallau; T. Fischer

Organization Type:

Private industry

Program Duration: From: 1994-8-1 To: 1997-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (BMU)

Associated Organization(s):

Bundesamt für Strahlenschutz (BfS)

GFR19980107

Title:

Development of an integrated near field model of high level waste containers in Gorleben salt dome: geochemically based source term for HLW glass, spent fuel and cement

Title in Original Language:

Erstellung eines integrierten Nahfeldmodells von Gebinden hochradioaktiver Abfälle im Salzstock Gorleben: geochemisch-fundierter Quellterm für HAW-Glas, abgebrannte Brennelemente und Zement

Topic Code(s):

324 -Safety Assessment and Performance Studies

Abstract:

The main objective of this study is compilation, review and integration of available knowledge on the behaviour of high level radioactive wastes and cement in geochemical environment of near fields of disposal areas in Gorleben salt dome. Based on a geochemical approach, source terms for the three types of wastes, HLW glass, spent fuel and cement, will be developed considering influence factors due to waste and its surroundings including the presence of backfill materials. The following are the main topics of activity:

- compilation and evaluation of available data and modelling approaches;
- geochemical modelling of leaching and behaviour of radionuclides;
- site specific experiments with real high level waste materials in brines from Gorleben and experiments for the determination of important parameters; and
- formulation of source terms.

State-of-the-art reports on leaching behaviour of glass, spent fuel and cement have been prepared. With respect to geochemistry of radionuclides, a status report of pentavalent actinides is available. Geochemical models for HLW glass and cement has been developed. Also, leach experiments with HLW glass and spent fuel are in progress. A newly formulated tentative source term for HLW glass has been developed.

WM Descriptor(s): backfilling; cements; colloids; corrosion; gases; geochemistry; glass; Gorleben salt dome; high-level radioactive wastes; mathematical models; source terms; spent fuels

Principal Investigator(s):

GRAMBOW, B.

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Organization Performing the work:

FORSCHUNGSZENTRUM KARLSRUHE INE
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Other Investigators:

B. Kienzler; T. Fanghänel; A. Loida; V. Neck

Organization Type:

Other

Program Duration: From: 1996-6-1 To: 1997-12-31

State of Advancement: Research in progress

Sponsoring Organization(s):

Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (BMU)

Associated Organization(s):

Bundesamt für Strahlenschutz (BfS)

GFR19980108

Title:
Development of a standard data file for use in geochemical modelling

Title in Original Language:

Topic Code(s):
323 -Earth Science Studies and Models

Abstract:

A standard data file will be prepared for the geochemical modelling of the reaction of natural brines with rock salt. The data file should contain checked experimental data as well as Pitzer parameters and solubility constants, with the help of which the data could be verified. The following are the main steps of the study:
- Selection of modelling system and corresponding Pitzer parameters and solubility constants;
- Pointing gaps in the existing data and evaluation of resulting prediction uncertainties;
- Testing of applicability of the standard data file on a natural analogue;
- Implementation of the standard data file in the program EQ3/6.

Computer readable files for solubility data beginning from ternary system up to hexary system have been prepared. These are 650 data files with more than 7000 data points. A compilation of available Pitzer interaction parameters and solubility constants with temperature dependency has been completed. Through verification of selected systems, a selection of available parameters and a further assessment of data compatibility could be made.

WM Descriptor(s): brines; data compilation; geochemistry; Gorleben salt dome; salts

Principal Investigator(s):
VOIGT, W.

TECHNISCHE UNIVERSITÄT BERGAKADE
FREIBERG INSTITUT FÜR ANORGANISCHE
CHEMIE
D-09596
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Organization Performing the work:
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Leipziger Str. 29 D-09596 FREIBERG GERMANY

Other Investigators:
B. Kienzler; T. Fanghänel; A. Loida; V. Neck

Organization Type:
Institution of higher education

Program Duration: From: 1996-1-1 To: 1998-9-30

State of Advancement: Research in progress

Sponsoring Organization(s):
Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (BMU)

Associated Organization(s):
Bundesamt für Strahlenschutz (BfS)

GFR19980109

Title:
Development of a methodology for modelling the behaviour of trace elements with the computer code EQ3/6

Title in Original Language:
Entwicklung enier Vorgehensweise zur Modellierung des Verhaltens von Spurenkomponenten mit dem Programm EQ3/6

Topic Code(s):
323 -Earth Science Studies and Models

Abstract:

Tools are being developed for describing the behaviour of natural trace elements in brine in the near field. The tools will also be used for a fast interpretation of the origin of brines found in the salt rock during site investigation. The capability of the geochemical computer code EQ3/6 to model simple chemical compositions of natural brine systems is being checked. The existing capabilities of the computer code are being extended to

model the behaviour of the most relevant trace elements in brine. Calculations for natural brines found in the Gorleben salt dome will be performed to validate the tools developed.

WM Descriptor(s): brines; chemical composition; geochemistry; Gorleben salt dome; mathematical models; salt deposits; salts; site characterization; trace amounts

Principal Investigator(s):
SIEMANN, M.

TECHNISCHE UNIVERSITÄT CLAUSTHAL
INSTITUTE FÜR MINERALOGIE UND
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D-38678
CLAUSTHAL-ZELLERFELD

Organization Performing the work:
TECHNISCHE UNIVERSITÄT CLAUSTHAL INST. FÜR MINERALOGIE UND MINERALISCHE ROHSTOFFE
D-38678 Clausthal-Zellerfeld GERMANY

Other Investigators:
M. Schramm

Organization Type:
Other

Program Duration: From: 1996-1-1 To: 1998-9-30

State of Advancement: Research in progress

Sponsoring Organization(s):
Bundesamt für Strahlenschutz (BfS)

Associated Organization(s):
none

GFR19980110

Title:
Development of a method for the analysis of single fluid inclusions in evaporites by laser ablation ICP-MS

Title in Original Language:
Entwicklung einer Methode zur Analyse kleiner Flüssigkeits - einschlüsse in Salzgesteinen mittle Laser-Ablation ICP-MS

Topic Code(s):
323 -Earth Science Studies and Models

Abstract:

The analysis of single fluid inclusions in evaporites can provide important information about the geochemical past of the rock. Thus, this information is important indicators for the assessment of the integrity of the geological barrier. These methods were applied specially in Gorleben and led to the important conclusion that the rocks in the deeper regions of the salt dome have not changed geochemically since their formation 250 million years ago. A method for the quantitative analysis of fluid inclusions in evaporites will be developed. With this method, single fluid inclusions up to 20 um can be isolated by laser ablation and subsequently analyzed quantitatively by ICP-MS. New and important results will be obtained about the chemical composition of brines included in the salt of the disposal rooms.

To get more information about the method it was necessary to start this investigation with a literature study to get the latest facts of science and technology. Next step was the comparison of laser and other (mechanical) methods. After this, the technical equipment was calibrated and the first measurement results (determination of elements) at specially designed test pattern were obtained.

WM Descriptor(s): brines; chemical composition; geochemistry; Gorleben salt dome; lasers; salt deposits; salts; site characterization; trace amounts

Principal Investigator(s):
MENGEL, K.

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CLAUSTHAL-ZELLERFELD

Organization Performing the work:
TECHNISCHE UNIVERSITÄT CLAUSSTHAL INST. FÜR MINERALOGIE UND MINERALISCHE ROHSTOFFE
D-38678 CLAUSTHAL-ZELLERFELD GERMANY

Other Investigators:

Organization Type:
Institution of higher education

Program Duration: From: 1996-5-1 To: 1998-7-31

State of Advancement: Research in progress

Sponsoring Organization(s):
Bundesamt für Strahlenschutz (BfS)

Associated Organization(s):
none

GFR19980111

Title:
Evaluation of a computer program for documentation, data storage, presetnation and genetical interpretation of brines in Gorleben

Title in Original Language:
Entwicklung eines DV-Programmes zur Dokumentation, Datenspeicherung, Präsentation und Unterstützung der genetischen Interpretation salinarer Lösungen

Topic Code(s):
323 -Earth Science Studies and Models

Abstract:

The Federal Office for Radiation Protection and Institute for Mineralogy and Mineral Resources (Technical University of Clausthal) is developing in co-operation a computer program for the genetic interpretation of brines in Gorleben as an expert system. It will be used during the site confirmation and the future operation of the confirmed mine and potential repository. The program will enable a computerized storage of data, and mostly automatic scientific presentation of results and a clear documentation of all registered brines. Thus it will be a helpful tool for the genetic interpretation of brines. Therefore, it was necessary to evaluate the first concepts for programming works. The results of this investigation are the programming concepts, the program and the data bank.

WM Descriptor(s): brines; chemical composition; computer codes; Gorleben salt dome; salt deposits; salts; site characterization

Principal Investigator(s):
MENGEL, K.

TECHNISCHE UNIVERSITÄT CLAUSTHAL
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Organization Performing the work:
TECHNISCHE UNIVERSITÄT CLAUSSTHAL INST. FÜR MINERALOGIE UND MINERALISCHE ROHSTOFFE
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Other Investigators:

Organization Type:
Institution of higher education

Program Duration: From: 1997-2-1 To: 1998-5-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Bundesamt für Strahlenschutz (BfS)

Associated Organization(s):
none

GFR19980112

Title:
Study on the age determination of formations and evaluation of results with respect to its applicability on evaporates and brines

Title in Original Language:

Studie zur absoluten Altersdatierung von Gesteinen und Bewertung der Ergebnisse im Hinblick auf eine Anwendbarkeit bei Evaporiten und salinaren Lösungen

Topic Code(s):

323 -Earth Science Studies and Models

Abstract:

In a literature study the actual status of science and technology in the field of radioactive age determination of evaporates and brines was investigated by the Technical University of Clausthal. The aim of the study was the evaluation of the methods for a possible application on evaporates and brines.

WM Descriptor(s): chemical composition; geochemistry; Gorleben salt dome; salt deposits; salts; site characterization

Principal Investigator(s):

MENGEL, K.

TECHNISCHE UNIVERSITÄT CLAUSTHAL
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CLAUSTHAL-ZELLERFELD

Organization Performing the work:

TECHNISCHE UNIVERSITÄT CLAUSSTHAL INST. FÜR MINERALOGIE UND MINERALISCHE ROHSTOFFE
D-38678 CLAUSTHAL-ZELLERFELD GERMANY

Other Investigators:

Organization Type:

Institution of higher education

Program Duration: From: 1996-7-1 To: 1997-12-1

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):

Bundesamt für Strahlenschutz (BfS)

Associated Organization(s):

none

GFR19980113

Title:

Validation of biospheric models

Title in Original Language:

Validierung von Biosphärenmodellen

Topic Code(s):

211 -Biological Uptake Mechanisms and Models

Abstract:

Different models from various countries for calculating long term radiation exposures from radionuclides in the environment are compared. The influences of uncertainties in the exposure scenarios on the radiation exposures calculated with the models of the German Radiological Protection Ordinance are investigated. This especially refers to climatic changes, modified consumption habits and additional exposure pathways. It is tried to validate the data base for the biosphere modelling by considering natural analogues for relevant radionuclides in the long term. In this connection, the investigator is participating in the international BIOMASS project.

WM Descriptor(s): biosphere; environmental exposure pathway; health hazards; simulation

Principal Investigator(s):

PRÖHL, G.

GSF-FORSCHUNGSZENTRUM FÜR UMWELT
UND GESUNDHEIT GMBH INSTITUT FÜR
STRAHLENSCHUTZ
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NEUHERBERG

Organization Performing the work:

GSF-FORSCHUNGSZENTRUM FUER UMWELT UND GESUNDHEIT, MBH
D-85758 Neuherberg GERMANY

Other Investigators:
M. Baier

Organization Type:
Foundation or laboratory for research and/or development

Program Duration: From: 1996-10-1 To: 1999-12-31

State of Advancement: Research in progress

Sponsoring Organization(s):
Bundesamt für Strahlenschutz (BfS)

Associated Organization(s):
none

GFR19980114

Title:
GASGEN/GAMERS - Determination of gas production and description of gas transport in a salt repository

Title in Original Language:
GASGEN/GAMERS - Ermittlung der Gasbindung und Beschreibung der Gastransports in einem salinaren Endlager

Topic Code(s):
223 -Effects of Gaseous Releases

Abstract:

The project is divided in two parts. In the first part GASGEN (Gas Generation), measurements of gas generation in existing waste packages are carried out. A computer program is developed for assessing realistic time-dependent gas generation rates under consideration of waste content, waste conditioning and the geochemical situation in the repository. In the second part GAMERS (Gas Migration in a Repository System), requirements on the repository system (backfilling materials, geometry of the drifts and caverns, humidity of the host rock) due to gas production are worked out. The work is part of the PROGRESS project. Two-phase-migration of brine, water and water vapour is modelled with a modified version of the TOUGH2 code. The code will be coupled with a geochemical code. Solution and dissolution of rock salt will be considered in the calculations. Measurements of two-phase flow parameters of compacted rock salt and bentonite are performed.

WM Descriptor(s): corrosion; gas flow; gases; geochemistry; Gorleben salt dome; mathematical models; two-phase flow

Principal Investigator(s):
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Organization Performing the work:
ISTec GmbH
D-50455 KÖLN GERMANY

Other Investigators:

Organization Type:
Private industry

Program Duration: From: 1996-1-1 To: 1999-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Bundesamt für Strahlenschutz (BfS)

Associated Organization(s):
none

GFR19980115

Title:
MAW(Q) and HTR spent fuel experimental programme

Title in Original Language:
MAW(Q) und HTR-Brennelemente Versuchsprogramm

Topic Code(s):
327 -Waste Emplacement

Abstract:

In the MAW (Q) and HTR fuel research program the properties of crushed salt as flame barrier and as backfilling material in vertical boreholes are as well studied as the generation of hydrogen by corrosion of cask metals. Current planning provides for the final disposal of HLW and ILW of the upper activity category in the future Gorleben repository using either horizontal drift emplacement or the borehole technique. The theoretical model approaches for describing the pressure distribution in vertical final disposal boreholes filoled with wste packages and crushed salt are experimentally investigated and a safety concept including failure scenario will be developed. Crushed salt as backfill material should also prevent the formation of a propagating frame front due to the reaction of inflammable gas concentrations (hydrogen, methane) in the event of an assumed ignition. Technical requirements on crushed salt and the backfilling process are found out with experiments under consideration of failure scenario. Time dependent production rates of hydrogen by anaerobic corrosion of metals are developed under consideration of experiments and theoretical approaches.

WM Descriptor(s): backfilling; boreholes; corrosion; gases; Gorleben salt dome; hydrogen; metals; methane

Principal Investigator(s):

BRÜCHER, H.

FORSCHUNGSZENTRUM FÜR SICHERHEIT
UND REAKTORTECHNIK
D-52425
JÜLICH

Organization Performing the work:

Forschungszentrum Jülich (FZJ) FA/FB Inst. f. Sicherheitsforschung und Reaktortechnik
D-52425 Jülich GERMANY

Other Investigators:

Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: 1996-1-1 To: 1999-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Bundesamt für Strahlenschutz (BfS)

Associated Organization(s):

none

GFR19980116

Title:

Thermo-mechanical behaviour of rock salt

Title in Original Language:

Thermomechanisches Verhalten von Salzgestein

Topic Code(s):

323 -Earth Science Studies and Models

Abstract:

The main objective of this project is the description of the thermo-mechanical behaviour of rock salt. This description is an indispensable part of demonstration of the integrity of the salt dome barrier for the effectiveness of the backfilling action and hence the long term safety. The following are the main items of the study:
- a better understanding of physical processes during creep and failure of rock salt;
- development of new material laws on the basis of this understanding; and
- development of a methodology for the determination of homogeneous zones in rock salt.

Experiments are carried out on creep, strength and dilatancy. These experiments are used for the development of material laws and implementation of these material laws in finite element codes. As a result of comparison between experiments and model calculations, material parameter sets of different rock salts have been worked out. The first results of FE-simulation of particular creep experiments are available.

WM Descriptor(s): creep; finite element method; Gorleben salt dome; mathematical models; mechanical properties; rock mechanics

Principal Investigator(s):

HUNSCHE, U.

BUNDESANSTALT FUER
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Organization Performing the work:

BUNDESANSTALT FÜR GEOWISSENSCHAFTEN UND ROHSTOFFE (BGR)
D-30631 HANNOVER GERMANY

Other Investigators:

Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: 1995-1-1 To: 2000-12-31

State of Advancement: Research in progress

Sponsoring Organization(s):

Bundesamt für Strahlenschutz (BfS)

Associated Organization(s):

none

GFR19980117

Title:

Groundwater flow in heterogeneous medium under consideration of density influencing processes with regard to site description and long term safety

Title in Original Language:

Grundwasserbewegung in heterogenen Medien unter Berücksichtigung dichtebeeinflussender Prozesse im Hinblick auf Standortbeschreibung und Langzeitsicherheit

Topic Code(s):

303 -Earth Science Models and Studies

Abstract:

The objective of this study is to the development of fundamentals for carrying out site specific calculations for groundwater flow and for the evaluation of such calculations according to the status of science and technology as regards comprehensive site description, and a logical and contradiction free demonstration of long term safety. The following are the main tasks:
- examination, evaluation and further development of groundwater model codes;
- review, testing, evaluation and further development of special calculation methods for uncertainty analyses, sensitivity and parameter studies and treatment of heterogeneous structures; and
- working out, review and realization of model requirements and validation concepts.

WM Descriptor(s): brines; density; Gorleben salt dome; ground water; mathematical models; site characterization

Principal Investigator(s):

SCHELKES, KLAUS

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Organization Performing the work:

BUNDESANSTALT FÜR GEOWISSENSCHAF UND ROHSTOFFE (BGR)
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Other Investigators:

Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: 1995-1-1 To: 2002-12-31

State of Advancement: Research in progress

Sponsoring Organization(s):

Associated Organization(s):

Bundesamt für Strahlenschutz (BfS) none

GFR19980118

Title:

Tertiary sediments as a barrier for the U/Th migration in the far-field of repositories

Title in Original Language:

Tertiäre Sedimente als Barriere für die U/Th-Migration im Fernfeld von Endlagern

Topic Code(s):

324 -Safety Assessment and Performance Studies

Abstract:

Uranium and thorium deposits in sedimentary sediments may serve as a natural analogue for the radionuclide retention in the far-field of underground repositories of radioactive wastes. The investigation of such natural analogues can be used for verification or modification of codes used in performance assessment. In particular transport codes are used for modelling the long-term behaviour of radionuclide migration in geological formations. In the course of a pilot project a suitable site in the vicinity of Ruprechtov (Czech Republic) has been identified. The prevailing Tertiary sediments at this site are tuffs and clays with argillaceous lignites at the top and kaolinzed clay and sand at the bottom. Some of these sediments are found in other parts of Europe and also at locations which have been pre selected for radioactive waste disposal. By reconnaissance drillings two uranium bearing horizons in 12 m and 35 m depth have been observed. In sediment samples with higher uranium concentrations disequilibria between U-238 and Th-230 indicate that uranium transport has taken place within the last 100 000 years. In a full scale R&D project hydrological and geochemical investigations as well as accompanying model calculations will be performed in order to identify and understand geochemical and transport processes which happened in the past. The detailed investigation programme includes monitoring of hydrological conditions, groundwater and porewater analyses, sediment analyses, determination of accessible uranium by sequential extraction. The transferability of the results to potential repository sites as well as the application of the findings to long-term safety assessment models shall be evaluated.

WM Descriptor(s): computer codes; diffusion; drilling; geochemistry; hydrology; isotope ratio; mathematical models; natural analogue; precipitation; radioactive waste disposal; radiochemistry; radionuclide migration; retention; safety analysis; sorption; thorium; uranium

Principal Investigator(s):

NOSECK, U.

Gesellschaft für Anlagen- und Re (GRS) mbH
Enlagersicherheitsforschung
D-38122
Braunschweig

Organization Performing the work:

Gesellschaft für Anlagen- und Re (GRS) mbH
Enlagersicherheitsforschung
D-38122 Braunschweig GERMANY

Other Investigators:

Th. Brasser; W. Brewitz

Organization Type:

Private industry

Program Duration: From: 1995-7-1 To: 2001-6-30

State of Advancement: Research in progress

Sponsoring Organization(s):

Bundesminist. f. Bildung, Wissenschaft, Forschung und Technologie

Associated Organization(s):

Nuclear Research Institute (NRI), Czech Republic

GFR19980119

Title:
Compaction and permeability of crushed salt

Title in Original Language:
Kompaktion und Permeabilität von Salzgrus

Topic Code(s):
324 -Safety Assessment and Performance Studies

Abstract:

The objective of this study is to define the compaction behaviour of crushed salt as backfilling material for repositories in salt domes. For this, the interaction of rock and backfilling have to be considered. Also, the changes of permeability of the backfilling with changing compaction should be predictable. The following are the main goals of the study:
- development of quantitative statements about the interaction between compaction and permeability of the backfilling;
- derivation of reliable statements about the behaviour of crushed salt with added brine (during backfilling procedure and after a scenario) and about the compaction acceleration.
These statements are necessary for the justification of an early permeability decreasing of the backfilling material with suitable additives, e.g. bentonite in a licensing procedure.

WM Descriptor(s): backfilling; bentonite; creep; Gorleben salt dome; mathematical models; mechanical properties; permeability; salts; seals

Principal Investigator(s):

Stührenberg, D.

BUNDESAMT FÜR GEOWISSENSCHAFTEN UND ROHSTOFFE (BGR)
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Organization Performing the work:

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Other Investigators:

Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: 1995-1-1 To: 2000-12-31

State of Advancement: Research in progress

Sponsoring Organization(s):

none

Associated Organization(s):

none

GFR19980120

Title:
Scientific basis of the environmental control radioactive waste management

Title in Original Language:
Naucne osnove zastite zivotne sredine upravljanje radioaktivnim otpadom

Topic Code(s):
201 -Dispersion and Migration of Radionuclides; 202 -Dispersion and Migration Models; 306 -Barrier Studies and Tests; 310 -STUDIES FOR NEAR SURFACE DISPOSAL FACILITIES; 316 -Barrier Studies/Tests/Impacts

Abstract:

For the purpose of this project, investigations of the physico-chemical and mechanical characteristics of the three stage engineer trench system are prospected: mortar for the radioactive waste materials immobilization, concrete containers and concrete for trenches. the main task is to determinate diffusion coefficients, retardation factors and coefficients of distribution of the prospected radionuclides Cs-137, Co-60, Sr-90 and Mn-54, as well as mechanical characteristics of each segment of the engineer trench system, under normal and accidental conditions on the disposal site. The other task is to develop simplified mathematical model for analysing the migration of the named radionuclides, that are contained in the radioactive waste composition. Results

presented in this project are examples of data obtained in a cement testing project which will influence the design of a future radioactive waste storage center.

WM Descriptor(s): cesium 137; cobalt 60; concretes; containers; diffusion; manganese 54; mathematical models; radioactive waste disposal; radionuclide migration; strontium 90

Principal Investigator(s):

PLECAS, I.

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Organization Performing the work:

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Other Investigators:

Radojko Pavlovic; Miodrag Mandic; Snezana Pavlovic

Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: 1996-1-1 To: 1999-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Bundesamt für Strahlenschutz (BfS)

Associated Organization(s):

none

GFR19980121

Title:

Investigation of old backfill as a natural analogue for the compaction of backfill in underground repositories

Title in Original Language:

Analogon für kompaktierten Versatz in Endlagern - Phase 1

Topic Code(s):

117 -Waste Disposal; 316 -Barrier Studies/Tests/Impacts; 328 -Natural Analogue Studies

Abstract:

Investigations of natural analogues are considered as a valuable contribution to the verification of models and codes used in long term safety analyses. The in situ investigation of old crushed salt backfill as a natural analogue for compacted salt backfill in underground repositories is the objective of this project. Generally, long term effects and the interdependency between relevant parameters cannot be easily derived from in situ experiments. This is especially true for the long term behaviour of viscoplastic salt backfill and its compaction due to the creep induced closure of drifts or storage rooms in the host rock. The objective of phase 1 of the project was to define the requirements that are to be fulfilled by representative objects and the finding and selection of appropriate sites for further investigation. Three locations suitable for further investigations were identified so far. Currently, a respective investigation programme for the envisaged in situ investigations is under development.

WM Descriptor(s): backfilling; compacting; mines; natural analogue; plasticity; rocks; safety analysis; underground

Principal Investigator(s):

GIES, HERMANN

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Braunschweig

Organization Performing the work:

Gesellschaft für Anlagen - und R (GRS) mbH
D-38122 Braunschweig GERMANY

Other Investigators:

Hans-Karl Feddersen

Organization Type:

Private industry

Program Duration: From: 1996-9-1 To: 1997-6-1

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):

Bundesministerium für Bildung, Forschung und Technologie (BMBF)

Associated Organization(s):

FZK/PTE, BGR, DBE

India

IND19980001

Title:

Use of cesium-selective synthetic mordenite for reduction of activity in spent fuel storage pool water

Title in Original Language:

Topic Code(s):

132 -Liquid Waste Treatment; 146 -Spent Fuel Storage

Abstract:

Radiocesium is found to be the major contributor to the radioactivity of spent fuel storage pool water at AFR (Away-from-reactor) facility at Tarapur Atomic Power Station. A column experiment was conducted to study the removal of activity in pool water using locally available synthetic zeolite AR1 (mordenite type) which had been identified in our earlier studies to have high affinity for cesium sorption. In the trial run using a 1.0 L zeolite column nearly 5000 L of pool water was passed resulting in almost complete removal of Cs-137. The pool water activity could be reduced from about 10"-"2 #mu#Ci/ml to 10"-"4-10"-"5 #mu#Ci/ml range. The conductivity pH and silica contents of the effluent were higher than that of the influent the difference reducing slowly with continued processing. Based on these results efforts are now being made for processing of pool water through a larger-scale zeolite column for reduction of activity followed by a mixed-bed ion exchange resin column for maintaining the pH conductivity and silica contents within prescribed limits.

WM Descriptor(s): activity levels; cesium 137; inorganic ion exchangers; isotope separation; mordenite; radioactive waste processing; removal; spent fuel storage; water treatment; zeolites

Principal Investigator(s):

SAMANTA, SUSANTA KUMAR

PROCESS DEVELOPMENT SECTION PROCESS ENGG. & SYSTEMS DIVISION ETP BUILDING, DD COMPLEX BHABHA ATOMIC RESEARCH CENTRE
MUMBAI (BOMBAY)
400 085

Organization Performing the work:

BHABHA ATOMIC RESEARCH CENTRE
TROMBAY MUMBAI (BOMBAY) 400 085 INDIA

Other Investigators:

Siddiqui H.R.

Organization Type:

Other

Program Duration: From: 1995-1-1 To: 1997-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Bhabha Atomic Research Centre; Trombay Bombay 400 085 India

Recent publication info:

993

IND19980002

Title:
Use of potassium cobalt hexacyanoferrate(II) as a granular inorganic sorbent for selective removal of radiocesium from ion-exchange regenerant waste

Title in Original Language:

Topic Code(s):

132 -Liquid Waste Treatment; 146 -Spent Fuel Storage

Abstract:

Regeneration of cation exchange resin bed used in clean-up system for spent fuel storage pool water at AFR (Away-from-reactor) facility Tarapur Atomic Power Station resulted in waste solution containing about 1.0 #mu#Ci/ml of Cs-137 as the major radionuclide. In preliminary batch tests with this waste it was found that potassium cobalt (II) hexacyanoferrate(II) an inorganic sorbent which could be prepared in granular column-usable form in the laboratory showed high K_d values (>10"4 ml/g) for cesium. A field trial was then conducted using a column containing 5.5 L of the sorbent. In the trial run early 12000 L of waste solution was passed through the bed thereby reducing the activity to about 10"-"4 #mu#Ci/ml. The column run thus demonstrated that this sorbent can be used in once-through cesium sorption columns for effectively decontaminating regenerate waste solution thereby providing high volume reduction factor.

WM Descriptor(s): activity levels; cesium 137; cobalt complexes; ferricyanides; inorganic ion exchangers; isotope separation; potassium complexes; radioactive waste processing; removal; spent fuel storage; water treatment

Principal Investigator(s):

SAMANTA, SUSANTA KUMAR

PROCESS DEVELOPMENT SECTION PROCESS ENGG. & SYSTEMS DIVISION ETP BUILDING, DD COMPLEX BHABHA ATOMIC RESEARCH CENTRE
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Organization Performing the work:

BHABHA ATOMIC RESEARCH CENTRE
TROMBAY MUMBAI (BOMBAY) 400 085 INDIA

Other Investigators:

Verma B.B.; Siddiqui H.R.

Organization Type:

Other

Program Duration: From: 1994-1-1 To: 1997-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Bhabha Atomic Research Centre; Trombay 400 085 India

Recent publication info:

994

IND19980003

Title:
Development of calciner systems for radioactive liquid waste

Title in Original Language:

Topic Code(s):

112 -Liquid Waste Treatment; 132 -Liquid Waste Treatment

Abstract:

It is advantageous to convert the nitrates into solid oxides using suitable calciner prior to the vitrification. In order to remove moisture dehydrate denitrify and oxidise the heterogeneous waste into a granular product various calcination techniques were examined. Differential thermal analysis and thermogravimetric analysis of fission nitrates has been carried out. Based on fluidization index rating studies using transparent system

(FIRST) an experimental model was designed. This system is being tested to optimize the design and operation performance. The rotary ball kiln calcination has some advantages with respect to flexibility in operation for various feed stocks. In addition the generation of vessel offgases is very small. Design of a new experimental rig for rotary ball kiln calcination has been carried out. The experimental and theoretical investigations in this work will provide a rational methodology for scale-up of the fluidised and rotary kiln calciners.

WM Descriptor(s): calcination; calcined wastes; differential thermal analysis; liquid wastes; radioactive effluents; radioactive waste processing; thermal gravimetric analysis

Principal Investigator(s):

PANDE, DWARIKA PRASAD

FUEL REPR. & NUCLEAR WASTE MANAGEMENT GROUP BHABHA ATOMIC RESEARCH CENTRE
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Organization Performing the work:

PROCESS ENG. & SYSTEM DIV. BHABHA ATOMIC RESEARCH CENTER
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Other Investigators:

Prasad T.L.; Siddiqui H.R.

Organization Type:

Other

Program Duration: From: 1995-6-1 To: 1997-12-1

State of Advancement: Research in progress

Recent publication info:

995

IND19980004

Title:

Use of ultrafiltration for treatment of radioactive liquid wastes

Title in Original Language:

Topic Code(s):

112 -Liquid Waste Treatment

Abstract:

The objective of the programme is to study the effectiveness of the process of ultrafiltration and submicron filtration for removal of radioactivity. Separation of uranium Cs-137 and Sr-90 from liquid wastes which is of interest to nuclear industry. It is proved in lab scale studies that uranium Cs-137 and Sr-90 is removed effectively from radioactive liquid effluents. Df in the order of 100 to 1000 is achieved for low level wastes with initial activities in the range of 10"-"2 mCi/l to 10"-"4 mCi/l.

WM Descriptor(s): activity levels; cesium 137; isotope separation; liquid wastes; radioactive effluents; radioactive waste processing; removal; strontium 90; ultrafiltration; uranium isotopes

Principal Investigator(s):

ANAND BABU, C.

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Organization Performing the work:

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Other Investigators:

Shri K.B.; Lal J.A.

Organization Type:

Other

Program Duration: From: 1994-1-1 To: 1999-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

CWMF BARC; Kalpakkam 603102

Recent publication info:

996

IND19980005

Title:

Selective removal of argon from air using low temperature adsorption

Title in Original Language:

Topic Code(s):

111 -Gaseous Waste Treatment

Abstract:

Ar-41 is produced by neutron activation of Ar-40 in calandria vault coolant air of a typical PHWR (MAPS). As the argon-41 release needs to be controlled studies on developing a process based on the selective adsorption of Ar at suitable low temperature and using a suitable adsorbent has been initiated. Molecular sieves 3A 4A 5A and 13X; silica gel activated alumina and activated charcoal were evaluated for their uptake of argon/nitrogen at temperatures of 77 K and 140 K. Silica gel was found to give higher uptake of argon compared to that for nitrogen. This material was selected for further studies. The efficiency of removal was observed to be 60-99% for a residence time of 0.2 min at a temperature ranging between 200 K and 250 K. Studies are being continued to confirm the reproducibility of the data. Studies on characterisation of silica gel for physisorbed moisture and hydroxyl group are underway to understand their role in the mechanism of argon uptake by silica gel.

WM Descriptor(s): activated carbon; argon; argon 41; calandrias; gaseous wastes; isotope separation; molecular sieves; PHWR type reactors; radioactive waste processing; removal; silica gel

Principal Investigator(s):

SUMANGALA, R.K.

CWMF NWMG BHABHA ATOMIC RESEARCH CENTRE
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Organization Performing the work:

CENTRALISED WASTE MANAGEMENT FACILITY
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Other Investigators:

Raj S.S.; Biplob P.; Lal K.B.; Jaleel A.

Organization Type:

Other

Program Duration: From: 1994-4-1 To: 1997-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Centralised Waste Management Facility Nuclear Waste Management Group Bhabha Atomic Research Centre; Kalpakkam - 603 102 Tamil Nadu India

Recent publication info:

997

IND19980006

Title:

Application of zeolite matrices for exchange and fixation of radioactive ions

Title in Original Language:

Topic Code(s):

112 -Liquid Waste Treatment; 132 -Liquid Waste Treatment

Abstract:

Studies on indigenously available synthetic zeolites have indicated that these materials can be used to remove radioactive ions from liquid effluents by ion exchange process. The exchanged zeolites on subsequent thermal treatment may be further utilized as matrices for the fixation of the radioactive ions. Efforts have been initiated in this direction to determine the effectiveness of the zeolites as host matrices for the retention of the ions. Based on the results from ion-exchange studies zeolite AR-1 loaded with Cs zeolite 4A loaded with Sr and zeolite 13X loaded with Th were heated to different temperatures up to 1000 deg C. The samples heated to 1000 deg C were subjected to desorption studies and static leach tests. Preliminary results indicated that heating led to a significant reduction in leaching of the ions. Leach resistance was high for Sr - 4A and Th - 13X which was attributed to a transformation of phase of the respective zeolites at about 980 deg C. The reduction in leaching of Cs from CS - AR-1 was to a lesser extent which is explained by the fact that AR-1 (a mordenite) has higher thermal stability owing to its high Si/Al ratio. The observations were confirmed by thermal analyses and surface area determinations of the zeolites and the heated products.

WM Descriptor(s): cesium; inorganic ion exchangers; isotope separation; leaching; radioactive effluents; removal; strontium; thorium; zeolites

Principal Investigator(s):

SINHA, P.K.

CENTRALISED WASTE MANAGEMENT FACILITY
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603 102

Organization Performing the work:

CENTRALISED WASTE MANAGEMENT FACILITY
BHABHA ATOMIC RESEARCH CENTRE
KALPAKKAM 603 102 INDIA

Other Investigators:

Lal K.B.; Jaleel A.

Organization Type:

Other

Program Duration: From: 1993-10-1 To: 1997-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Centralised Waste Management Facility NWMG BARC;
Kalpakkam 603 102 Tamil Nadu India

Recent publication info:

998

IND19980007

Title:

Studies on removal of iodine from dissolver off-gas of nuclear fuel reprocessing plant

Title in Original Language:

Topic Code(s):

111 -Gaseous Waste Treatment

Abstract:

Considering the need to treat the off-gas arising out of dissolving nuclear spent fuel using 8M nitric acid it was necessary to look for a suitable material for the removal of long lived iodines I-129 after the off-gas has been depleted in NO_x/particulate levels using alkali scrubbers demisters and ruthenium filters. Mordenite and molecular sieve-13X were used as the base materials for exchanging the sodium with silver using silver nitrate solution for the exchange. Flow rate required for the optimal exchange and concentration of silver nitrate has been finalised as 15 ml/min and 20 g/l for a packed bed of 3.5 cm dia X 14 cm ht. housing nearly 100 g of material of 1.5 mm pellet dia and of varying length size between 5mm-15mm. Saturation of the bed could be determined by analysing the outlet concentration on regular intervals. Method of preparation has been tested for nearly 500 samples. DF for the removal of methyl iodide from air stream using 17 cc of silver sorbent for a flow rate of 5 lpm (bed size; 3.0 cm dia x 3.5 cm ht) was found to be ranging between 100-200 for a concentration range of 1.5 mg/l - 6mg/l when bed temperature was maintained at 160 deg C. Sufficient experience has been gained on the performance of silver sorbent for the removal of CH_3I from air. Studies are being conducted

now to find out the desorption characteristics of the already loaded silver sorbent. Effect of presence of NO_x at different concentrations also need to be evaluated.

WM Descriptor(s): gaseous wastes; iodine 129; ion exchange; isotope separation; molecular sieves; mordenite; off-gas systems; removal; reprocessing; spent fuels

Principal Investigator(s):

RAJ, S.S.

CENTRALISED WASTE MANAGEMENT FACILITY BHABHA ATOMIC RESEARCH CENTRE
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Organization Performing the work:

CENTRALISED WASTE MANAGEMENT FACILITY BHABHA ATOMIC RESEARCH CENTRE
KALPAKKAM 603 102 INDIA

Other Investigators:

Biplob P.; Lal K.B.; Jaleel A.

Organization Type:

Other

Program Duration: From: 1994-4-1 To: 1997-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Centralised Waste Management Facility Nuclear Waste Management Group Bhabha Atomic Research Centre; Kalpakkam-603 102 Tamil Nadu India

Recent publication info:

999

IND19980008

Title:

Site selection programme in granitic formations for deep geological repositories

Title in Original Language:

Topic Code(s):

322 -Site Survey and Characterization

Abstract:

Granitic rock formations of central and north-western part of India are being assessed for deep geological repository. The programme is based on narrowing down the choice from very large areas to candidate sites. Tectonic geological structural hydrogeological thermal and mechanical properties of the rockmass have been studied along with environmental aspects of the areas. Potential zones of 100 sq km and promising sub-zones of 25-30 sq km have been identified till now using matrix analysis of data. Detailed geological and geophysical surveys comprising mapping on 1:5000 scale and deep resistivity magnetic and EM have been completed in one zone and bore hole drilling and associated studies are to commence for complete sub-surface characterisation of site

WM Descriptor(s): geologic formations; geologic surveys; granites; radioactive waste disposal; site selection; underground disposal

Principal Investigator(s):

MATHUR, R.K.

REPOSITORY PROJECT SECTION NUCLEAR WASTE MANAGEMENT GROUP BHABHA ATOMIC RESEARCH CENTRE
MUMBAI (BOMBAY)
400 085

Organization Performing the work:

BARC Repository Projects Section Waste Management Operations Grp Trombay
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Other Investigators:
Narayan P.K.; Kulkarni A.V.; Acharya A.

Organization Type:
Foundation or laboratory for research and/or development

Program Duration: From: 1992-8-1 To: 1999-12-1

State of Advancement: Research in progress

Recent publication info:
1000

IND19980009

Title:
Excavation response studies for geological repository programme

Title in Original Language:

Topic Code(s):
325 -Design, Construction, Commissioning

Abstract:
In context of geological disposal program and studies on design of repository rockmass excavation response is being predicted by numerical methods technique in a Granitic formation. Parameters like geostatic stress condition and joint pattern have been taken from generic data. In an underground circular opening stresses and critical locations were predicted using ABAQUS code. The same problem is being analysed by UDEC code also for comparison purpose. Work on generation of mechanical and other geo-static site specific data is continuing and the same would be used when available for refinement of model.

WM Descriptor(s): computerized simulation; excavation; geologic models; geologic surveys; granites; shaft excavations; site characterization; stress analysis; u codes; underground disposal

Principal Investigator(s):
RAKESH, R.R.

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Mumbai 400 085 INDIA

Other Investigators:
Narayan P.K.; Mathur R.K.; Krishnan S.

Organization Type:
Other

Program Duration: From: 1995-12-1 To: 1999-12-1

State of Advancement: Research in progress

Recent publication info:
1001

IND19980010

Title:
Performance of engineered barrier materials in near surface disposal system

Title in Original Language:

Topic Code(s):
316 -Barrier Studies/Tests/Impacts

Abstract:
Near surface disposal is practised in India for low and intermediate level solid and conditioned wastes. Adequate safety assurance in these near surface disposal facilities is achieved using multi-barrier approach consisting of waste form backfill materials and engineered structures and finally geo-hydrological features of the site. Performance evaluation of the components viz: matrices and engineered barriers is in progress. The

emphasis is on use of blended cement materials as a conditioning matrix. The programme also includes assessment and remediation measures for the aged structures.

WM Descriptor(s): backfilling; ground disposal; intermediate-level radioactive wastes; low-level radioactive wastes; site characterization; solidification; waste forms

Principal Investigator(s):
BANSAL, N.K.

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Other Investigators:
Wattal P.K.; Satya B.

Organization Type:
Other

Program Duration: From: 1991-11-1 To: 1998-7-1

State of Advancement: Research in progress

Recent publication info:
1002

IND19980011

Title:
Study of phase separation related to vitrified waste products (VWP)

Title in Original Language:

Topic Code(s):
134 -Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies)

Abstract:

During vitrification formation of soluble yellow phase is undesirable since it can take active components from high level radioactive waste (HLW). The study is underway to quantify the extent of soluble yellow phase formation with respect to various constituents of HLW viz: chromate molybdate sulphate etc. The separated yellow phase has been analysed for chemical constituents and crystal structure. Efforts are specifically concentrated to control the formation of this yellow phase during vitrification by addition of reducing agents. Heat treatment of vitrified waste product VWP induces nucleation and subsequent crystallisation. The extent of crystallisation depends on time and temperature of heat treatment. The selected VWP composition was given detailed heat treatment and resulted in the formation of pyrophonite and rhodonite crystals at 700 deg C for 24 hrs. The effect of these crystals on leaching is being studied in detail.

WM Descriptor(s): crystallization; high-level radioactive wastes; phase studies; phase transformations; radioactive waste processing; vitrification; waste forms

Principal Investigator(s):
YEOTIKAR, R.G.

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Other Investigators:
Sonavane M.S.; Shah J.G.; Valsala T.P.; Kanwar R.

Organization Type:
Other

Program Duration: From: 1992-12-1 To: 1996-12-1

State of Advancement: Research in progress

Recent publication info:

1003

IND19980012

Title:

Synthesis and characterisation of phenolic chelating ion-exchange resin for treatment of alkaline liquid waste generated during fuel reprocessing

Title in Original Language:

Topic Code(s):

112 -Liquid Waste Treatment

Abstract:

Alkaline IL waste generated during reprocessing of spent fuel contains Pu U Cs and Sr besides various other constituents. For treatment purposes Pu and U are first separated by precipitation. The supernatant is treated by resorcinol formaldehyde (AF) chelating ion-exchange resin synthesized by condensation polymerisation under base catalysis. The product prepared under various conditions were pulverised and sieved to size range -16+60 ASTM mesh and used for characterisation. Exchange kinetics distribution coefficient exchange capacity selectivity coefficient chemical stability etc. were studied in detail. A pilot plant for production of chelating resorcinol formaldehyde resin for treatment of alkaline liquid radioactive waste was erected and commissioned. The temperature control is an important parameter imparting selectivity for Cs uptake from alkaline sodium nitrate (1.5M) waste. The other operations include thermal curing by air drying and size reduction in a micropulverisor. Fines were removed by following water and the size range -16+60 ASTM mesh were obtained by sieving. This resin has been successfully used for the treatment of alkaline liquid waste in Waste Immobilisation Plant Tarapur India for decontamination of waste with respect to Sr-90 and Cs-137.

WM Descriptor(s): chelating agents; ion exchange materials; liquid wastes; radioactive waste processing; reprocessing; resins; separation processes; spent fuels

Principal Investigator(s):

JOHNSON, G.

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Kaushik C.P.; Rath L.K.; Yeotikar R.G.; Kanwar R.

Organization Type:

Other

Program Duration: From: 1992-3-1 To: 1995-12-1

State of Advancement: Research in progress

Recent publication info:

1004

IND19980013

Title:

Electrochemical oxidation process for the treatment of spent resin and TBP solvent

Title in Original Language:

Topic Code(s):

113 -Solid Waste Treatment; 169 -Removal/Recycling of Organics

Abstract:

Studies on the evaluation of silver-mediated electrochemical oxidation process for organic wastes using a two-compartment cell were continued. Using this cell effects of current density temperature and anolyte acidity on the rate of oxidation were investigated. It was noted that as the current density was increased the amount of resin oxidised also increased. However the efficiency of the reaction expressed as CO_2 generated per amp-hour decreased. Complete oxidation was observed at 60 deg C compared to 82 percent at 30 deg C. For pure TBP both anolyte acidity and temperature were found to increase the efficiency. Behaviour of pure dodecane was also similar. For 30 percent TBP-dodecane mixture higher proportion of TBP was oxidised. Further investigation of this system is in progress.

WM Descriptor(s): electrochemistry; organic ion exchangers; organic wastes; oxidation; radioactive waste processing; resins; TBP

Principal Investigator(s):

RAMASWAMY, M.

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Organization Performing the work:

Other Investigators:

Siddiqui H.R.

Organization Type:

Program Duration: From: 1991-6-1 To: 1996-12-1

State of Advancement: Research in progress

Recent publication info:

1005

IND19980014

Title:

Natural clays as backfill materials for the containment of radionuclides

Title in Original Language:

Topic Code(s):

117 -Waste Disposal; 154 -Waste Immobilization

Abstract:

Interaction of clay backfill material with radioactive liquid wastes having activity of the order of 1000 Bq/ml has been studied. The radionuclides of interest studied included Cs-137 Ce-144 Ru-106 Sb-125 Zr-95 Nb-95 along with other alpha emitters. The clays studied were bentonite vermiculite attapulgite shale and soils. Thermodynamic analysis of sorption/desorption data on the basis of #delta#H #delta#G and #delta#S values indicated chemisorption as a major retention mechanism for vermiculite and coastal clay soil. Admixtures of these backfill with varying proportions of bentonite vermiculite and costal clay soil along with silica were also investigated for these wastes. Admixtures having 20% each of bentonite and attapulgite and 30% coastal clay soil and silica gave sorption for Ce-144 > 99% while retention for Cs-137 was nearly 98%. Retention for gross alpha was also nearly 95%. Low percentage retention was observed for radionuclides like Ru-106 and Sb-125. Studies on optimization of admixtures including role of minor additives like monozite baryte calcite chalcocite and pyrite to adjust Eh pH and also ion specific retention behaviour are in progress.

WM Descriptor(s): alpha particles; antimony 125; backfilling; cerium 144; cesium 137; clays; containers; liquid wastes; niobium 95; radioactive waste disposal; ruthenium 106; zirconium 95

Principal Investigator(s):
KHAN, ZAHIR AHMED

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Kartha P.K.S.; Siddiqui H.R.

Organization Type:
Other

Program Duration: From: 1992-11-1 To: 1997-11-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Bhabha Atomic Research Centre; Trombay Bombay 400-085 India

Recent publication info:
1006

IND19980015

Title:
Alkaline hydrolysis process for the treatment of spent solvents

Title in Original Language:

Topic Code(s):
113 -Solid Waste Treatment; 169 - Removal/Recycling of Organics

Abstract:

Treatment of spent solvent (30% TBP in n-dodecane) from reprocessing plants by the 'alkaline hydrolysis route' was studied on an engineering scale of 40 litre batch using non-radioactive solvent. Number of runs established conversion of TBP to sodium salt of DBP to the extent of 99.97% using 10-12.5 Molar alkali at temperatures ranging from 80-116 deg C. Complete recovery of diluent dodecane was also achieved from the aqueous phase of reaction products containing butanol and sodium salt of DBP. The kinetics of hydrolysis reaction at these temperatures is slow and hence inherently safe. Aqueous bottom phase is compatible with cement and can be directly immobilized. Laboratory scale trials on active spent solvents with gross #beta# activity in the range of 7000-40000 Bq/ml and #alpha# in the range of 700-1200 Bq/ml have established that the diluent recovered can be recycled and the bulk of the original activity (>99.9%) is retained in the bottom aqueous phase. The diluent had an activity in the range of 2-8 Bq/ml. A full scale plant to process 200 lts/batch of these solvents has been set up based on this process and will be operational soon.

WM Descriptor(s): dodecane; hydrolysis; organic solvents; reprocessing; TBP; waste processing

Principal Investigator(s):
WATTAL, P.K.

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Smitha M.; Vincent T.; Gopinathan P.; Raju R.P.; Siddiqui H.R.

Organization Type:
Other

Program Duration: From: 1995-1-1 To: 1996-6-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Bhabha Atomic Research Centre; Trombay Bombay 400 085
India

Recent publication info:

1007

IND19980016

Title:

Removal of actinides from HLW solutions. Batch studies

Title in Original Language:

Topic Code(s):

132 -Liquid Waste Treatment

Abstract:

Solvent extraction studies were undertaken for the removal of long-lived actinides viz. uranium neptunium plutonium and americium from simulated HLW solutions. In these batch studies TBP as well as CMPO were used as extractants for the removal of the actinides. Extraction of neptunium and plutonium were studied under various oxidizing and reducing conditions. Various reagents were employed for the stripping of neptunium and plutonium from loaded TBP and CMPO. Stripping of actinide was also studied under various conditions. Mixture of hydrogen peroxide and ascorbic acid was found to be effective for simultaneous stripping of neptunium and plutonium from 30% TBP leaving uranium in the organic phase. Dilute nitric acid could strip the hexavalent neptunium and plutonium in addition to trivalent americium from the loaded CMPO. These studies were extended to actual HL waste solutions on a laboratory scale.

WM Descriptor(s): americium; CMPO; high-level radioactive wastes; liquid wastes; neptunium; plutonium; removal; solutions; solvent extraction; TBP; uranium

Principal Investigator(s):

CHITNIS, R.R.

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Wattal P.K.; Mathur J.N.; Ramanujam A.

Organization Type:

Other

Program Duration: From: 1994-8-1 To: 1996-8-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Bhabha Atomic Research Centre; Trombay Bombay 400 085
India

Recent publication info:

1008

IND19980017

Title:

Vitrification of sulphate bearing high level radioactive waste in lead borosilicate system

Title in Original Language:

Topic Code(s):

134 -Waste Immobilization/Vitrification (including

Heat Transfer, Leaching and Other Studies)

Abstract:

Lead borosilicate formulation has been developed for vitrification of HL wastes containing sulphates up to 3 gms/lt. Waste oxide loading up to 27.5%(wt. basis) could be accommodated without affecting the homogeneity of the product. Incorporation of PbO up to 25 wt% ensured formation of thermally stable and highly insoluble lead sulphate compatible with basic borosilicate network. Retention of SO_4 in the vitrified waste product was in the range of 85-90%. Heat treatment at 450 deg C for seven days did not result in crystal formation. Glass transition temperature determined by DTA method was found to be 500 deg C indicating thermal stability of the formulations. The leach rate based on sodium loss was found to be 2.74 x 10"-"5 gm/cm"2/day after 803 days of leaching.

WM Descriptor(s): borosilicate glass; high-level radioactive wastes; leaching; lead silicates; radioactive waste processing; sulfates; vitrification

Principal Investigator(s):

JAHAGIRDAR, P.B.

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Other Investigators:

Wattal P.K.; Siddiqui H.R.

Organization Type:

Other

Program Duration: From: 1994-7-1 To: 1996-6-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Bhabha Atomic Research Centre; Trombay Bombay 400 085 India

Recent publication info:

1009

IND19980018

Title:

Numerical simulation of Joule heated ceramic melter for vitrification of high level liquid wastes

Title in Original Language:

Topic Code(s):

134 -Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies)

Abstract:

Numerical simulation of Joule heated ceramic melter for vitrification of high level radioactive liquid waste has been carried out using a three dimensional mathematical model. The model developed has been used to study the influence of factors such as melter electrode configuration electrode firing pattern glass pool geometry and glass properties on the melter performance. This performance evaluation of the ceramic melter has been based on its thermal effectiveness degree of mixing in the glass pool and uniformity in the heat flux distribution at the glass pool surface. Non-uniformly fired four pair electrode design has been found to be attractive since it offers higher thermal effectiveness better product homogeneity and improved uniformity with respect to surface heat flux distribution.

WM Descriptor(s): ceramics; crucibles; high-level radioactive wastes; liquid wastes; numerical solution; simulation; vitrification

Principal Investigator(s):

SUGILAL, G.

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Other Investigators:

Wattal P.K.; Siddiqui H.R.

Organization Type:

Other

Program Duration: From: 1992-11-1 To: 1997-11-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Atomic Research Centre; Trombay Bombay 400-085 India

Recent publication info:

1010

IND19980019

Title:

Granulation of glass forming additives as an alternative to 'slurry feeding' for vitrification of HL waste

Title in Original Language:

Topic Code(s):

134 -Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies)

Abstract:

Studies were undertaken to develop and evaluate solid feed in the form of 3-6 mm dia calcined granules of glass forming additives in lieu of slurry mode of feeding. Calcined granules conforming to lead borosilicate base glass composition (40% SiO_2 13.3% B_2O_3 13.3% Fe_2O_3 and 33.4% PbO) were made at 700 deg C having bulk density of 1.8 gms/cc. These granules have cold crushing strength of 30 kg/cm"2 desirable for mechanical handling during feeding for vitrification. The granules with a porosity of about 30% have an advantage over premelted glass frit wherein interaction between waste components and glass require prolonged heating at elevated temperatures owing to the absence of pores in them. Besides minimum carry over of particulates reduction in thermal load on the furnace and nearly 50% reduction in the off gases are the distinct advantages of using this granulated feed compared to slurry mode. Microstructural investigations of the vitrified waste product using these granulated feed along with simulated high level waste revealed a homogeneous product with practically no phase separation and no detectable crystallinity. Leach rate based on weight loss basis was found to be 3 x 10"-"5 gms/cm"2/day comparable to that of slurry fed glass.

WM Descriptor(s): additives; borosilicate glass; calcination; granular materials; high-level radioactive wastes; microstructure; radioactive waste processing; vitrification

Principal Investigator(s):

JAHAGIRDAR, P.B.

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Wattal P.K.; Siddiqui H.R.

Organization Type:

Other

Program Duration: From: 1994-7-1 To: 1996-6-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Bhabha Atomic Research Centre; Trombay Bombay 400 085
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Recent publication info:

1011

IND19980020

Title:
Hydrous titania as a granular inorganic sorbent for removal of Sr-90 from alkaline radioactive wastes

Title in Original Language:

Topic Code(s):

112 -Liquid Waste Treatment

Abstract:

Hydrous titania (HTO) is being studied as an inorganic sorbent for the selective removal of radiostrontium from alkaline waste solutions. Methods have been standardised in the laboratory for the preparation of this sorbent using either TiCl_4 or Ti metal sponge as starting materials. Batch K_d values of the order of 10"4 mlg"-"1 have been measured for the uptake of radiostrontium from simulated alkaline reprocessing waste solution. The effect of pH sodium and strontium concentration on the uptake of strontium has been studied. The radiation stability of the sorbent has also been investigated. Column tests show that DF of about 1000 can be obtained for about 6000 bed volumes of simulated waste feed solution. Tests with real wastes have also shown promising results. A method has also been standardised to prepare this sorbent in bulk quantity for plant scale application. This sorbent can be used in once-through mode for removal of radiostrontium from alkaline IL waste solutions.

WM Descriptor(s): adsorbents; granular materials; inorganic ion exchangers; liquid wastes; radioactive waste processing; removal; strontium 90; titanium oxides

Principal Investigator(s):

SAMANTA, SUSANTA KUMAR

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Other Investigators:

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Organization Type:

Other

Program Duration: From: 1994-1-1 To: 1996-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

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India

Recent publication info:

1012

IND19980021

Title:
Development of treatment process for alkaline salt-loaded reprocessing wastes at Trombay

Title in Original Language:

Topic Code(s):

112 -Liquid Waste Treatment

Abstract:

Intermediate level aqueous wastes generated from the spent fuel reprocessing plant at Trombay are presently stored in underground carbon steel tanks. Such wastes are highly alkaline and contain large concentrations of sodium salts (e.g. nitrate carbonate aluminate etc.). The radioactivity is mainly due to Cs-137. Traces of Sr-90 Ru-106 uranium and plutonium are also found in these wastes. In the course of investigations to develop a comprehensive treatment scheme for such wastes it has been found that Resorcinol Formaldehyde Polycondensate Resin (RFPR) developed earlier is capable of effectively removing Cs-137. Batch and column experiments with real waste sample have given encouraging results. After removal of Cs-137 the waste can be treated with acid to destroy carbonate as well as precipitate the aluminium as hydroxide. It was found that plutonium also gets removed to a large extent along with aluminium. Further investigations are continuing to optimise process conditions so that satisfactory decontamination from all radionuclides can be achieved.

WM Descriptor(s): cesium 137; intermediate-level radioactive wastes; liquid wastes; organic ion exchangers; removal; reprocessing; resins; sodium compounds; spent fuels

Principal Investigator(s):

SAMANTA, SUSANTA KUMAR

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Organization Type:

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Program Duration: From: 1995-1-1 To: 1997-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

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Recent publication info:

1013

IND19980022

Title:

Characterization and incineration of filter sludge waste

Title in Original Language:

Topic Code(s):

113 -Solid Waste Treatment

Abstract:

The paper pulp powder, normally known as solka floc, is used as precoat filter for filtration of radioactive low level waste in power station. This precoat removes the insoluble particles and is removed after use depending on the pressure drop across the filter media. The filter media called filter sludge (FS) is then centrifuged, to remove water to the maximum possible extent. Presently the FS having contact dose 0.2 to 5 mR/hr. is packed in carbon steel drums and stored in RCC trenches. Efforts have been made to incinerate the filter sludge so that maximum volume reduction achieved and the incinerated ash can be cementized, Thermal evaluation of the raw material, solka floc was carried out for knowing the burning characteristics using the thermogravimetry (TG) and differential thermal analyser (DTA). Filter sludge was characterized fully for activity, water content and ash content. The filter sludge was incinerated in the furnace at various temperature and the ash was characterized. Efforts for cementation of ash is on the way.

WM Descriptor(s): ashes; cements; filters; filtration; low-level radioactive wastes; thermal gravimetric analysis

Principal Investigator(s):

Sonavane, M.S.

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Other Investigators:

Singh, U.S.; Kaushik, C.P.; Yeotikar, R.G.

Organization Type:

Other

Program Duration: From: 1997-1-1 To: 1998-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

none

Associated Organization(s):

none

IND19980023

Title:

Conditioning of filter sludge waste into a cement matrix

Title in Original Language:

Topic Code(s):

113 -Solid Waste Treatment

Abstract:

Solca flock is used as precoat filter media for filtration of low level liquid waste in the power station. The precoat media is removed after use depending on the pressure drop. This filter media is called filter sludge (FS) and contains water and insoluble material apart from activity. This FS waste is centrifuged to removed water, packed in carbon steel drums and stored in RCC trenches. The contact dose of these drums varies from 0.2 to 5 R/hr. The FS waste was subjected to leaching study. Since FS waste as such is not the ultimate disposal matrix and its leaching is also high, study has been initiated for conditioning of filter sludge waste into a cement matrix. Cement waste products (CWP) have been prepared using varying quantity of FS waste, water, vermiculite and OPC cement. The CWPs were subjected to curing for 28 days and thereafter to mechanical strength evaluation and leaching. Long term leaching of these CWPs is on the way.

WM Descriptor(s): cements; filters; leaching; low-level radioactive wastes

Principal Investigator(s):

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Mishra Ajai and Yeotikar, R.G.

Organization Type:

Other

Program Duration: From: 1997-1-1 To: 1999-7-1

State of Advancement: Research in progress

Sponsoring Organization(s):

none

Associated Organization(s):

none

IND19980024

Title:
Long term leaching of radioactive vitrified waste products

Title in Original Language:

Topic Code(s):
182 -Waste from form characterization

Abstract:

Sodium borosilicate glass matrix has been adopted for immobilization of high level liquid radioactive waste (HLW) in India. For immobilization of present HLW, glass composition IR111 has been finalized and adopted on plant scale. During vitrification of HLW secondary waste is generated. After few vitrification operations with normal HLW, one operation with secondary waste is carried out. For immobilization of secondary waste different glass composition is used. For evaluation of these glasses for leaching on activity basis, the active glass compositions corresponding to actual and secondary wastes were prepared. These glass compositions were subjected for detailed leaching study by ISO method at 70°C for evaluation of leach rate on activity loss basis and its comparison with sodium loss basis. Long term leaching study of these active glass composition was also continued and leaching samples corresponding to about 550 days have also been removed recently. The leaching was found to be less on activity loss basis compared to that on sodium loss basis. Leach rate after 600 days of leaching of VWPs made from actual and secondary waste on activity loss basis is 7.95 x 10-6 and 2.51 x 10-6 g/cm²/day respectively.

WM Descriptor(s): borosilicate glass; high-level radioactive wastes; leachates; leaching; liquid wastes; radioactive wastes; vitrification

Principal Investigator(s):
YEOTIKAR, R.G.

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Organization Type:
Other

Program Duration: From: 1996-3-1 To: 1998-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):
none

Associated Organization(s):
none

IND19980025

Title:
Treatment of low level liquid waste containing Ru-106 activity using zinc charcoal column

Title in Original Language:

Topic Code(s):
112 -Liquid Waste Treatment

Abstract:

Low level radioactive liquid waste (LLW) generated as effluent of ion exchange column during processing of intermediate level radioactive liquid waste, contains radioactive Ru along with other radioactivity. Decontamination of the LLW with respect to Ru is very difficult since Ru is in various species. For effective

decontamination of LLW with respect to Ru, a column process has been developed and adopted on pilot plant scale. The packed with zinc-charcoal bed was used for this purpose. The pH of the waste was reduced to about 2 and the waste was passed through zinc-charcoal column. The effluent of this column was then treated by usual chemical co-precipitation technique for decontamination with respect to other isotopes.

WM Descriptor(s): chemical analysis; liquid wastes; low-level radioactive wastes; ruthenium 106; separation processes; waste processing

Principal Investigator(s):

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Vinod Prasad; Chaki, G.C.; Mishra Ajai; Samanta, S.K.; Yeotikar, R.G.

Organization Type:

Other

Program Duration: From: 1995-3-1 To: 1995-12-1

State of Advancement: Unknown

Sponsoring Organization(s):

none

Associated Organization(s):

none

IND19980026

Title:

Evaluation of various backfill materials

Title in Original Language:

Topic Code(s):

323 -Earth Science Studies and Models

Abstract:

In order to assess the change in chemistry of water by passage through the backfill, it is essential to characterize the backfill materials. Therefore, study has been carried out for evaluation of various prospective backfill materials for their different properties. The backfill materials studied are bentonite, vermiculite, granite, soil clays etc. The properties evaluated are swelling, change in chemistry of water after equilibration and adsorption. Apart from these, various other properties like density, particle distribution and thermal stability have also been evaluated. It is observed that the majority of particles of bentonite are in the range of 100-500 microns. As regards swelling behaviour of unheat-treated bentonite specimen, it is observed that, after 8 to 10 hours, the swelling is complete and, thereafter, no further swelling takes place. The swelling is more in case of calcium bentonite than the sodium bentonite. The swelling of bentonite after heat treatment is observed to be comparable with the unheat-treated bentonite. It was observed that total ion exchange capacity of vermiculite varies between 25-30 meq/100 g. The particle size distribution of vermiculite showed that more than 90 percent of the material is having particle size in the range of -16+80 STM mesh. The peaks in X-ray diffraction scans of Cs loaded vermiculite are entirely different from that of as such sample, indicating change in structure of vermiculite after Cs loading. It was observed that, when vermiculite was equilibrated with water, gets saturated within a period of 24 hours with respect to various ions under experimental conditions. Further studies are on the way.

WM Descriptor(s): backfilling; bentonite; clays; granites; ion exchange; swelling; vermiculite

Principal Investigator(s):

YEOTIKAR, R.G.

BHABHA ATOMIC RESEARCH CENTRE Waste Management Facilities Tarapur, P.O. Ghivali, Dist, Thane
401 502
Maharashtra

Organization Performing the work:

BARC Complex Waste Management Facilities Tarapur, P.O. Ghivali, Dist. Thane
401502 Maharashtra INDIA

Other Investigators:

Kaushik, C.P.; Sonavane, M.S.; Shah, J.G.

Organization Type:

Other

Program Duration: From: 1995-7-1 To: 1998-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

none

Associated Organization(s):

none

IND19980027

Title:

Evaluation of cement matrices for conditioning of alkaline intermediate level radioactive liquid waste

Title in Original Language:

Topic Code(s):

112 -Liquid Waste Treatment

Abstract:

Experimental studies have been conducted for evaluation of cement matrices for conditioning of alkaline Intermediate Level Radioactive liquid waste (ILW). Ordinary Portland Cement (OPC) with 20% vermiculite and Slag Based Cement (SBC) were taken as candidate matrices. Alkaline radioactive liquid waste of different compositions were used for above studies. It includes alkaline radioactive liquid waste stored in different tanks and sludge formed during chemical treatment of LLW. The cement samples were analysed for phase identification by x-ray diffractometer. In both the cements i.e. slag based and ordinary Portland cement (SBC & OPC) phases identified were similar. Various major phases identified are tricalcium silicate (Ca3SiO5, JCPDS card No. 31-301), calcium magnesium aluminum silicate (Ca54MgAl2Si16O90, card No. 13-272) and calcium magnesium silicate (54CaO, 16SiO2Al2O3MgO, card No. 11-593). Tricalcium silicate was found to be the major phase in both the samples. Cement waste products were prepared by taking ordinary Portland cement + 20% vermiculite and slag based cement have been used for preparation of cement blocks. Curing of the products was done in humid condition. After having curing of cement blocks for a period of 28 days, blocks were taken out, and the same were subjected for leaching and compressive strength evaluation. The leaching of about 350 days was carried out. The study carried out indicated that the cement blocks made from OPC with vermiculite and SBC alone using different waste streams are having comparable properties in terms of leaching and compressive strength.

WM Descriptor(s): cements; intermediate-level radioactive wastes; leaching; vermiculite

Principal Investigator(s):

KAUSHIK, C.P.

BHABHA ATOMIC RESEARCH CENTRE WASTE MANAGEMENT FACILITIES Tarapur, P.O Ghivali, Dist., Thane
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Organization Performing the work:

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Other Investigators:

Singh, U.S.; Sonar, N.L.; Shah, J.G.; Yeotikar, R.G.

Organization Type:

Other

Program Duration: From: 1995-7-1 To: 1997-1-1

State of Advancement: Unknown

Preliminary report(s) available: Yes

Sponsoring Organization(s):

none

Associated Organization(s):

none

IND19980028

Title:

Development of flowsheet for actinide partitioning from HLW solutions

Title in Original Language:

Topic Code(s):

132 -Liquid Waste Treatment

Abstract:

Developmental studies for the formulation of a complete scheme for partitioning of actinides from high level waste were continued. Alpha activity inhigh level wastes left after removal of uranium, neptunium and plutonium using TBP is mainly due to americium and curium. Mixture of CMPO and TBP was used for the removal of transplutonics remaining actinides. Actinides from the loaded CMPO-TBP mixture were stripped using a mixture of weak acid, weak base and complexing agents. The proposed strippant is effective in recovering the actinides from CMPO-TBP mixture even with high nitric acid content. The strippant can recover actinides quantitatively in presence of high quantities of acidic impurities. Feasibility of the use of the strippant was successfully tested in counter-current mode using mixer-settlers. Use of this strippant reduces the volume of secondary waste.

WM Descriptor(s): actinides; extraction; high-level radioactive wastes; mixer-settlers; partition; solvents

Principal Investigator(s):

CHITNIS, R.R.

PROCESS ENGINEERING AND SYSTEMS DEVELOPMENT DIVISION BHABHA ATOMIC RESEARCH CENTRE
TROMBAY MUMBAI (BOMBAY)
400 085

Organization Performing the work:

BARC Trombay
Mumbai 400 085 INDIA

Other Investigators:

Wattal, P.K.; Ramanujam, A.; Dhami, P.S.; Mathur, J.N.

Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: 1997-1-1 To: 1998-1-1

State of Advancement: Unknown

Preliminary report(s) available: Yes

Sponsoring Organization(s):

none

Associated Organization(s):

none

IND19980029

Title:

Management of spent solvents by the alkaline hydrolysis process

Title in Original Language:

Topic Code(s):

169 -Removal/Recycling of Organics

Abstract:

A full scale (200l) inactive Alkaline Hydrolysis plant has been erected and commissioned for the management

of spent solvents containing TBP in n-Dodecane. Repeated runs were carried out on this facility with an end objective of demonstrating the feasibility of the process at a 200l inactive scale. The runs helped in establishing the process with respect to the percentage conversion of TBP to sodium salts of DBP, percentage recovery of dodecane and its quality and the overall material balance. Besides, the runs also helped verify process parameters during hydrolysis reaction. Remote separation and draining of aqueous and organic phases by interface measurement were also carried out during these trials. Runs carried out by using 12.5 M NaOH and at temp range of 80-116 deg C have indicated >99.5% conversion of TBP and >98% recovery of diluent dodecane. The aqueous bottoms arisings were immobilized in cement matrices on a 200l scale using a Nauta mixer based cementation facility. The 200l concrete blocks have been seen to have acceptable properties for safe disposal.

WM Descriptor(s): feasibility studies; hydrolysis; organic wastes; TBP

Principal Investigator(s):

Manohar, Smitha

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Organization Performing the work:

BARC
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Other Investigators:

P.K. Wattal; Tessy Vincent

Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: 1997-12-1 To: 1998-3-1

State of Advancement: Unknown

Preliminary report(s) available: Yes

Sponsoring Organization(s):

none

Associated Organization(s):

none

IND19980030

Title:

Vitrification of wastes arising from processing of beryllium ore

Title in Original Language:

Topic Code(s):

164 -Waste Immobilization

Abstract:

Various waste streams emanating from the processing of Beryllium ores need to be suitably managed on account of the presence of hazardous Beryllium in them. Immobilization trials have been taken for two of waste streams viz red mud (comprising of SiO_2, Al_2O_3, Fe, traces of fluorides & white mud (having CaF_2, $CaSiO_3$, $BeSiO_2$, BeO). As the red mud contains glass formers direct vitrification of the same was carried. The compositional difference in these two wastes have been used to an advantage by using both in 1:1 proportion and vitrifying it. The vitrification was carried out in a graphite crucible using an induction furnace at 1200 °C. Studies are on to characterize the vitrified waste forms and see their suitability for disposal.

WM Descriptor(s): hazardous materials; ores; vitrification; waste characterization

Principal Investigator(s):

JAHAGIRDAR, P.B.

Process Eng. & Systems Development Division,
Reprocessing & Nuclear Waste Management Group
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Organization Performing the work:

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Other Investigators:

Wattal, P.K.

Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: 1997-12-1 To: 1998-3-1

State of Advancement: Research in progress

Sponsoring Organization(s):
none

Associated Organization(s):
none

IND19980031

Title:
Safety Assessment of Radioactive Waste Packages for Disposal in Near Surface Disposal Facility

Title in Original Language:

Topic Code(s):
115 -Waste Packaging

Abstract:

The disposal of LILW is carried out in near surface engineered structures at various sites in India. It is planned to study systematically the performance of waste packages disposed in near surface disposal facilities. The base line data on waste packages and surrounding conditions in coastal/inland disposal facility is being compiled. It is proposed to carry out detail studies such as dimensional check, compressive strength, leach rates, corrosion etc. on containers and waste forms being disposed presently or earlier.

WM Descriptor(s): containers; packaging; waste disposal; waste forms

Principal Investigator(s):
Kumra, M.S.

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Organization Performing the work:
BARC
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Other Investigators:
Galande, S.M.; Surender Kumar; Kaushik, C.P.; Rakesh, R.R.

Organization Type:
Foundation or laboratory for research and/or development

Program Duration: From: 1997-9-1 To: 2002-9-1

State of Advancement: Research in progress

Sponsoring Organization(s):
none

Associated Organization(s):
IAEA

IND19980032

Title:
Safety Analysis of Near Surface Disposal Facilities Located in Hard Rock Formation

Title in Original Language:

Topic Code(s):
201 -Dispersion and Migration of Radionuclides

Abstract:

For a near surface disposal facility located in hard rock formation with gently dipping bedding planes toward a nearby lake, the appropriate scenario for safety analysis is being developed. In this connection the site specific data on characteristics of bedding planes and lithology, geochemistry, hydrology has been collected. An appropriate analytical tool relevant to scenario such as migration through bedding planes/Joints/fractures and dilution in downstream river water is being developed.

WM Descriptor(s): computer codes; radionuclide migration; technology development

Principal Investigator(s):

RAKESH, R.R.

REPOSITORY PROJECTS SECTION BHABHA
ATOMIC RESEARCH CENTRE
WIP BUILDING
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Organization Performing the work:

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Other Investigators:

Narayan, P.K.; Mathur, R.K.

Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: 1998-1-1 To: 1999-6-1

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):

none

Associated Organization(s):

none

IND19980033

Title:

Physico-chemical and hydrological investigations for safety assessment of near surface waste disposal site, Kaiga

Title in Original Language:

Topic Code(s):

312 -Site Survey and Characterization

Abstract:

To assess the suitability of the site for location of near surface radioactive waste disposal facility at Kaiga Atomic Power Station, physico-chemical and hydrogeological properties of host soil and rocks are being evaluated. Various properties of soil samples viz. porosity, void ratio, grain size distribution, organic matter content, pH, total cation exchange capacity were evaluated. Interaction of radionuclides (Cs-137 and Sr-90) with soil media was studied for determination of distribution coefficient (kd). The groundwater movement was estimated using tritium tracer by multi-well technique. Results obtained to date show that the soil has low content of clay resulting low values of kd and cation exchange of capacity (CEC). The groundwater movement was observed in the direction of N 72°E and S 49°E having a flow rate of 1 m per day (maximum). Properties of barrier material (bentonite) were also investigated to formulate a concept for reliable and safe disposal of radioactive waste. The work is continuing at other locations of the site.

WM Descriptor(s): bentonite; cesium 137; ground water; radioactive waste disposal; radionuclide migration; site characterization; site selection; strontium 90

Principal Investigator(s):

Joshi, M.R.

BARC Repository Projects Section Waste
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400 085

Organization Performing the work:

BARC Repository Projects Section Waste Management Operations Grou Trombay
Mumbai 400 085 INDIA

Other Investigators:

Pawar, V.M.; Raje, B.S.; Mathur, R.K.

Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: 1996-3-1 To: 1999-10-1

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):

none

Associated Organization(s):

none

IND19980034

Title:
Siting Programme for Locating a Geological Repository in Granites

Title in Original Language:

Topic Code(s):
302 -Site Survey and Characterization; 321 -General Planning and Management

Abstract:

The work of narrowing down the choice of candidate sites in granitic pluton of North-Western India is continuing. One zone selected on the basis of geophysical surveys (resistivity, EM, IP & magnetic) is being further evaluated by geological & structural mapping on 1:1000 scale, trenching, shallow borehole drilling etc. Associated studies on geochemical, hydrogeological, petrogenesis, geochronological aspects are also undertaken. Observations till now are that the rock mass is homogeneous with a few basic intrusions and without significant groundwater potential. Detailed and micro-level studies by deep borehole drilling, joint-fracture characterization, thermomechanical behaviour etc. have been planned in next phase of investigations.

WM Descriptor(s): geologic surveys; granites; site selection

Principal Investigator(s):

MATHUR, R.K.

REPOSITORY PROJECT SECTION NUCLEAR WASTE MANAGEMENT GROUP BHABHA ATOMIC RESEARCH CENTRE
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Organization Performing the work:

BARC Repository Projects Section Waste Management Operations Grou Trombay
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Other Investigators:
Narayan, P.K.; Kulkarni, A.V.; Acharya, A.

Organization Type:
Foundation or laboratory for research and/or development

Program Duration: From: 1991-8-1 To: 1999-12-1

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):
none

Associated Organization(s):
none

IND19980035

Title:
Volatisation of sulphate from vitrified lead-borosilicate matrix

Title in Original Language:

Topic Code(s):
134 -Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies)

Abstract:

Volatilization studies were carried on a lead-borosilicate formulation developed for high level waste containing 3 g/l of sulphate. This composition has 25% of waste oxide, 30% SiO_2, 10% B_2O_3, 25% PbO and 10% Fe_2O_3 (wt%). About 5 g of glass-mix was taken in an alumina boat and heated in a horizontal furnace at temperature ranging from 900-1100°C and for different duration of time ranging from 3-9 hours. Nitrogen was used as carrier gas and volatilized sulphate was collected in a scrub solution containing 5 wt% of $BaCl_2$. Sulphate contained in the scrub solution was analysed by gravimetric method.
Results indicate that nearly 2% of sulphate enters into off-gas at 900°C. There is a gradual rise in volatility from 2% to 5% at 950°C and above 950°C there is a steep rise in volatilization. At 1100°C, nearly 33% of

sulphate is lost from the glass during vitrification. Duration of heating does not have much impact up to 1000°C, but beyond 1000°C there is a drastic rise in the volatility with respect to time of heating.

WM Descriptor(s): borosilicate glass; high-level radioactive wastes; vitrification; volatility

Principal Investigator(s):

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Organization Performing the work:

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Other Investigators:

Wattal, P.K.

Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: 1997-12-1 To: 1998-3-1

State of Advancement: Research in progress

Sponsoring Organization(s):

none

Associated Organization(s):

none

Italy

ITA19980001

Title:

Advanced partitioning techniques for long-lived radionuclide separation from radioactive liquid wastes

Title in Original Language:

Topic Code(s):

132 -Liquid Waste Treatment

Abstract:

The main objective of this research work is to test and demonstrate (by means of a computer code too) the feasibility of the enhanced separation of the LLR (Long Lived Radionuclides) mainly actinides from high liquid radioactive wastes in order to obtain a residual HLLW stream pratically 'alpha free'. The work began in 1993 and will be completed in 1998 in the frame of two following contracts ENEA-CEC (for the periods: 1993-1995 and 1996-1998) and of a collaboration with Politechnico. The first part of the work has concerned the investigation of a flow-sheet referred to a two-cycle process using CMPO or Ph_2Bu_2 as coextractant of An and Ln and DTPA as complexant followed by HDEHP as extractant for the selective separation of An/Ln. The second part of the work will concern the study and development of a two-cycle partitioning process combining the DIAMEX process for An/Ln coextraction with the triazine (TPTZ) process for An/Ln selective separation.

WM Descriptor(s): actinides; CMPO; HDEHP; high-level radioactive wastes; liquid wastes; radioactive waste processing; rare earths; separation processes; triazines

Principal Investigator(s):

NANNICINI, ROBERTO

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Organization Performing the work:

ENEA ERG-FISS
TASCO/ISPRA ITALY

Other Investigators:

Amato L.; Colombo G.C.; Troiani F.; Moccia A.; Cali V.; Bassaro U.; Gasso G.; Facchini A.

Organization Type:

Other

Program Duration: From: 1993-1-1 To: 1998-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):
ENEA ERG-FISS-TASCO/ISPRA (Italy)

Associated Organization(s):
CEA Univ. Reading TUI FZ Univ. Chalmers Julich

Recent publication info:
1014

ITA19980002

Title:
Plutonium decrease and nuclear fuel cycle

Title in Original Language:

Topic Code(s):
800 -Actinide & Transmutation Studies

Abstract:
In the framework of the Commission of the European Communities contract 'Impact of the Accelerator Based Technologies on Nuclear Fission Safety' the comparison between available experimental data and calculated spallation products yield on lead target will be performed. The concentration of typical spallation products such as "1"9"9Tl 2 0"0Pb 2 0"0Tl 2 0"1Pb 2 0"1Tl 2 0"2Tl 2 0"3Bi 2 0"3Pb 2 0"4Bi 2 0"5Bi 2 0"6Bi will be calculated for the comparison with experimental data. This task will include also the evaluation of heat deposition on lead target the evaluation of the fuel inventory incineration capabilities and radiotoxicity flow for an accelerator-driven system with lead spallation target and molten salt fuel coolant and the estimate of the radiation damages on the lead spallation target double walls.

WM Descriptor(s): bismuth isotopes; fission product release; fission products; fuel cycle; lead; lead isotopes; nuclear fragmentation; plutonium; safety; spallation; spallation fragments; targets; thallium isotopes

Principal Investigator(s):
DANGELO, A.

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Organization Performing the work:
ENEA C.E. CASACCIA
VIA ANGUILLARESE 301 00100 Roma ITALY

Other Investigators:
Silvani V.

Organization Type:
Other

Program Duration: From: 1996-6-1 To: 1999-6-1

State of Advancement: Research in progress

Sponsoring Organization(s):
ENEA C.R.CASACCIA via Anguillarese 301 00100 Roma A.D. Italy

Associated Organization(s):
ANSALDO

Recent publication info:
1015

ITA19980003

Title:
Plutonium decrease and nuclear fuel cycle

Title in Original Language:

Topic Code(s):
800 -Actinide & Transmutation Studies

Abstract:

In the framework of the Commission of the European Communities contract 'Impact of the Accelerator Based Technologies on Nuclear Fission Safety': 2D/3D neutron kinetics study role of delayed neutrons in accelerator-driven systems. Interaction accelerator-subcritical system subcriticality margins studies.

WM Descriptor(s): criticality; delayed neutrons; fission; fission product release; fission products; fuel cycle; neutron beams; plutonium; safety; spallation

Principal Investigator(s):

LANDEYRO, P.A.

ENEA

Organization Performing the work:

ENEA C.E. CASACCIA
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Other Investigators:

Landeyro P.A.

Organization Type:

Other

Program Duration: From: 1996-6-1 To: 1999-6-1

State of Advancement: Research in progress

Sponsoring Organization(s):

ENEA C.R.E. CASACCIA via Anguillarese 301 00100 Roma A.D. Italy

Associated Organization(s):

Politechnico di Torino

Recent publication info:

1016

ITA19980004

Title:

Energy amplifiers and accelerator-driven subcritical systems

Title in Original Language:

Topic Code(s):

800 -Actinide & Transmutation Studies

Abstract:

In the framework of the Commission of the European Communities contract 'Thorium Cycles as Nuclear Waste Management Option': evaluation of the fuel inventory radiotoxicity flow of an accelerator-driven system operating in the fast spectrum with thorium oxide or nitride fuel and lead coolant.

WM Descriptor(s): criticality; fuel cycle; nitrides; radioactive waste management; thorium; thorium cycle; thorium oxides

Principal Investigator(s):

LANDEYRO, P.A.

ENEA

Organization Performing the work:

ENEA C.E. CASACCIA
VIA ANGUILLARESE 301 00100 Roma ITALY

Other Investigators:

Marucci G.

Organization Type:

Other

Program Duration: From: 1996-6-1 To: 1999-6-1

State of Advancement: Research in progress

Sponsoring Organization(s):

ENEA C.R. CASACCIA via Anguillarese 301 00100 Roma A.D. Italy

Recent publication info:

1017

Japan

JPN19980001

Title:
Development of an advanced TRU waste treatment technology

Title in Original Language:

Topic Code(s):
108 -Waste Management System Analysis; 800 - Actinide & Transmutation Studies

Abstract:
NUCEF (the Nuclear Fuel Cycle Safety Engineering Research Facility) has started its hot operation at the beginning of 1995 where TRU (transuranic) elements are used. The management of TRU waste arisen in the facility is very important issue. Liquid and solid wastes containing TRU elements are generated mainly from the Fuel Treatment System for critical experiments and from the researches of reprocessing process and TRU waste management for reprocessing plants using hot cells and glove-boxes. The TRU waste management in NUCEF is based on the classification of waste and is to maximize the recycle of reagents and the reuse of TRU elements separated from the waste as well as to reduce the waste volume and to lower the risk of waste by advanced separation and solidification. The study will develop technology to separate americium in the aqueous waste with high-nitric acid concentration from the Fuel Treatment System using adsorbent and/or extraction chromatography techniques. Separated americium will be calcined for further solidification as well as for the reuse in the study carried out in NUCEF.

WM Descriptor(s): americium; calcination; fuel cycle; liquid wastes; radioactive waste management; separation processes; transuranium elements

Principal Investigator(s):
MINEO, H.

JAPAN ATOMIC ENERGY RESEARCH INSTITUTE DEPARTMENT OF NUCEF PROJECT
TOKAI-MURA
319-11

Organization Performing the work:
JAPAN ATOMIC ENERGY RESEARCH INSTITUTE J A E R I
TOKAI-MURA, NAKA-GUN 319-11 JAPAN

Other Investigators:

Organization Type:
Other

Program Duration: From: 1996-4-1 To: 2000-3-1

State of Advancement: Research planned

Sponsoring Organization(s):
Japan Atomic Energy Research Institute Department of NUCEF Project Tokai Establishment; Tokai-mura Naka-gun Ibaraki 319-11 Japan

Recent publication info:
1018

JPN19980002

Title:
Adsorption of carbon-14 on mortar

Title in Original Language:

Topic Code(s):
114 -Waste Immobilization (Bituminization, Cementation, Including Tests of Properties, Leaching Studies)

Abstract:

The sorption experiments of carbon-14 on the mortar grain focused on the chemical form were used for the experiments: inorganic radiocarbon and organic radiocarbons. The ground mortar were soaked in the solution with carbon-14 at 15 deg C for periods of up to 160 days. At the end of each run carbon-14 concentrations in the supernatants were determined before and after centrifugation. In the mortar - inorganic radiocarbon system the retention process of carbon-14 related to reaction on the surface of the mortar was speculated as follows. First 3CaO-SiO2 and 2CaO-SiO2 of the mortar components contact with water and produce Ca(OH)2. Ca(OH)2 produces Ca2+ and OH- in the solution. Then calcite forms from Ca2+ and CO32- in the solution. Thus the sorption ratio of carbon-14 onto mortar will be high until mortar has been completely carbonated because Ca2+ is rich in the mortar and the solubility of calcite is low. In the mortar - organic radiocarbon system the soluble organic carbon-14 is hardly sorbed on the surface of the mortar. Therefore the cementitious materials may not inhibit the release of organic radiocarbons from the low-level radioactive wastes contrary to the case of inorganic radiocarbon.

WM Descriptor(s): adsorption; carbon 14; concentration ratio; low-level radioactive wastes; mortars; radioactive waste processing; sorptive properties

Principal Investigator(s):

MATSUMOTO, J.

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TOKAI-MURA, NAKA-GUN
319-11

Organization Performing the work:

ENGINEERED BARRIER LABORATORY
TOKAI-MURA 319-11 JAPAN

Other Investigators:

Organization Type:

Other

Program Duration: From: 1990-1-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

Engineered Barrier Laboratory; Tokai Ibaraki Japan

Associated Organization(s):

none

Recent publication info:

1019

JPN19980003

Title:

Alpha-decay damage of Synroc-constituent minerals doped with curium-244

Title in Original Language:

Topic Code(s):

134 -Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies)

Abstract:

In Synroc actinide nuclides would be incorporated in actinide-host phases: perovskite and zirconolite. As microencapsulation by more durable zirconolite could mask radiation-damage effects on less durable perovskite single phase materials are useful for getting direct information on this point. In our study alpha-decay damage effects on Cm-doped perovskite and zirconolite have been investigated through density measurement and MCC-1 leaching testing in pH-2 acid solution at 90 deg C for two months.

WM Descriptor(s): alpha decay; curium 244; high-level radioactive wastes; perovskite; radiation effects; radioactive waste processing; synroc process; zirconolite

Principal Investigator(s):

MITAMURA, H.

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319-11

Organization Performing the work:

JAPAN ATOMIC ENERGY RESEARCH INSTITUTE J A E R I
TOKAI-MURA, NAKA-GUN 319-11 JAPAN

Other Investigators:

Matsumoto S.; Tsuboi T.; Tamura Y.

Organization Type:

Other

Program Duration: From: 1993-9-1 To: 1998-9-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Japan Atomic Energy Research Institute; Tokai Naka Ibaraki 319-11 Japan

Recent publication info:

1020

JPN19980004

Title:

Sorption of TRU on buffer materials

Title in Original Language:

Topic Code(s):

114 -Waste Immobilization (Bituminization, Cementation, Including Tests of Properties, Leaching Studies)

Abstract:

The objective of this study is to clarify the nature of association between transuranic element and buffer materials (bentonite). Batch type sorption experiments combined with desorption experiments using sequential extraction method have been carried out as functions of pH of solution and compositions of mineral and exchangeable cation of buffer materials. The experimental data show the dependencies of TRU sorption on buffer materials on above factors. For example the amount of Np sorbed on bentonite was constant (#approx#10 cm"3#centre dot#g"-"1) at pH between 2 and 7 and the sorbed Np was desorbed by 1M KCl solution (these results suggest electrostatic sorption of Np on bentonite). Whereas the amount of Np sorbed on sodium-smectite which is a major component of this bentonite increased with decreasing pH of solution below pH 5 (#approx#200 cm"3#centre dot#g"-"1 at pH 2.5) and most of Np sorbed at low pH was undesorbed by KCl (specific of Np).

WM Descriptor(s): bentonite; desorption; neptunium; separation processes; sorption; sorptive properties; transuranium elements

Principal Investigator(s):

KOZAI, N.

TOKAI-MURA, NAKA-GUN
319-11

Organization Performing the work:

ENGINEERED BARRIER LABORATORY
TOKAI-MURA 319-11 JAPAN

Other Investigators:

Ohnuki T.; Matsumoto J.; Banba T.

Organization Type:

Other

Program Duration: From: 1990-1-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

Engineered Barrier laboratory JAERI; Tokai Ibaraki Japan

Recent publication info:

1021

JPN19980005

Title:

Performance of nuclear waste glass under repository condition

Title in Original Language:

Topic Code(s):

134 -Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies)

Abstract:

The objective of this project is to study the effects of redox condition and co-existing materials on waste glass corrosion. Static corrosion tests under both oxic and anoxic conditions were carried out. Oxic tests were performed in air and anoxic ones in a glove box purged with mixed gas (Ar + 5% H_2). A little difference between leaching rates under oxic and anoxic conditions was observed. For soluble elements (B Li Na) and Ca leaching rates under anoxic condition were slightly smaller than those under oxic condition. Conversely Fe and Al were slightly larger under anoxic condition and for other elements (e.g. Si) there were no difference between the conditions. Similar corrosion tests were performed in the presence of magnetic under oxic and anoxic conditions respectively. The experimental results show that the presence of magnetite enhances glass corrosion due to the sorption of silica on the surface of magnetite.

WM Descriptor(s): corrosion; glass; leaching; radioactive waste disposal; redox reactions; underground disposal; vitrification; waste forms

Principal Investigator(s):

MAEDA, T.

TOKAI-MURA NAKA-GUN
319-11

Organization Performing the work:

ENGINEERED BARRIER LABORATORY
TOKAI-MURA 319-11 JAPAN

Other Investigators:

Inagaki Y.; Banba T.; Furuya H.

Organization Type:

Other

Program Duration: From: 1993-4-1 To: 1998-3-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Engineered Barrier Laboratory; Tokai Ibaraki Japan

Associated Organization(s):

Kyushu University

Recent publication info:

1022

JPN19980006

Title:

Research and development on zirconia- and alumina-based ceramic waste forms for high concentrated TRU elements

Title in Original Language:

Topic Code(s):

134 -Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies)

Abstract:

Application of 3 types of ceramic waste forms based on zirconia and/or alumina for immobilizing high concentrated TRU waste which are fully composed of TRU elements arising from for example reprocessing and group partitioning processes of high level waste were investigated with emphasis on phase stability and

chemical durability using TRU simulants of Ce and Nd. First yttria-stabilized zirconia (YSZ) solid solution waste form indicated good phase stability and excellent chemical durability. High dense pellet of YSZ waste form could be also prepared. Second alumina compound waste form showed good phase stability by the formation of magnetoplumbite (MP) and perovskite (PK) phases. On the other hand it is needed for preparing good chemical durability or high dense samples to suppress the formation of PK or MP phase respectively. Third YSZ-alumina composite waste form maintained good phase stability of YSZ and alumina waste form by the formation of YSZ solid solution and the alumina compounds. Suppression of PK phase was also needed to prepare samples with excellent chemical durability. From the results it is confirmed that YSZ waste form is superior to the alumina and the composite waste forms in immobilizing high concentrated TRU elements. The effects of the variation of TRU elements' valences caused by the change of sintering atmosphere on phase stability and chemical durability will be also investigated using YSZ waste forms including "2"3"7Np and "2"4"1Am at Nuclear Fuel Cycle Safety Research Facility: NUCEF in JAERI from the end of 1995.

WM Descriptor(s): aluminium oxides; ceramics; comparative evaluations; high-level radioactive wastes; phase stability; radioactive waste disposal; transuranium elements; waste forms; zirconium oxides

Principal Investigator(s):

KURAMOTO, K.

DEPT OF ENVIRONMENTAL SAFETY
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319-11

Organization Performing the work:

ENGINEERED BARRIER LABORATORY
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Other Investigators:

Muraoka S.; Mitamura H.; Makino Y.; Yanagi T.

Organization Type:

Other

Program Duration: From: 1989-4-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

Engineered Barrier Laboratory; Tokai Ibaraki Japan

Associated Organization(s):

Osaka University

Recent publication info:

1023

JPN19980007

Title:

Sorption behaviour of neptunium(V) onto goethite under coexisting of humic acid

Title in Original Language:

Topic Code(s):

114 -Waste Immobilization (Bituminization, Cementation, Including Tests of Properties, Leaching Studies)

Abstract:

A sorption of neptunium(V) on goethite on the absence and presence of humic acid has been studied as a function of pH and humic acid concentration by a batch method. The sorption of neptunium(V) in the absence of humic acid increased with pH over pH 6 because point of zero charge of goethite sample was 6.4. In the presence of humic acid up to 10 mg/l the sorption of neptunium(V) at pH around 7 was larger about 20% than that in the absence of humic acid. However the sorption of neptunium(V) in pH range from 6 to 9 decreased beyond the humic acid concentration of 10 mg/l. These influences of humic acid on the sorption behavior was related to the change in surface charge density of goethite by the sorption of humic acid and in the chemical form of neptunium(V) from NpO_2"+ to Np(V)-humate.

WM Descriptor(s): concentration ratio; goethite; humic acids; neptunium; pH value; radioactive waste disposal; sorption; sorptive properties; waste forms

Principal Investigator(s):

SAKAMOTO, Y.

DEPT OF ENVIRONMENTAL SAFETY RESEARCH JAPAN ATOMIC ENERGY RESEARCH INSTITUTE (JAERI)
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319-11

Organization Performing the work:

JAPAN ATOMIC ENERGY RESEARCH INSTITUTE DEPARTMENT OF ENVIRONMENTAL SAFETY RESEARCH
TOKAI-MURA 319-11 JAPAN

Other Investigators:

Ohashi A.; Ohashi H.; Sato S.

Organization Type:

Other

Program Duration: From: 1993-10-1 To: 1996-3-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Japan Atomic Energy Research Institute Department of Environmental Safety Research; Tokai-mura Naka-gun Ibaraki-ken 319-11 Japan

Associated Organization(s):

Hokkaido University

Recent publication info:

1024

JPN19980008

Title:
Studies on sorption behaviour of technetium in soils

Title in Original Language:

Topic Code(s):

114 -Waste Immobilization (Bituminization, Cementation, Including Tests of Properties, Leaching Studies)

Abstract:

The technetium sorption behaviour in different soils has been studied by batch experiments under aerobic conditions. The samples characteristics and soil preequilibrium water properties of pH-Eh have been also investigated. In addition the activated carbon and reduced iron powder have been selected as the additives to the JAERI sand according to the research work and the technetium sorption behaviour in the artificial soils has been studied in the similar conditions. The experimental results show that all soil except for grey soil have little distribution coefficient for technetium (TcO_4"-) while the artificial soils have very high distribution coefficient for technetium. The distribution coefficient Kd values have an increase trend with the additive increase in artificial soils and contact time. Physico-chemical processes of fixation and possible sorption modes are discussed as well.

WM Descriptor(s): aerobic conditions; radioactive waste disposal; soils; sorption; sorptive properties; technetium; waste forms

Principal Investigator(s):

TAKEBE, S.

DEPT OF ENVIRONMENTAL SAFETY RESEARCH JAPAN ATOMIC ENERGY RESEARCH INSTITUTE (JAERI)
TOKAI-MURA, NAKA-GUN
319-11

Organization Performing the work:

Natural Barrier Laboratory

Other Investigators:

Deying X.

Organization Type:

Other

Program Duration: From: 1994-1-1 To: 1995-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Natural Barrier Laboratory

Recent publication info:

1025

JPN19980009

Title:

Influence of soil/solution ratio on adsorption behavior of cesium on soils

Title in Original Language:

Topic Code(s):

114 -Waste Immobilization (Bituminization, Cementation, Including Tests of Properties, Leaching Studies)

Abstract:

The influence of the ratio between soil weight and solution volume (soil/solution ratio) on a distribution coefficient of cesium for coastal sandy soil kaoline and silica sand to water has been studied. The distribution coefficients of "1"3"7Cs for the soils decreased with the increase of the soil/solution ratios. The concentration of the cations dissolved from the soils into the solution varied with the soil/solution ratio. However when the concentration of coexistent cations kept to be 10"-"2 mol/l the distribution coefficient was kept constant at different soil/solution ratios. These results show that the soil/solution ratio does not directly affect on the adsorption of "1"3"7Cs on the soils but the variation in the concentration of dissolved cations with the soil/solution ratio results in the change in the distribution coefficient.

WM Descriptor(s): adsorption; cesium; cesium 137; concentration ratio; kaolin; radioactive waste disposal; sand; silicon oxides; soils; solutions; sorptive properties

Principal Investigator(s):

TANAKA, T.

DEPT OF ENVIRONMENTAL SAFETY
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319-11

Organization Performing the work:

Natural Barrier Laboratory

Other Investigators:

Ohnuki T.

Organization Type:

Other

Program Duration: From: 1990-1-1 To: 1996-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Natural Barrier Laboratory

Recent publication info:

1026

JPN19980010

Title:

Colloidal migration behaviour of radionuclides sorbed on mobile fine soil particles through a sand layer

Title in Original Language:

Topic Code(s):

114 -Waste Immobilization (Bituminization, Cementation, Including Tests of Properties,

Leaching Studies); 201 -Dispersion and Migration of Radionuclides

Abstract:

Migration properties of "6"0Co 8 5Sr and "1"3"7Cs sorbed on fine soil particles have been examined by a column method. The influent solutions containing both the radionuclides and the fine soil particles smaller than 5 #mu#m in diameter were introduced in the coarse sand column of different length between 1 and 10 cm. The first order desorption rate constants of the radionuclides from the fine soil particles to the coarse sand were estimated from the relation between the effluent amounts of the radionuclides on the fine soil particles and the coarse sand were obtained by a batch method. The effluent amounts of the radionuclides decreased with increasing length of the column then kept a constant values. At the column of 10 cm the effluent amounts of "6"0Co 8 5Sr and "1"3"7Cs relative to the influent ones were 0.3 0.1 and 0.8 respectively. The sorption ratio of each radionuclide for the fine soil particles was several 10 times larger than that for the coarse sand. First order desorption rate constants of the radionuclides from the fine soil particles were in the order of "8"5Sr > "1"3"7Cs > "6"0Co.

WM Descriptor(s): cesium 137; cobalt 60; desorption; extraction columns; radioactive waste disposal; radionuclide migration; sand; soils; sorption; strontium 85; waste forms

Principal Investigator(s):

TANAKA, T.

DEPT OF ENVIRONMENTAL SAFETY RESEARCH JAPAN ATOMIC ENERGY RESEARCH INSTITUTE (JAERI)
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Organization Performing the work:

Natural Barrier Laboratory

Other Investigators:

Ohnuki T.

Organization Type:

Other

Program Duration: From: 1992-1-1 To: 1996-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Natural Barrier Laboratory

Recent publication info:

1027

JPN19980011

Title:

Sorption of "6"0Co 8 5Sr 1 3"7Cs 2 3"7Np and "2"4"1Am on soil under coexistence of humic acid: effects of molecular size of humic acid

Title in Original Language:

Topic Code(s):

114 -Waste Immobilization (Bituminization, Cementation, Including Tests of Properties, Leaching Studies)

Abstract:

Sorption experiments have been performed by a batch method to study the effects of humic acid of different molecular size on the complexing stability with "6"0Co 8 5Sr 1 3"7Cs 2 3"7Np and "2"4"1Am and on the sorption behavior of these radionuclides on a sandy soil. Equilibrium constants K in the sorption of "1"3"7Cs and "2"3"7Np onto the soil were not changed at different concentrations of humic acid since "1"3"7Cs and "2"3"7Np do not interact with humic acid while those of "6"0Co and "2"4"1Am decreased with increasing humic acid concentration due to forming humic complexes. However the K of "8"5Sr was not changed at different humic acid concentrations despite "8"5Sr interacts with humic acid. Concentration profiles of the radionuclides in each size fraction of the solution before and after the sorption experiments were examined by

ultrafiltration technique. The reduction of concentration of "6"0Co in the fraction less than 300 000 of cutoff molecular weight (MW) and that of concentration of "2"4"1Am in the fraction larger than 100 000 MW respectively by the sorption onto the soil decreased with increasing humic acid concentration. This decrease resulted in the decrease in the K of "6"0Co and "2"4"1Am with increasing humic acid concentration.

WM Descriptor(s): americium 241; cesium 137; cobalt 60; complexes; concentration ratio; humic acids; molecular weight; neptunium 237; radioactive waste disposal; sand; soils; sorption; strontium 85

Principal Investigator(s):

TANAKA, T.

DEPT OF ENVIRONMENTAL SAFETY
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Organization Performing the work:

Natural Barrier Laboratory

Other Investigators:

Senoo M.

Organization Type:

Other

Program Duration: From: 1993-1-1 To: 1998-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Natural Barrier Laboratory

Recent publication info:

1028

JPN19980012

Title:

Study on natural groundwater flow system: Isotope hydrology and resistivity tomography

Title in Original Language:

Topic Code(s):

303 -Earth Science Models and Studies

Abstract:

Isotope hydrology: For prediction and analysis of long term groundwater flow stable isotope hydrology using deuterium and oxygen-18 in groundwater is considered a useful technique. An area to study the stable isotope hydrology was selected in Japan. About 90 samples were taken from the area. Distribution of analyzed #delta# values of deuterium and oxygen-18 showed that groundwater in this area originates from local meteoric water and that a large river adjacent to the area is not a source of groundwater. Resistivity tomography: For a basic study of resistivity tomography an experimental tank 2 x 2 m on each side and 2.2 m deep was filled with a NaCl solution that simulated homogeneous geologic media. A multi-electrode composed of 61 electrodes and fracture models were used in the tank for physical model simulations. Numerical model simulations were performed using geometry identical to the physical model simulations. Based on the results obtained from both sets of simulations the detection limit of resistivity tomography using a pole-pole array was studied.

WM Descriptor(s): deuterium; fluid flow; geologic models; ground water; hydrology; oxygen 18; tomography; tracer techniques

Principal Investigator(s):

KUMATA, MASAHIRO

DEPARTMENT OF ENVIRONMENTAL SAFETY RESEARCH JAPAN ATOMIC ENERGY RESEARCH INSTITUTE (JAERI)
TOKAI-MURA, NAKA-GUN
319-11

Organization Performing the work:

JAPAN ATOMIC ENERGY RESEARCH INSTITUTE J A E R I
TOKAI-MURA, NAKA-GUN 319-11 JAPAN

Other Investigators:

Mukai M.; Iwamoto H.

Organization Type:

Other

Program Duration: From: 1991-4-1 To: 1996-3-1

State of Advancement: Unknown

Sponsoring Organization(s):

Japan Atomic Energy Research Institute; Tokai-mura Naka-gun Ibaraki Pref. 319-11 Japan

Recent publication info:

1029

JPN19980013

Title:
Soluble organic components leached from bitumen

Title in Original Language:

Topic Code(s):

114 -Waste Immobilization (Bituminization, Cementation, Including Tests of Properties, Leaching Studies); 303 -Earth Science Models and Studies

Abstract:

For underground disposal of bituminized wastes soluble organic components and complex formation were studied for blowing asphalt. All experiments conducted under aerobic for two types of degradation that is chemical degradation and radiolytic degradation. For chemical degradation (1) bitumen + ion exchanged distilled water (2) bitumen + calcium hydroxide + sodium nitrate + ion exchanged distilled water were used. After adjustment of the samples they were put in teflon leaching container and settled in thermostatic oven at 365K for fixed period. For radiolytic degradation the bitumen was irradiated to 10 MGy by gamma rays. After each experiments the leachant was filtrated by 0.45 #mu#m filter. In the case of the total organic carbon (TOC) of chemical degradation was about 200 #approx# 250 mg/dm"3 (about 1 y leaching days). And in the case of the main leachant components of chemical degradation and radiolytic degradation were formic acid acetic acid and oxalic acid respectively.

WM Descriptor(s): bitumens; decomposition; leaching; organic acids; radioactive waste disposal; radiolysis; solutions; underground disposal; waste forms

Principal Investigator(s):

KAGAWA, A.

4-33 MURAMATSU
TOKAI-MURA
319-11

Organization Performing the work:

TOKAI WORKS POWER REACTOR AND NUCLEAR FUEL DEVELOPMENT CORPORATION
4-33 MURAMATU TOKAI-MURA, NAKA-GUN 319-11 JAPAN

Other Investigators:

Ito M.

Organization Type:

Other

Program Duration: From: 1994-3-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

Tokai Works Power Reactor and Nuclear Development Corporation; Tokai-mura Ibaraki-ken 319-11 Japan

Recent publication info:

1030

JPN19980014

Title:

The development of melter inside observation system

Title in Original Language:

Topic Code(s):

134 -Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies)

Abstract:

Tests of erosion measurement of refractory materials were performed with a test system to develop an in-melter inspection system which has observation and erosion measurement functions for certifying conditions of the melter inside. As a result the test system based on application technology of laser triangulation showed fine performance for erosion measurement.

WM Descriptor(s): ceramics; crucibles; erosion; furnaces; in-service inspection; laser radiation; measuring methods; melting; radioactive waste processing; refractories; vitrification

Principal Investigator(s):

KOBAYASHI, H.

TOKAI WORKS POWER REACTOR AND NUCLEAR FUEL DEVELOPMENT CORPORATION
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319-11

Organization Performing the work:

TOKAI WORKS POWER REACTOR AND NUCLEAR FUEL DEVELOPMENT CORPORATION
TOKAI-MURA 319-11 JAPAN

Other Investigators:

Futamura H.; Igarashi H.; Ohuchi J.

Organization Type:

Other

Program Duration: From: 1994-3-1 To: Not provided

State of Advancement: Unknown

Recent publication info:

1031

JPN19980015

Title:

The development of advanced melter

Title in Original Language:

Topic Code(s):

134 -Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies)

Abstract:

An electric melter has been developed to vitrify the high level liquid waste from the reprocessing of spent nuclear fuel. The JCEM is now being carried out aiming at increasing vitrification capacity and reducing generation of secondary waste from the spent melter. The small-scale test of JCEM was carried out and it was confirmed to maximum vitrification capacity. The cold-crucible induction melting has been developed to study

its feasibility of conditioning various radioactive wastes. The small-scale test of melting for zircaloy and glass were carried out.

WM Descriptor(s): crucibles; furnaces; glass; high-level radioactive wastes; liquid wastes; melting; radioactive waste processing; reprocessing; vitrification; waste forms; zircaloy

Principal Investigator(s):

Igarashi, H.

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319-11

Organization Performing the work:

TOKAI WORKS POWER REACTOR AND NUCLEAR FUEL DEVELOPMENT CORPORATION
TOKAI-MURA 319-11 JAPAN

Other Investigators:

Shimoda Y.; Masaki T.; Kobayashi H.; Kawamura K.; Ohuchi J.

Organization Type:

Other

Program Duration: From: 1994-3-1 To: Not provided

State of Advancement: Unknown

Recent publication info:

1032

JPN19980016

Title:

Process development to reduce quantity of HLW

Title in Original Language:

Topic Code(s):

105 -Waste Minimisation; 134 -Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies)

Abstract:

Typical waste glasses contain 25 wt% waste oxide. Higher waste loading enables to reduce quantity of HLW and management cost. The limitation in high waste loading are phase separation and heat generation. The following processes were developed. a) Separation of sediment: Sediment in waste solutions contains molybdenum which causes phase separation on glass melting. Sediment separation will be adopted to adjust molybdenum content in waste solution. b) Separation of platinum group elements: Palladium and ruthenium are recovered from waste solution by electrolysis. They will be used as resource. c) Separation of heat generating elements: Alkali and alkaline earth metals are separated from waste solution by pH adjustment and zeolite adsorption. Recovered heat generating elements will be utilized as heat and radiation sources. d) Solidification: The separated elements such as molybdenum and heat generating elements are vitrified. The residual elements in HLW are vitrified. According to the concept of the process laboratory scale experiments have been carried out. The compositions of separated elements were determined on the basis of the separation ratio that was obtained from the experiments. The resultant wastes were vitrified and characterized. The properties of the simulated vitrified wastes were roughly equivalent to those of typical vitrified waste. Estimated total volume of these wastes was half of that for typical waste loading (25 wt%). The results of the experiments indicate that high-waste-loading process is feasible.

WM Descriptor(s): compacting; glass; high-level radioactive wastes; radioactive waste processing; separation processes; solidification; vitrification; volume; waste forms

Principal Investigator(s):

KAWAMURA, KAZUHIRO

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Organization Performing the work:

TOKAI WORKS POWER REACTOR AND NUCLEAR FUEL DEVELOPMENT CORPORATION
TOKAI-MURA 319-11 JAPAN

Other Investigators:

Yoneya M.; Igarashi H.; Ohuchi J.

Organization Type:

Other

Program Duration: From: 1994-3-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

Tokai Works Power Reactor and Nuclear Fuel Development Corporation (PNC); Tokai-mura Ibaraki-ken 319-11 Japan

Recent publication info:

1033

JPN19980017

Title:

A modelling study for long-term life prediction of carbon steel overpack for geological isolation of high-level radioactive waste

Title in Original Language:

Topic Code(s):

135 -Waste Packaging (Canister Types, Materials, Corrosion Studies); 324 -Safety Assessment and Performance Studies

Abstract:

A mathematical model for life prediction of carbon steel overpack for geological isolation of high-level radioactive waste has been developed. In general corrosion model oxygen and water are assumed to be oxidants in this model. Rate of oxygen reduction is assumed to be controlled by the rate of inward diffusion of oxygen through the bentonite buffer. Rates of water reduction and metal dissolution are assumed to be controlled by kinetic processes of electrochemical reactions. We have constructed a model for the prediction of the duration in which carbon steel overpacks may be subject to localized corrosion. This model predicts the duration in which the rate of oxygen supply to the surface of the overpack is greater than the passive current density as the duration for propagation of localized corrosion. A pit growth model which includes chemical electrochemical and migration process that control pit growth rates has been constructed. The modelling studies mentioned above have been supported by an experimental programme. This programme includes experiments to provide input parameters for the models such as the kinetics of electrochemical reaction and diffusion coefficient of oxygen in the bentonite buffer.

WM Descriptor(s): bentonite; carbon steels; containers; corrosion; high-level radioactive wastes; lifetime; packaging; radioactive waste disposal; simulation; underground disposal

Principal Investigator(s):

Honda, A.

TOKAI-MURA
319-11

Organization Performing the work:

TOKAI WORKS POWER REACTOR AND NUCLEAR FUEL DEVELOPMENT CORPORATION
4-33 MURAMATU TOKAI-MURA, NAKA-GUN 319-11 JAPAN

Other Investigators:

Taniguchi N.; Ishikawa H.

Organization Type:

Other

Program Duration: From: 1990-4-1 To: Not provided

State of Advancement: Research planned

Sponsoring Organization(s):

Tokai Works Power Reactor and Nuclear Fuel Development Corporation; Tokai-mura Ibaraki-ken 319-11 Japan

Recent publication info:

1034

JPN19980018

Title:

Development of non-destructive assay for TRU waste

Title in Original Language:

Topic Code(s):

181 -Methodologies, Analytical Methods, Measurements Instrumentation; 186 -Radionuclide characterization in drums

Abstract:

The TRU assay system using the active neutron technique has been installed and demonstrating the sensitivity and operability of the actual system at the PWTF (Pu-contaminated Waste Treatment Facility). The following topics are being investigated: 1. Detection limit of cellulose matrix is 1 mg 2 3"9Pu/200 l drum. 2. Matrix effect upon measurement sensitivity and accuracy is different for different absorbers and moderator contents. 3. Fissile material distribution effect depends on thermal neutron flux distribution and moderation of prompt neutrons.

WM Descriptor(s): measuring methods; neutron activation analysis; nuclear facilities; plutonium 239; radioactive waste processing; transuranium elements; waste processing plants

Principal Investigator(s):

ANDOU, Y.

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Organization Performing the work:

TOKAI WORKS POWER REACTOR AND NUCLEAR FUEL DEVELOPMENT CORPORATION
4-33 MURAMATU TOKAI-MURA, NAKA-GUN 319-11
JAPAN

Other Investigators:

Usui K.; Ohuchi M.; Irinouchi S.; Yokoyama K.

Organization Type:

Other

Program Duration: From: 1990-4-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

Tokai-Works Power Reactor and Nuclear Fuel Development Corporation (PNC); Tokai-mura Ibaraki-ken 319-11 Japan

Recent publication info:

1035

JPN19980019

Title:

Demonstration of the TRU wastes processing technologies at Pu-contaminated waste treatment facility

Title in Original Language:

Topic Code(s):

105 -Waste Minimisation; 163 -Solid Waste Treatment

Abstract:

Various kinds of TRU-bearing process wastes have been generated from Mox fuel fabrication and fuel reprocessing facilities at PNC. The waste from Mox fuel fabrication facilities has been successfully treated in Plutonium-contaminated Waste Treatment Facility (PWTF) since 1987. Combustible wastes and chlorinated organic wastes have been incinerated to be ash and then melted to be ceramic blocks by micro-wave heating. Metal wastes have been cut and melted by electro-slag remelting. Approximately 145 tons (9 125 drums) of the plutonium-contaminated waste (PCW) have been reduced to be 20 tons (87 drums) of ceramic blocks or metal ingots. The total volume reduction ratio is approximately 1/100. Leaching rate of the ceramic block is 1 x 10 "-"5g/cm"2 #centre dot# day(MCC-1 method). These operational result shows that volume reduction and immobilization technologies for the PCW have been successfully demonstrated at PWTF.

WM Descriptor(s): ceramics; fuel fabrication plants; fuel reprocessing plants; high-level radioactive wastes; incinerators; plutonium 239; radioactive waste processing; scrap metals; transuranium elements; waste forms; waste processing plants

Principal Investigator(s):

ANDOU, Y.

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Organization Performing the work:

TOKAI WORKS POWER REACTOR AND NUCLEAR FUEL DEVELOPMENT CORPORATION
TOKAI-MURA 319-11 JAPAN

Other Investigators:

Ohuchi M.; Usui K.; Satoh T.; Irinouchi S.; Yokoyama K.

Organization Type:

Other

Program Duration: From: 1987-11-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

Tokai-Works Power Reactor and Nuclear Fuel Development Corporation (PNC); Tokai-mura Ibaraki-ken 319-11 Japan

Recent publication info:

1036

JPN19980020

Title:

Experimental and modelling studies on diffusion of Cs Ni and Sm in granodiorite basalt and mudstone

Title in Original Language:

Topic Code(s):

202 -Dispersion and Migration Models; 326 - Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

Through-diffusion experiments were carried out for Cs Ni and Sm which can have a valence of I II and III respectively through granodiorite basalt and mudstone which have been considered as candidates for natural barrier at 25 deg C under ambient conditions. The tracer solution was prepared as a mixture of Cs Ni and Sm. The experiments were continued for a maximum of 596 days. During the experiments the pH was monitored. The tortuosities of the rocks were measured by using a NaCl tracer and a through-diffusion method. The porosities pore-size distributions specific surface area and dry densities of the rocks were measured by a water saturation method and a mercury porosimetry. Effective and apparent diffusion coefficients (#epsilon#Dp Da) were obtained for each element. The #epsilon#Dp and Da values ranged from 0.57 to 1.4x10"-"1"2 and 1.0x10"-"1"1 m"2/s for granodiorite respectively. Those for mudstone ranged from 0.53 to 4.8x10"-"1"3 and from 2.6 to 3.9x10"-"1"3 m"2/s respectively and those for basalt ranged from 0.28 to 1.5x10"-"1"3 and from

1.6 to 2.1x10"-"1"3 m"2/s respectively. The #epsilon#Dp and Da values of Cs were the highest of the three elements for all rocks. Both the diffusion coefficients for all elements were in the order: granodiorite > mudstone > basalt. The pore size was found to be relatively large for each rock compared with the ionic radius. The #epsilon#Dp values were predicted based on the formation factors by taking into account the porosity and tortuosity. The predicted values were in relatively good agreement with the measured values with deviations of less than five times.

WM Descriptor(s): basalt; cesium; diffusion; granodiorites; nickel; porosity; radionuclide migration; samarium; tracer techniques; underground disposal

Principal Investigator(s):

SATO, H.

TOKAI-MURA
319-11

Organization Performing the work:

TOKAI WORKS POWER REACTOR AND NUCLEAR FUEL DEVELOPMENT CORPORATION
4-33 MURAMATU TOKAI-MURA, NAKA-GUN 319-11
JAPAN

Other Investigators:

Shibutani T.; Yui M.

Organization Type:

Other

Program Duration: From: 1991-10-1 To: 1996-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Tokai Works Power Reactor and Nuclear Fuel Development Corporation; Tokai-mura Ibaraki-ken 319-11 Japan

Recent publication info:

1037

JPN19980021

Title:

Development of the krypton removal from the reprocessing off-gas

Title in Original Language:

Topic Code(s):

111 -Gaseous Waste Treatment

Abstract:

PNC has been developing the recovery and storage technology for radioactive krypton to reduce the radioactive effluents released from the reprocessing plant. Krypton Recovery Technology Development Facility (KRF) the pilot plant adopting the cryogenic distillation process has been in hot operation with the head-end off-gas from Tokai Reprocessing Plant since 1988. Thirteen hot operations of KRF were carried out. About 6.5 x 10"1"5 Bq of radioactive krypton were recovered and stored during the operations. The immobilization technology using ion-implantation process has been developing for the long term storage of the recovered krypton. The special vessel being able to immobilize about 300N krypton-gas were developed. And the development of the scale-up vessel is now under testing. PNC is planning to evaluate the immobilization technology using the recovered krypton in KRF. The immobilization hot tests will be started at 1996.

WM Descriptor(s): gaseous wastes; krypton; off-gas systems; radioactive effluents; radioactive waste facilities; radioactive waste processing; removal; reprocessing

Principal Investigator(s):

HAYASHI, S.

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Organization Performing the work:

TOKAI WORKS POWER REACTOR AND NUCLEAR FUEL DEVELOPMENT CORPORATION
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JAPAN

Other Investigators:
Nakanisi Y.

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
Tokai Works Power Reactor and Nuclear Fuel Development Corporation (PNC); 4-33 Muramatu Tokai-mura Ibaraki-ken Japan

Associated Organization(s):
none

Recent publication info:

1038

JPN19980022

Title:
Removal of radionuclides in low level liquid waste of reprocessing plant

Title in Original Language:

Topic Code(s):
112 -Liquid Waste Treatment

Abstract:

Power Reactor and Nuclear Fuel Development Corporation (PNC) has been developing radionuclides removal technique to get higher volume reduction of the low level liquid waste (LLW) salt from the Tokai Reprocessing Plant (TRP). Experiments were done using concentrated liquid waste from the TRP. Radioactivity of the LLW is about 1E+4Bq/ml. Dominant radionuclides are Pu U Ru and Cs. The LLW contains high concentration sodium salt. Radionuclides removal technique mainly consists of coprecipitation with ultrafiltration and ion exchange. Before coprecipitation iodine in LLW is precipitated as silver iodine by silver nitrate. Alpha nuclides as Pu U and some beta nuclides are effectively removed by ultrafilter after coprecipitation using ferric nitrate as the coprecipitant. Strontium and cesium are adsorbed by sodium titanic acid and potassium cobalt ferrocyanide. Decontamination factor (DF) obtained are as follows: i) 1E+6 for alpha nuclides ii) about 1E+2 for Ru and total beta nuclides.

WM Descriptor(s): cesium; fuel reprocessing plants; liquid wastes; low-level radioactive wastes; plutonium; radioactive effluents; radioactive waste processing; removal; reprocessing; ruthenium; uranium

Principal Investigator(s):

KOBAYASHI, IKUSA

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TOKAI-MURA, NAKA-GUN
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Organization Performing the work:

TOKAI WORKS POWER REACTOR AND NUCLEAR FUEL DEVELOPMENT CORPORATION Waste technology Development
4-33 Muramatsu TOKAI-MURA, NAKA-GUN 319-11
JAPAN

Other Investigators:
IIjima K.; Miyamoto Y.; Nakanishi Y.

Organization Type:
Other

Program Duration: From: 1987-4-1 To: Not provided

State of Advancement: Research in progress

Recent publication info:

1039

JPN19980023

Title:
Estimation of effective diffusivity in compacted bentonite

Title in Original Language:

Topic Code(s):
201 -Dispersion and Migration of Radionuclides

Abstract:

Effective diffusion coefficients of radioactive nuclides in compacted sodium-bentonite were theoretically calculated based on an electric double layer theory. Comparison between calculated and measured diffusion coefficients was in good agreement. The effective diffusion coefficient is dominated by pore structure and pore diffusion coefficient Dp. The pore structure can be characterized by porosity #phi# constructivity #delta# and tortuosity #tau#"2 of bentonite. In this calculation the #beta# was assumed to be unity and the #phi# and the #tau#"2 were determined experimentally. The Dp was estimated by means of the electric double layer thory. In the estimation smectite interlayer was assumed the space between parallel plane sheets of smectite crystal lattice. Through-diffusion experiments were carried out by using Cs"+ for monovalent cation Cl"- and TcO_4"- for monovalent anion and tritiated water for neutral molecule. The measured and calculated effective diffusion coefficients in different densities of bentonite showed the same tendency of cation > neutral > anion. The higher the dry density of bentonite became the larger the discrepancy between the estimated and the measured diffusivities became. However the predicted values were in good agreement with the measured ones quantitatively.

WM Descriptor(s): bentonite; cations; cesium ions; diffusion; high-level radioactive wastes; porosity; radionuclide migration; underground disposal

Principal Investigator(s):

SATO, H.

TOKAI-MURA
319-11

Organization Performing the work:

TOKAI WORKS POWER REACTOR AND NUCLEAR FUEL DEVELOPMENT CORPORATION
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JAPAN

Other Investigators:

Organization Type:
Other

Program Duration: From: 1990-4-1 To: 1995-6-1

State of Advancement: Research planned

Sponsoring Organization(s):
Tokai Works Power Reactor and Nuclear Fuel Development Corporation; Tokai-mura Ibaraki-ken 319-11 Japan

Associated Organization(s):
Mitsubishi Materials Corporation

Recent publication info:
1040

JPN19980024

Title:
Experimental and modeling studies on sorption of cesium and selenium in compacted bentonite

Title in Original Language:

Topic Code(s):
114 -Waste Immobilization (Bituminization, Cementation, Including Tests of Properties, Leaching Studies); 201 -Dispersion and Migration of Radionuclides

Abstract:

Migration behavior of Cs and Se through bentonite were studied by using batch sorption and in-diffusion experiments. Bentonite used in this study is Kunigel V1 (sodium-bentonite). The batch sorption experiment shows the distribution coefficients of Cs were decreased with increasing concentration of Cs and competing alkaline element. Comparison of cation concentration before and after experiment the major cations concentration such as Na"+ K"+ Ca"2"+ and Mg"2"+ in the solution were increased with Cs sorption. The

sorption of Cs was modeled by ion exchange between Cs"+ and cations in bentonite and the predicted and experimental data show good agreement. The sorption ratio of Se was in the range of 0-20% on bentonite and a little higher value at lower pH range. The sorption experiments of Se on some accessory minerals in the bentonite were also carried out to interpret sorption behavior. Selenium was sorbed strongly on #alpha#-FeOOH and pyrite at the low pH ranges but weakly on the other accessory minerals such as quartz montmorillonite and feldspar. These sorption behaviors were interpreted by using a surface complexation model. This model was based on the assumption that the sorption behavior was dominated by #alpha#-FeOOH coating on the surface of pyrite. The predicted data show good agreement with experimental data.

WM Descriptor(s): bentonite; cations; cesium; concentration ratio; diffusion; ion exchange; radionuclide migration; selenium; sorption; underground disposal

Principal Investigator(s):
SHIBUTANI, T.

TOKAI WORKS POWER REACTOR AND NUCLEAR FUEL DEVELOPMENT CORPORATION
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Organization Performing the work:
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JAPAN

Other Investigators:
Ashida T.; Kohara Y.; Yui M.; Sato S.

Organization Type:
Other

Program Duration: From: 1993-4-1 To: 1995-3-31

State of Advancement: Research in progress

Sponsoring Organization(s):
Tokai Works Power Reactor and Nuclear Fuel Development Corporation; Tokai-mura Ibaraki-ken 319-11 Japan

Recent publication info:
1041

JPN19980025

Title:
Diffusion behaviour for Se and Zr in sodium-bentonite

Title in Original Language:

Topic Code(s):
114 -Waste Immobilization (Bituminization, Cementation, Including Tests of Properties, Leaching Studies); 201 -Dispersion and Migration of Radionuclides

Abstract:

Apparent diffusion coefficients for Se and Zr in bentonite were measured by in-diffusion method at room temperature using water-saturated sodium-bentonite. Kunigel V1"* containing 50wt% Na-smectite as a major mineral was used as the bentonite material. The experiments were carried out in the dry density range of 400-1800 kg/m"3. Bentonite samples were immersed with distilled water and saturated before the experiments. The experiments for Se were carried out under N_2 atmospheric condition (O_2: 2.5ppm). Those for Zr were carried out under aerobic condition. The apparent diffusion coefficients decrease with increasing density of the bentonite. Since dominant species of Se in the pore water is predicted SeO_3"2"- Se may be retarded by anion-exclusion because of negative charge on the surface of the bentonite and little sorption. The dominant species of Zr in the porewater is predicted Zr(OH)_5 or HZrO_3. Distribution coefficient measured for Zr on the bentonite was about 1.0 m"3/kg from batch experiment. Therefore the retardation may be caused by combination of the sorption and the anion-exclusion. A modelling for the diffusion mechanisms in the bentonite were discussed based on an electric double layer theory. Comparison between the apparent diffusion coefficients predicted by the model and the measured ones shows a good agreement.

WM Descriptor(s): bentonite; density; diffusion; radionuclide migration; selenium; underground disposal; zirconium

Principal Investigator(s):
SATO, H.

TOKAI-MURA
319-11

Organization Performing the work:
TOKAI WORKS POWER REACTOR AND NUCLEAR FUEL DEVELOPMENT CORPORATION
4-33 MURAMATU TOKAI-MURA, NAKA-GUN 319-11
JAPAN

Other Investigators:
Yui M.; Yoshikawa H.

Organization Type:
Other

Program Duration: From: 1994-4-1 To: 1995-6-1

State of Advancement: Research planned

Sponsoring Organization(s):
Tokai Works Power Reactor and Nuclear Fuel Development Corporation; Tokai-mura Ibaraki-ken 319-11 Japan

Recent publication info:
1042

JPN19980026

Title:
Effects of aging on the solubility of palladium

Title in Original Language:

Topic Code(s):
201 -Dispersion and Migration of Radionuclides;
304 -Safety Assessment and Performance Studies

Abstract:
Palladium-107 is one of the important radionuclides in assessing the long-term performance of a high-level waste repository. It is important the identification of the solubility limiting solid phase on experimental basis to adopt the suitable palladium solubility under the repository condition for a performance assessment. The palladium solubility was measured in a dilute aqueous solution at room temperature in the pH range from 3 to 13 under an anaerobic condition <0.1 ppm O_2. Amorphous palladium hydroxide as the initial solid phase was aged in the solution and the solid phase was monitored by X-ray diffraction analysis over the experimental period. The crystalline Pd metal appeared clearly and the concentration of palladium in the solution decreased gradually with the aging time. The concentrations of palladium in filtrate through 10 000 molecular-weight-cutoff filter after 178 days were less than 9.4x10"-"1"0 M in the pH range from 4 to 10 and increased to 10"-"7 M in the pH range greater than 10. This study suggests that the palladium solubility in the Pd-H_2O system under the repository condition may be limited by Pd metal in the long term and may be less than 10"-"9 M.

WM Descriptor(s): aging; aqueous solutions; fission products; high-level radioactive wastes; palladium; palladium 107; radionuclide migration; solubility; underground disposal

Principal Investigator(s):
ODA, C.

ENGINEERED BARRIER LABORATORY
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Organization Performing the work:
TOKAI WORKS POWER REACTOR AND NUCLEAR FUEL DEVELOPMENT CORPORATION
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Other Investigators:
Yoshikawa H.; Yui M.

Organization Type:
Other

Program Duration: From: 1993-4-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

Tokai Works Power Reactor and Nuclear Fuel Development Co.; Tokai-mura Ibaraki-ken 319-11 Japan

Recent publication info:

1043

JPN19980027

Title:

An experimental study on transport behaviour of colloids through the compacted bentonite

Title in Original Language:

Topic Code(s):

201 -Dispersion and Migration of Radionuclides;
306 -Barrier Studies and Tests

Abstract:

It is necessary to investigate the transport behaviour of radioactive material in the engineered barriers and the natural barriers for the performance assessment of high level radioactive waste disposal. Recently the influence of fine particles such as colloids on the radionuclides migration behaviour has been pointed out. However the transport behaviour of colloids in the repository environments are not fully understood and few experimental studies on the transport of colloid through compacted bentonite has been performed. In this study we investigated the transport behaviour of colloids in the bentonite which is expected as buffer materials mixed with silica sands under various ratio of the bentonite to the sands. The experiments were conducted by hydraulic conductivity test method using colloidal gold particles. The colloidal gold were about 15 nm in diameter and bentonite was compacted to dry density 1.0 g/cm"3. We found a filtration effect of the colloidal gold by the compacted bentonite mixed with 30 and 40 wt% silica sands.

WM Descriptor(s): bentonite; colloids; high-level radioactive wastes; radioactive waste disposal; radionuclide migration; sand; underground disposal

Principal Investigator(s):

KUROSAWA, S.

TOKAI WORKS POWER REACTOR AND NUCLEAR FUEL DEVELOPMENT CORPORATION Waste technology Development
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TOKAI-MURA, NAKA-GUN
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Organization Performing the work:

TOKAI WORKS POWER REACTOR AND NUCLEAR FUEL DEVELOPMENT CORPORATION
4-33 MURAMATU TOKAI-MURA, NAKA-GUN 319-11 JAPAN

Other Investigators:

Yoshikawa H.; Yui M.

Organization Type:

Other

Program Duration: From: 1995-4-1 To: 1996-3-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Tokai Works Power Reactor and Nuclear Fuel Development Corporation

Recent publication info:

1044

JPN19980028

Title:

Tono natural analogue study

Title in Original Language:

Topic Code(s):

201 -Dispersion and Migration of Radionuclides; 328 -Natural Analogue Studies

Abstract:

The Tono Natural Analogue Study has been performed in the Tono uranium deposit located in the central Japan. An exploratory shaft was excavated and galleries for natural analogue studies have been extended at a depth of 130 m since 1986. Advantage of the Tono mine as an analogue study site is its relatively undisturbed nature under reducing condition. The main technical goals of the Tono Analogue Study are: (1) determination of solubility and speciation of U-series nuclides and testing geochemical thermodynamic database; (2) characterization of retardation properties of the sedimentary rock and testing nuclide migration model; (3) characterization of geochemical disturbances around the gallery caused by excavation; (4) characterization of colloid species in groundwater and testing colloid transport model.

WM Descriptor(s): colloids; daughter products; natural analogue; radionuclide migration; sedimentary rocks; shaft excavations; site characterization; solubility; uranium deposits

Principal Investigator(s):

YOSHIDA, HIDEKAZU

TONO GEOSCIENCE CENTRE POWER
REACTOR AND NUCLEAR FUEL
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Organization Performing the work:

Tono Geoscience Center Power Reactor and Fuel Development Corporation (PNC)
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Other Investigators:

Organization Type:

Other

Program Duration: From: 1986-5-1 To: 1997-3-1

State of Advancement: Research in progress

Recent publication info:

1045

JPN19980029

Title:

Development of investigation methodologies for groundwater flow in the deep underground

Title in Original Language:

Topic Code(s):

323 -Earth Science Studies and Models; 328 -Natural Analogue Studies

Abstract:

The hydrogeological study has been performed in and around the Tono Mine located in the central Japan. The goal of the study is to conduct a complete case study to provide a comprehensive and accurate picture of the hydraulic conditions within a given geological environment by means of field measurements and numerical simulations. From a viewpoint of the geological structures and topographical features an area of 10 km by 10 km was chosen for this study with maximum depth of 1 km. Some kind of indispensable equipments and numerical modelling methods for hydrogeological characterization are developed and data on the hydraulic properties of the deep underground is accumulated.

WM Descriptor(s): fluid flow; geologic structures; ground water; hydraulic conductivity; hydraulics; hydrology; natural analogue; underground; uranium mines

Principal Investigator(s):

KOIDE, K.

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Organization Performing the work:

TONO GEOSCIENCE CENTER (PNC)
959-31 SONODO JORINJI TOKI-SHI 509-51 JAPAN

Other Investigators:

Organization Type:

Other

Program Duration: From: 1992-4-1 To: 1997-3-1

State of Advancement: Research in progress

Recent publication info:

1046

JPN19980030

Title:

Experimental investigation of active range of sulphate-reducing bacteria for geological isolation

Title in Original Language:

Topic Code(s):

202 -Dispersion and Migration Models; 222 -Microbial Effects

Abstract:

Geomicrobiology for the geological disposal of radioactive wastes was studied for evaluation of the effects on underground environment and radionuclide migration. The activities and tolerance of sulphate-reducing bacteria (SRB) were investigated. Under 35 deg C at pH 7 to 10 Eh -350 to 0 mV growth of SRB was investigated. A chart of active range for SRB was obtained and the maximum pH and Eh values were confirmed. It was considered that growth of SRB was difficult above pH 9.6 (at Eh -300 mV) and over Eh -50 mV (at pH 7).

WM Descriptor(s): biogeochemistry; biological availability; growth; radioactive waste disposal; radionuclide migration; redox potential; sulfate-reducing bacteria; underground disposal

Principal Investigator(s):

YOSHIKAWA, H.

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319-11

Organization Performing the work:

TOKAI WORKS POWER REACTOR AND NUCLEAR FUEL DEVELOPMENT CORPORATION
4-33 MURAMATU TOKAI-MURA, NAKA-GUN 319-11 JAPAN

Other Investigators:

Mihara M.; Ito M.

Organization Type:

Other

Program Duration: From: 1994-4-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

Tokai Works Power Reactor and Nuclear Fuel Development Corporation; Tokai-mura Ibaraki-ken 319-11 Japan

Recent publication info:

1047

JPN19980031

Title:
Geoscientific studies at the Tono mine and the Kamaishi mine in Japan

Title in Original Language:

Topic Code(s):
323 -Earth Science Studies and Models; 328 -Natural Analogue Studies

Abstract:

Power Reactor and Nuclear Fuel Development Corporation is conducting geoscientific studies to build a firm scientific basis for the safe disposal of high level radioactive waste in deep geologic formation. In this connection the in-situ experiments have been carried out at the Tono mine and the Kamaishi mine. Comprehensive information on rock mechanical hydrological and geochemical properties have been obtained at these sites and the techniques and instruments for investigation of geological environment have been applied and the issues to be studied have been identified.

WM Descriptor(s): geochemistry; geologic surveys; high-level radioactive wastes; hydrology; mines; natural analogue; rock mechanics; site characterization; underground disposal

Principal Investigator(s):

SATO, T.

TONO GEOSCIENCE CENTER POWER REACTOR AND NUCLEAR FUEL DEVELOPMENT CORPORATION (PNC)
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Organization Performing the work:

TONO GEOSCIENCE CENTRE POWER REACTOR AND NUCLEAR FUEL DEVELOPMENT CORPORATION (PNC)
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Other Investigators:
Sugihara K.; Matsui H.

Organization Type:
Other

Program Duration: From: 1988-4-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

Tono Geoscience Center Power Reactor and Nuclear Fuel Development Corporation; 959-31 Sonodo Jorinji Izumi-cho Toki-shi Gifu 509-51 Japan

Recent publication info:

1048

JPN19980032

Title:
Modelling study on mass transport in a heterogeneous porous medium

Title in Original Language:

Topic Code(s):
303 -Earth Science Models and Studies

Abstract:

In performance assessment of geological disposal system a dispersion phenomenon in geological media is one of the most important processes to be modeled and dependent on the heterogeneity of the media. In order to understand the dispersion process under a given heterogeneous field a laboratory experimental apparatus was constructed. A synthetic heterogeneous field in the flow-bed is composed of six kinds of glass beads with different diameters. Both dye (brilliant blue) and NaCl were used as tracers in the experiment. Particle tracking approach incorporating advection and molecular diffusion processes was applied to the numerical analysis and fine numerical grid was used so as to express the dispersion phenomenon as a result of variability of microscopic velocity field. By comparing the simulated results with measurements the confidence of the

groundwater and transport model considered in this study was enhanced.

WM Descriptor(s): bench-scale experiments; diffusion; dispersions; environmental transport; flow models; geologic models; heterogeneous effects; mass transfer; underground disposal

Principal Investigator(s):

HATAWARA, K.

TOKAI-MURA
319-11

Organization Performing the work:

TOKAI WORKS POWER REACTOR AND NUCLEAR FUEL DEVELOPMENT CORPORATION
TOKAI-MURA, NAKA-GUN 319-11 JAPAN

Other Investigators:

Watari S.; Uchida M.

Organization Type:

Other

Program Duration: From: 1994-4-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

Tokai Works Power Reactor and Nuclear Fuel Development Corporation (PNC)

Recent publication info:

1049

JPN19980033

Title:

Effects of transport model alternatives incorporating precipitation on the performance of engineered barriers

Title in Original Language:

Topic Code(s):

202 -Dispersion and Migration Models; 326 - Barrier Studies/Tests/Impacts including Near Field Effects

Abstract:

The migration of radionuclide through bentonite was analyzed by alternative models considering the precipitation caused by decay-chain ingrowth. In the realistic model the temporal and spacial isotopic ratio in bentonite was taken into account for determining the shared solubility for each radionuclide. The release rate of radionuclide from the outer surface of bentonite to surrounding rock is generally lower in such realistic analysis considering precipitation in bentonite than calculated by the model neglecting precipitation. This result shows the model not considering such effects is mostly conservative for the safety assessment.

WM Descriptor(s): bentonite; isotope ratio; precipitation; radionuclide migration; safety analysis; simulation; solubility

Principal Investigator(s):

OHI, T.

TOKAI-MURA
319-11

Organization Performing the work:

TOKAI WORKS POWER REACTOR AND NUCLEAR FUEL DEVELOPMENT CORPORATION
4-33 MURAMATU TOKAI-MURA, NAKA-GUN 319-11 JAPAN

Other Investigators:

Miyahara K.; Naito M.; Umeki H.

Organization Type:

Other

Program Duration: From: 1994-4-1 To: 1996-3-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Tokai Works Power Reactor and Nuclear Fuel Development Corporation

Recent publication info:

1050

JPN19980034

Title:
Comparison of dissolution behaviour between nuclear waste glass and natural volcanic glass

Title in Original Language:

Topic Code(s):

182 -Waste from form characterization; 328 - Natural Analogue Studies

Abstract:

Knowledge on the differences in dissolution behavior between nuclear waste glass and natural volcanic glass is indispensable to natural analogue study with natural volcanic glass. In this study corrosion tests have been conducted to identify the differences in dissolution behavior of both glasses under Si saturated and unsaturated conditions. A simulated nuclear waste glass (P 0798) and a synthesized volcanic glass were used for this purpose. The solubility of Si of simulated nuclear waste glass and that of synthesized volcanic glass were 110 ppm and 20 ppm respectively. The dissolution rate constants of the simulated nuclear waste glass and that of the synthesized volcanic glass were 0.3 g/m"3/day and 0.1 g/m"3/day respectively. These discrepancies have correlation with the difference of the free energy of hydration which is a function of chemical composition of glass. The selective dissolution of soluble elements was observed for both the glasses under Si saturated condition which suggests that hydration of both the glasses is controlled by diffusion of water. These results indicate that the dissolution mechanism of both the glasses are essentially the same and the natural analogue study which takes account of the differences caused by chemical composition can be used to assess the estimation of long-term behavior of nuclear waste glass.

WM Descriptor(s): basalt; bench-scale experiments; comparative evaluations; corrosion; dissolution; glass; natural analogue; radioactive wastes; waste forms

Principal Investigator(s):

Mitsui, S.

TOKAI-MURA
319-11

Organization Performing the work:

TOKAI WORKS POWER REACTOR AND NUCLEAR FUEL DEVELOPMENT CORPORATION
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Other Investigators:

Sasamoto H.; Kubota M.; Kamei G.

Organization Type:

Other

Program Duration: From: 1994-4-1 To: 1996-3-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Tokai Works Power Reactor and Nuclear Fuel Development Corporation

Recent publication info:

1051

JPN19980035

Title:
Development of decontamination techniques for decommissioning of nuclear facilities

Title in Original Language:

Topic Code(s):

411 -Mechanical Decontamination Methods; 421 - Dismantling Techniques

Abstract:

Power Reactor and Nuclear Fuel Development Corporation (PNC) has been developing decontamination measurement and cutting techniques for decommissioning of nuclear fuel facilities in Waste Dismantling

Facilities (WDF) located in Oarai Engineering Center. As a mean of 'Through decontamination techniques' electropolishing process and dry-ice blasting process have been developed. As for the decontamination performance of dry-ice blast DF of about 10"2 was obtained on account of raise the blast pressure from past average 4 kgf/cm"2 to the maximum 17.6 kgf/cm"2 and blast volume of dry-ice particles from 1 kg/min to 5 kg/min. To improve measurement and evaluation method for decommissioning PNC has been developing three types RID. One of them cell port type was made sure of the distribution of contamination before and after the decontamination by putting in ceiling port of cell. In order to establish cutting method applying to both metal and nonmetal plasma jet torch has been developed. Changing design of chip and nozzle restriction rate cutting depth was attained to 45 mm with SUS304 on condition of cutting speed of 1 mm/sec and standing 5 mm off.

WM Descriptor(s): cutting; decommissioning; decontamination; electropolishing; explosions; fuel cycle centers; fuel fabrication plants; fuel reprocessing plants; radioactive waste facilities

Principal Investigator(s):

TANIMOTO, K.

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Organization Performing the work:

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Other Investigators:

Tobita H.; Nemoto M.

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

none

Associated Organization(s):

none

Recent publication info:

1052

JPN19980036

Title:

A study on photochemical separation of actinide elements

Title in Original Language:

Topic Code(s):

181 -Methodologies, Analytical Methods, Measurements Instrumentation

Abstract:

Studies of photochemical valence adjustment and solvent extraction for the separation and coextraction of Pu and Np in nitric acid solutions were carried out. The concentrations of Pu and Np in a mixed nitric acid solution were 1x10"-"3 M(mol#centre dot#dm"-"3). A mercury lamp source was used. The photochemical valence adjustment to the valence condition of Pu(IV and VI) - Np(V) for their separation was completely attained using a mixed 2 M HNO_3 solution containing 1x10"-"2 M hydroxylamine nitrate and hydrazine under the irradiation conditions of 0.15 W/cm"2 and 30 mins. The adjustment to the valence condition of Pu(IV and VI) - Np(VI) for their coextraction was completely attained using a mixed 3 M HNO_3 solution containing 1x10"-"2 M urea under the irradiation conditions of 1.45 W/cm"2 and 10 mins. The separation and coextraction of Pu and Np by solvent extraction using 30% TBP/n-dodecane were carried out during and after the photochemical valence adjustment. By only one photochemical separation operation about 86% of Pu and about 99% of Np were distributed into the organic phase and the aqueous phase respectively and then by only one photochemical coextraction operation about 86% of Pu was distributed together with about 99% of Np into the same organic phase.

WM Descriptor(s): neptunium; nitric acid; photochemistry; plutonium; separation processes; solvent extraction; valence; visible radiation

Principal Investigator(s):

WADA, Y.

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Other Investigators:

Morimoto K.; Tomiyasu H.

Organization Type:

Other

Program Duration: From: 1988-4-1 To: 1999-3-1

State of Advancement: Unknown

Sponsoring Organization(s):

Tokai Works Power Reactor and Nuclear Fuel Development Corporation; 4-33 Muramatu Tokai-mura Naka-gun Ibaraki-ken 319-11 Japan

Associated Organization(s):

Research Laboratory for Nuclear Reactor

Recent publication info:

1053

JPN19980037

Title:

Nuclear data study for transmutation of fission products

Title in Original Language:

Topic Code(s):

800 -Actinide & Transmutation Studies

Abstract:

We have been measured the thermal neutron capture cross section and the resonance integral of fission products and have been studied the fine structure in a photonuclear reaction cross section to investigate the system transmuting fission products. For the measurement of the neutron capture cross section the isotope ratio method has been adopted and the error of the measurement was reduced to about one-half. The results of the capture cross section for 2 200 m/s neutrons and the resonance integral were obtained for 9 0Sr 1 3"7Cs 9 9Tc and "1"2"9I. Our data differs widely from previous data in values for some nuclei. For the study of the fine structure in photonuclear cross section the high resolution and high energy photon spectrometer (HHS) has been developed. The Monte Carlo simulation showed that the fine structure became observable with an energy resolution of 0.1% by taking advantage of the HHS. The dip peaks corresponding to the fine structure are clearly shown with the energy resolution of about 20 keV in the simulation.

WM Descriptor(s): capture; cesium 137; cross sections; experimental data; fine structure; fission products; iodine 129; isotope ratio; neutron reactions; photonuclear reactions; resonance integrals; strontium 90; technetium 99; transmutation

Principal Investigator(s):

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Other Investigators:

Nakamura S.; Shigetome Y.; Katoh T.; Wada Y.

Organization Type:

Other

Program Duration: From: 1988-4-1 To: 1999-3-1

State of Advancement: Unknown

Sponsoring Organization(s):

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Recent publication info:

1054

JPN19980038

Title:

Recovery of valuable metals from high-level radioactive wastes

Title in Original Language:

Topic Code(s):

132 -Liquid Waste Treatment

Abstract:

Processing steps of the recovery of platinum group metals from insoluble residue in dissolver solution of spent fuel and the calcination of high level liquid waste were investigated. Lead extraction was found to be effective to recover valuable metals from high-level radioactive wastes. As for refining processes of noble metals extracted in lead selective separation of ruthenium by ozone oxidation method and mutual separation of rhodium and palladium by solvent extraction method were examined. Both methods were found to have high efficiency for refining these three metals. An optimum conceptual flow sheet for recovery of valuable metals from high-level radioactive wastes especially insoluble residue was derived from experimental studies.

WM Descriptor(s): high-level radioactive wastes; lead; liquid wastes; materials recovery; ozonization; palladium; radioactive waste management; rhodium; ruthenium; solvent extraction

Principal Investigator(s):

MYOCHIN, M.

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Other Investigators:

Wada Y.; Kosugi K.

Organization Type:

Other

Program Duration: From: 1988-4-1 To: 1999-3-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Power Reactor and Nuclear Fuel Development Corporation; 4-33 Muramatsu Tokai-mura Naka-gun Ibaraki 319-11 Japan

Recent publication info:

1055

JPN19980039

Title:

Solvent extraction of nuclides in high-level radioactive wastes by new functional macrocycles

Title in Original Language:

Topic Code(s):

132 -Liquid Waste Treatment

Abstract:

Fundamental extractability of new macrocycles has been examined in collaboration with a few domestic Universities where molecular design and synthesis of them were proceeded in parallel Novel polyether bis(#BETA#-diketon) crownophane and calixarene analogs in adding with commercially-available macrocyclic family were dedicated to those study. A crownophane substituted with pyridyl groups gave higher distribution ratio of 20#approx#30 especially for Ag"+ and host bis(#BETA#-diketone) preliminary doped with transition metals exhibited different selectivities for guest alkali alkali-earth metal cations as changing a such intra-molecular metals as Cu Ni and Zn. Those metals likely changed the electronical and conformational arrangement of host structure. Bis(#BETA#-diketone)-Cu for instance indicated the highest selectivity for Sr"2"+ among the candidates including a dibenzo-18-crown-6 etc. Screening test using domestic various crown ethers and calixarenes for the major component of high-level radioactive wastes indicated that only dicyclohexano-18-crown-6 had a proper extractability for Sr"2"+ in a synthetic HLW with 1M nitric acid. Next program will focus on the extraction of tetra- and hexa-valent actinides with combination of proper kinds of diluents.

WM Descriptor(s): copper; crown ethers; high-level radioactive wastes; nickel; organic compounds; radioactive waste processing; silver ions; solvent extraction; strontium ions; zinc

Principal Investigator(s):
OZAWA, M.

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Other Investigators:
Nomura K.; Watanabe M.; Tanaka Y.

Organization Type:
Other

Program Duration: From: 1991-4-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
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Associated Organization(s):
Shizuoka Univ. Gunma Univ. Kyushu Univ.

Recent publication info:
1056

JPN19980040

Title:
Partitioning research of actinides and fission products in high-level radioactive wastes by bifunctional CMPO-TRUEX process

Title in Original Language:

Topic Code(s):
132 -Liquid Waste Treatment; 800 -Actinide & Transmutation Studies

Abstract:

In the future back-end system associating generally with HLW-repository program PUREX-radioactive wastes need to be more appropriate ones to meet the requirements of being economically minimal and ecologically soft. Salt and #alpha# in the HLW are major obstacles to satisfy those. Two systems a mediatory in situ electrolysis for reoxidation of trivalent-Pu/HAN/Hydrazine in nitric acid solution and a new clean-up for degraded solvent constituted with hydrazine oxalate and hydrazine carbonate followed by electrolysis were experimentally investigated and the results suggested these technics were compatible to induce salt-free radioactive wastes. The CMPO-TRUEX process has been tested counter-currently and its flowsheet was successfully polished up to recover all of actinides completely from fission products without adding any salt-reagent (TRUEX PNC's Salt-Free Version). In addition to its radiological stability up to 10"7R newly obtained biochemical and thermochemical data of 0 #phi# D[IB] CMPO fully supported its durability and general safety

in such a new ligand/solvent extraction process. Consolidation of these two solvent extraction processes can eventually decrease the burden to the back-end fuel cycle with providing salt- and #alpha#-free radioactive wastes. The central scientific issue is to find proper minor actinides/lanthanides separation techniques for actinides burning.

WM Descriptor(s): actinides; electrolysis; fission products; high-level radioactive wastes; purex process; radioactive waste processing; solvent extraction; truex process

Principal Investigator(s):

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Organization Type:

Other

Program Duration: From: 1991-4-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

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Recent publication info:

1057

JPN19980041

Title:

Study on actinides burner cores in fast reactor

Title in Original Language:

Topic Code(s):

800 -Actinide & Transmutation Studies

Abstract:

Some of minor actinide (MA) nuclides contained in residual waste from reprocessing have extremely long-term radiotoxicity. Among the various nuclear reactors the sodium-cooled fast breeder reactor (LMFBR) can be used for the transmutation of the MA nuclides because of the possible nuclear fission generated by high-energy neutrons. The following studies have been performed to develop MA burner core concepts by LMFBR: (1) evaluation of properties of MA containing fuel (2) optimization of loading method of MA (3) effect of rare earth(RE) in MA on core characteristics (4) influence of uncertainties of MA nuclear data (5) influence of MA containing fuel on reactor plant and fuel cycle (6) effect of MA recycling on core characteristics (7) core with uranium-free fuels containing MA. The main results in the studies are summarized as follows: (a) the MA transmutation in the typical large LMFBR with MOX fuel has no serious penalties from the view point of core performances provided that the loading method can be employed with small ratio of MA fuel. (#approx#5% MA for homogeneous loading method). (b) the MA recycling in LMFBR is feasible from neutronic and thermal-hydraulic points of view. However the Np at the 8th cycle is significantly depleted compared to the unirradiated feed and the fraction of Cm is greatly increased because of neutron captures in Am. The accumulation of Cm by the MA recycling will bring some problems concerning to the fuel handling and reprocessing due to increase both decay heat and neutron emission rate from Cm-244.

WM Descriptor(s): actinides; heterogeneous reactor cores; high-level radioactive wastes; LMFBR type reactors; radioactive waste processing; rare earths; recycling; reprocessing; transmutation

Principal Investigator(s):

WAKABAYASHI, T.

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Ikegami T.

Organization Type:

Other

Program Duration: From: 1991-4-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

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Recent publication info:

1058

JPN19980042

Title:

Study on super-long-life cores loaded with minor actinide fuel

Title in Original Language:

Topic Code(s):

800 -Actinide & Transmutation Studies

Abstract:

Super-long-life fast breeder reactor cores (SLLC) loaded with minor actinide (MA) fuel were designed aiming at continuous operation without refueling during plant lifetime and efficient reduction of MA nuclides (Np Am and Cm). The feasibility was studied from nuclear and thermal characteristics. As a result 1000 MWe and 300 MWe SLLCs with small reactivity change and power swing during plant lifetime were found to be feasible. MAs can be confined and transmuted in the reactor during plant life. A 1000 MWe SLLC can transmute MAs of 10 ton which come from 13 light water reactors (1000 MWe).

WM Descriptor(s): americium; curium; fbr type reactors; heterogeneous reactor cores; lifetime; neptunium; transmutation

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Other Investigators:

Wakabayashi T.

Organization Type:

Other

Program Duration: From: 1991-4-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

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Recent publication info:

1059

Kenya

KEN19980001

Title:
Determination of tritium and carbon-14 in radioactive wastes arising from medical and research institutions

Title in Original Language:

Topic Code(s):

122 -Liquid Waste Treatment; 181 -Methodologies, Analytical Methods, Measurements Instrumentation

Abstract:

Liquid wastes arising from nuclear techniques in Kenya's hospitals and research institutions have been detected and currently their qualification is possible at Materials Testing and Research Laboratories of the Ministry of Public Works by taking representative samples of contaminated wastes with tritium and carbon-14 present in organic and aqueous media. The aim is to determine the activities of these radioisotopes for waste management. In this way aliquots are drawn from the waste standards ad-hoc are prepared ULTIMA-GOLD or OPTI-FLUOR are added as appropriate scintillation cocktail. A liquid scintillation counter (TRI-CARB 1000 TR PACKARD) equipment interfaced with a personal computer loaded with AMS and spectra Graph software is used to measure the counts per minute (opm) in the determination. Concentrations from 50.7 Bq/ml to 5.37 x 10 Bq/ml have been quantified for aqueous research wastes while in organic wastes concentrations is approximately 90 Bq. Further radioactive waste management conditions for waste procedures and proposed waste managers are suggested.

WM Descriptor(s): aqueous solutions; carbon 14; liquid scintillation detectors; liquid wastes; low-level radioactive wastes; medical establishments; organic wastes; radioactive waste processing; tritium

Principal Investigator(s):

OTWOMA, DAVID

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Organization Performing the work:

NATIONAL RADIATION PROTECTION LABORATORY
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Other Investigators:

Mustapha Amidu

Organization Type:

Other

Program Duration: From: 1996-1-1 To: 1998-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

National Radiation Protection Laboratory; P.O.B. 19841

Recent publication info:

1060

Korea, Republic of

ROK19980001

Title:
Long-term integrity study on storage facility of spent fuel

Title in Original Language:

Topic Code(s):
136 -Waste Storage; 146 -Spent Fuel Storage

Abstract:

SIECO code was developed for analyzing the integrity of spent fuel under short and long-term storage conditions. The integrity evaluation of Zircaloy cladding and UO_2 following pool water drainage accident are performed using the SIECO. The oxidation behaviors of the irradiated and unirradiated Zircaloy-4 clad and UO_2 pellets in air simulating the accidental condition of loss of pool water were studied. Also adsorption of radionuclide and corrosion rate of the 314 314L and 316 stainless steels in pool under radiation environment were measured. The effects on irradiation dose and temperature in the ion-exchange capability for various ion-exchangers were studied and the ion-exchange rate and ion-selectivity of each ion-exchanger in a multi-component cooling water system were also measured.

WM Descriptor(s): corrosion; fuel integrity; ion exchange materials; irradiation; loss of coolant; oxidation; s codes; spent fuel storage; stainless steels; uranium dioxide; zircaloy

Principal Investigator(s):

RO, S.G.

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Organization Performing the work:

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Other Investigators:
Park K.I.; Min D.K.; Shin Y.J.

Organization Type:
Other

Program Duration: From: 1992-1-1 To: 1994-12-31

State of Advancement: Unknown

Sponsoring Organization(s):

Nuclear Environment Management Center (NEMAC) Korea Atomic Energy Research Center (KAERI); P.O.Box 105 Yusong Taejon Korea 305-600

Recent publication info:

1061

ROK19980002

Title:
Development of spent fuel management technology. Development of spent fuel storage technology

Title in Original Language:

Topic Code(s):
136 -Waste Storage; 146 -Spent Fuel Storage

Abstract:

This study has two objectives. One is to develop the dry storage technology for the short-term application and the other is to develop a new alternative dry storage technology for the next generation. The topics for this study include evaluation of integrity of the spent fuel in air-storage analysis of heat removal from dry storage system development of fuel rod extraction device for automation in spent fuel handling process development of corrosion-retardation technology of dry storage basket by the impressed current and sacrificial anode protection method safety assessment of dry storage facility and development of high dense storage technology. The studies related to these topics were initiated in 1995.

WM Descriptor(s): cooling; corrosion; dry storage; fuel integrity; oxidation; radioactive waste disposal; risk assessment; spent fuel storage

Principal Investigator(s):

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Other Investigators:

Min D.K.; Shin Y.J.; Park B.S.; Lee H.K.; Chun Y.S.

Organization Type:

Other

Program Duration: From: 1995-1-1 To: 1998-12-31

State of Advancement: Research in progress

Sponsoring Organization(s):

Nuclear Environment Management Center (NEMAC) Korea Atomic Energy Research Center (KAERI); P.O.Box 105 Yusong Taejon Korea 305-600

Recent publication info:

1062

ROK19980003

Title:

Development of spent fuel storage and handling technology

Title in Original Language:

Topic Code(s):

146 -Spent Fuel Storage

Abstract:

The R and D program addresses on the development of basic technologies for the storage and handling of spent fuel. As an effort to develop stable storage method a design of base-isolated spent fuel storage pool is proposed and its structural stability is verified by a dynamic analysis technique. Furthermore a zeolite based filter cartridge is developed for oxidization resistant canister for the storage of defective fuel. Its functionality is verified by an Dibinin-Astakov model of ion-exchange behavior. For remote handling of spent fuel an anti-swing overhead crane is developed to suppress the swinging motion of the fuel element during transportation. In addition a remote cask grappling and lid unbolting device (RCGLUD) is fabricated to automate the cask handling process. As a methodology to increase the storage capacity of pool a fuel rod extraction system is developed as a part of rod consolidation system. Finally a graphic motion simulation system is developed for the design and verification of various remote operations in general. The above R and D works are believed to provide new technical options for safe and effective handling of spent fuel with proper implementation.

WM Descriptor(s): fuel rods; fuel storage pools; materials handling equipment; radioactive waste management; remote handling; spent fuel casks; spent fuel storage; zeolites

Principal Investigator(s):

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Other Investigators:

Park B.S.; Park Y.S.; Jeon Y.S.; Kim J.W.; Lee H.K.; Park K.I.

Organization Type:

Other

Program Duration: From: 1994-1-1 To: 1994-12-31

State of Advancement: Unknown

Sponsoring Organization(s):

Nuclear Environment Management Center Korea Atomic Energy Research Institute; 150 Dukjin-Dong Yusung Taejon R.O.K.

Recent publication info:

1063

ROK19980004

Title:

Development of neutron shielding materials for spent fuel shipping cask - Development of epoxy resin based neutron shielding materials

Title in Original Language:

Topic Code(s):

145 -Spent Fuel Packaging (Canisters, Materials. etc.)

Abstract:

Epoxy resin based-neutron shielding materials have been developing since January 1995 to use in the spent fuel shipping cask. The base material is a vulcanised type epoxy resin at room temperature and has good fabricability because of its good fluidity before curing. Several kinds of additives such as aluminium hydroxide polypropylene boron compounds and defoaming agents etc. were added with different ratios to the base material. After mixing and curing of the mixtures their properties such as fabricability fire resistance combustion characteristics mechanical strength and thermal conductivity were evaluated. In 1996 the shielding effectiveness and prolonged-time heat resistance of the mixtures will be studied.

WM Descriptor(s): epoxides; neutrons; radiation protection; resins; shielding; shielding materials; spent fuel casks; waste transportation

Principal Investigator(s):

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Organization Performing the work:

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Other Investigators:

Cho S.H.; Hong S.S.

Organization Type:

Other

Program Duration: From: 1995-1-1 To: 1996-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Korea Atomic Energy Research Institute; Dukjin-dong 150 Yusong Taejon 305-353 Korea

Recent publication info:

1064

ROK19980005

Title:

The development of large spent fuel shipping cask - Conceptual design of large spent fuel shipping cask

Title in Original Language:

Topic Code(s):

145 -Spent Fuel Packaging (Canisters, Materials.

etc.)

Abstract:

A large spent nuclear fuel shipping cask has been developing since January 1995 for the transportation of spent fuels to be expected in the near future from nuclear power plants to interim storage facility. The research is focused on developing advanced techniques to be required to design the large spent fuel shipping cask. Its final goal is to secure the spent fuel transportation systems which will be indigenous. In 1995 conceptual design has been performed with due consideration of design parameters such as cooling time burnup and maximum weight etc. In 1996 dimensions of the large cask will be determined by performing shielding thermal and structural analyses.

WM Descriptor(s): design; dimensions; shielding materials; spent fuel casks; spent fuel storage; waste transportation

Principal Investigator(s):

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Seo K.S.; Ku J.H.; Lee J.C.; Bang K.S.

Organization Type:

Other

Program Duration: From: 1995-1-1 To: 1999-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

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Recent publication info:

1065

ROK19980006

Title:

Nuclear Fuel Cycle Waste Treatment Technology Development

Title in Original Language:

Topic Code(s):

131 -Gaseous Waste Treatment; 132 -Liquid Waste Treatment; 133 -Solid Waste Treatment; 400 - D&D - GENERAL; 402 -Nuclear Power Reactor Decommissioning; 403 -Research Reactor Decommissioning; 412 -Chemical Decontamination Methods; 521 -Decontamination of Soils

Abstract:

Korea Atomic Energy Research Institute, at the request of the Ministry of Science and Technology has been studying the treatment technologies for wastes from nuclear fuel cycle under development such as DUPIC, spent fuel handling and storage etc. and also for the decommissioning & decontamination of nuclear facilities. The final goals of the 10 year long basic R&D program, to be completed in 2006, are the development and demonstration of technologies for fuel cycle waste treatment mainly focusing on dry alpha waste treatment. To meet these targets three R&D topics are currently being pursued, 1) development of organic waste treatment by decomposition, 2) development of incineration and solidification technology, and 3) development of decontamination, decommissioning and environmental restoration technology.

WM Descriptor(s): alpha-bearing wastes; decommissioning; decontamination; high-level radioactive wastes; incinerators; radioactive waste processing; reduction; vitrification

Principal Investigator(s):
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Kim, Joon Hyung; Lee, Byoung Jig; Lee, Kune Woo

Organization Type:
Other

Program Duration: From: 1997-1-1 To: 2006-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Ministry of Science and Technology

Associated Organization(s):
none

ROK19980007

Title:
High Level Radioactive Waste Disposal Technology Development

Title in Original Language:

Topic Code(s):
135 -Waste Packaging (Canister Types, Materials, Corrosion Studies); 137 -Waste Disposal (including Spent Fuel); 201 -Dispersion and Migration of Radionuclides; 202 -Dispersion and Migration Models; 231 -Radiological Assessment Models

Abstract:

Korea Atomic Energy Research Institute, at the request of the Ministry of Science and Technology, has been studying the technologies for permanent disposal of high-level radioactive wastes in deep geological formations. The final goals of the 10 year long basic R&D program to be completed in 2006 are the development of the Korean Reference Disposal Concept and the establishment of technologies on Total System Performance Assessment, based on the disposal of the wastes with an appropriate multibarrier system into a crystalline rock in Korea. To meet these targets four basic R&D topics are currently being pursued: 1) development of a deep repository system, 2) engineered barrier development, 3) study on geoenvironmental science and 4) study on radionuclide migration.

WM Descriptor(s): geologic surveys; high-level radioactive wastes; radioactive waste disposal; spent fuels; underground disposal

Principal Investigator(s):
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Organization Type:
Other

Program Duration: From: 1997-1-1 To: 2006-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Associated Organization(s):

Ministry of Science and Technology none

ROK19980008

Title:
Development of Spent Fuel Transportation Technology

Title in Original Language:

Topic Code(s):
148 -Spent Fuel Transportation (Methods, Casks, etc.)

Abstract:
A large capacity cask had been developed from 1995 to 1996 to transport spent fuel assemblies to the interim storage facility to be constructed. Design criteria of the large cask was based on loading 28 PWR spent fuel assemblies with a burn-up of 50,000 MWD/MTU and 10 years of cooling time. Optimum design is important for the cask to reduce its size and weight as much as possible for the marginal safety of handling. Therefore, for the design of the large cask, it is necessary to develop design and test techniques which can assess the behavior of the cask under design loads. The burn-up of nuclear fuels tends to increase in power reactors with the employment of high performance fuels causing the increase of neutron intensity as well as decay heat of spent fuels. Consequently, the development of highly effective neutron shielding materials is required for the optimum design of the cask. As the conceptual and basic design step of the large cask, the design of the structure, basket array and radiation shielding had been performed. The principal stress using tri-axial strain test was evaluated within the allowable stress under 0.3 m drop conditions. The thermal resistance coefficient in the air gap was obtained by a thermal test using a section model of the large cask. Several kinds of epoxy resin with which specific gravity is 1.6 - 1.7 and hydrogen density is 6.0 - 6.25 x 10^{22} atoms/cc was developed for use as neutron shielding materials.

WM Descriptor(s): casks; shielding materials; transport regulations; transportation systems

Principal Investigator(s):
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Seo, K.S.; Ku, J.H.; Lee, J.C.; Bang, K.S.; Cho, S.H.; Ro, S.G.

Organization Type:
Other

Program Duration: From: 1996-1-1 To: 1996-12-1

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):
Ministry of Science and Technology

Associated Organization(s):
none

ROK19980009

Title:
Spent Fuel Degradation Behavior During Dry Storage

Title in Original Language:

Topic Code(s):
143 -Spent Fuel Storage

Abstract:

This project consists of three subjects, such as a study on the oxidation behavior of UO2 and Zircaloy-4 in air, an evaluation of internal pressure, and the creep rupture of spent fuel. The UO2 oxidation study was performed by using unirradiated, irradiated UO2, simulated fuel (SIMFUEL), unirradiated and irradiated Gd-doped UO2. The oxidation rate increases with the increase of oxygen partial pressure and air change rate, but decreases with the increase of the increase of the simulated burnup of the SIMFUEL. The oxidation rate of a Gd-doped UO2 pellet shows a more rapid increase at the initial stage, compared with that of a UO2 pellet, and lower saturation level at the final stage, depending on the amount of Gd203 addition. The oxidation rate of irradiated UO2 was observed to be much lower than that of unirradiated UO2. The oxidation behavior of Zircaloy-4 was tested by various environments and specimens. The fastest oxidation rate was found under 100% of O2. The pre-oxidized specimen shows a high oxidation rate in pre-transition range as the pre-oxidation temperature decreases, but a similar rate in the post-transition range. The prediction of internal pressure and cladding stress rupture time was made to support the determination of maximum allowable temperature and stress for dry storage of spent nuclear fuel. In the first part SPENFIP (SPENt Fuel Internal Pressure) Code was developed by modifying GT2R2 originally developed by PNL. This code calculates the internal pressure of the rod following the power history of a spent fuel rod. Secondly the CRUPTAIN(Creep RUPTure in Air, Inert, and Nitrogen gases) program module was developed on the basis of DATING code originated from PNL. The program takes both rupture time and creep strain criteria in the determination of maximum allowable cladding temperature and stress for a conservative result. Also, several features such as dry air storage of high burn-up spent fuel are added.

WM Descriptor(s): creep; dry storage; oxidation; spent fuel storage

Principal Investigator(s):

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Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: 1996-1-1 To: 1997-12-31

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):

Ministry of Science and Technology, Korea

Associated Organization(s):

none

ROK19980010

Title:

Development of Spent Fuel Remote Handling Technology

Title in Original Language:

Topic Code(s):

423 -Robotics, Remote Operations

Abstract:

The handling, inspection, transportation, and disassembly of spent nuclear fuel-reception composes an essential part of the management technology of spent fuel. However, due to the high radioactivity, such a process requires advanced remote technologies, which again requires the development of remote operated equipment and control systems. Since the nation's policy on spent fuel management is not finalized, R&D on application specific remote handling technology should be limited. Therefore, the technical items required for safe management of spent fuel are selected and pursued. In this regard, the following R&D activities are planned: collision-free transportation of a spent fuel assembly, mechanical disassembly of a fuel assembly and graphical simulation of a spent fuel handling/disassembly process. The R&D activity on a swing-free crane aims at developing a new crane system which realizes full automation of the radioactive waste handling process. In this

topic a dedicated control system is developed which implements a swing-collosion-free control algorithm. Also, to facilitate full automation of crane operations, a 3-dimensional position detection system is developed along with an algorithm to operate it. The force reflective telerobotic system will be developed to effectively perform delicate handling of spent fuel. Finally, to enhance the efficiency of the design process of spent fuel handling equipment, a graphic simulation system is developed. With this system, the validity of the mechanism design of a spent fuel handling device is effectively verified, and furthermore a synchronized operation is made feasible between the graphical model and actual equipment.

WM Descriptor(s): remote handling; remote handling equipment; spent fuels

Principal Investigator(s):

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Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: 1997-1-1 To: 2000-3-1

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):

Ministry of Science and Technology

Associated Organization(s):

none

Lithuania

LIT19980001

Title:

Analysis of radioactive waste and spent nuclear fuel management system in Lithuania

Title in Original Language:

Panandoto branduolinio kuro ir radioaktyviy adieky transportavimo ir saugojimo Lietuvos salygomis technologijy bei charakteringy siluminiy ir hidrodinaminiy procesy analize

Topic Code(s):

132 -Liquid Waste Treatment; 133 -Solid Waste Treatment

Abstract:

The systematized data on liquid and solid radioactive waste in Ignalina NPP and Lithuania are presented. Problems of management of radioactive waste and spent nuclear fuel are analyzed. Experimental data on the possible hydraulic shock for the falling container with spent nuclear fuel into the water-pool and possibilities of shock-absorbers are presented. Thermal conditions of the container with the spent RBMK reactor nuclear fuel are analyzed.

WM Descriptor(s): containers; high-level radioactive wastes; ignalinsk-1 reactor; ignalinsk-2 reactor; impact shock; materials handling; radioactive waste management; spent fuels; thermal analysis

Principal Investigator(s):

VILEMAS, JURGIS

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Poskas P.; Adomaitis J.; Simonis V.; Ragaisis V.

Organization Type:

Other

Program Duration: From: 1994-1-1 To: 1995-12-1

State of Advancement: Unknown

Sponsoring Organization(s):

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Recent publication info:

1066

Netherlands

NET19980001

Title:

Development PSA-3 methodology

Title in Original Language:

Topic Code(s):

231 -Radiological Assessment Models; 232 - Environmental Risk Assessment

Abstract:

Since 1980 KEMA is involved in Probabilistic Safety Assessment (PSA) a tool for the evaluation of the offsite consequences of releases of radioactive materials resulting from severe nuclear accidents. First KEMA developed a computercode of her own called MAKRO. As a result of the EC development of COSYMA (Code System of the MARIA project where MARIA is the acronym for (Methods for Assessing the Radiological Impact of Accidents) KEMA decided to become actively involved within this project. KEMA participated in the recent international intercomparison exercise of PSA codes organised by OECD/NEA and EC. In this benchmark exercise several modern PSA code packages were tested rigorously on a large number of consequences for different source terms. At the same time a COSYMA users comparison exercise took place where ten different users participated. KEMA was responsible for the coordination and produced the final report. As a result of this exercise an international COSYMA Users Group was founded sponsored by the EC also coordinated by KEMA. Furthermore research and development concerning several aspects of the code and models has been performed since. These aspects include atmospheric dispersion topics like stability class categorization building wake effects wind shear effect and meteorological sampling techniques.

WM Descriptor(s): c codes; environmental transport; m codes; probabilistic estimation; radioactive effluents; radioactivity; reactor accidents; risk assessment; safety analysis

Principal Investigator(s):

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Organization Type:
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Program Duration: From: 1995-1-1 To: 1995-12-31

State of Advancement: Unknown

Sponsoring Organization(s):

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Recent publication info:

1070

NET19980002

Title:
The calculation of the contribution of stack emissions to air pollution

Title in Original Language:

Topic Code(s):

103 -Effluents and Discharges; 202 -Dispersion and Migration Models

Abstract:

The model STACKS has been developed in the KEMA laboratories for calculating local air concentrations and depositions. STACKS can be regarded as an advanced gaussian model in which scaling parameters are implemented and adjusted to many measurements. Dispersion parameters are continuous functions of turbulence parameters and are height dependent. Also special attention has been paid to plume rise in vertically structured atmospheres. For tall stacks the advanced model STACKS predicts much lower local concentrations and depositions than traditional models. The differences are mainly caused by two effects: the large differences between the Pasquill stability classification and improved method using scaling parameters; the large differences in boundary layer heights between parametrized methods and others which is very important for tall stacks. All relevant modules in STACKS have been evaluated separately; the resulting long-term concentration pattern has been evaluated with immission data from two Dutch monitoring stations and with the extended data set of Kincaid. STACKS is being used in Environmental Impact Studies for electrical power generating companies and a number of industries. It has been officially accepted in the Netherlands as the reference model.

WM Descriptor(s): air pollution; concentration ratio; contamination; earth atmosphere; environmental transport; radioactive effluents; s codes; stack disposal

Principal Investigator(s):

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Program Duration: From: 1993-1-1 To: 1997-12-1

State of Advancement: Unknown

Sponsoring Organization(s):

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Recent publication info:

1071

Pakistan

PAK19980001

Title:
Measurement of sub-surface migration of radioactivity-borehole monitoring

Title in Original Language:

Topic Code(s):
201 -Dispersion and Migration of Radionuclides; 242 -Monitoring Techniques

Abstract:

Low-Level Radioactive Waste at Pinstech is disposed off into Near Surface Disposal pits specially developed for this purpose. A number of boreholes have been drilled at different locations around the pits and are monitored to check any radionuclide migration from disposal points to surrounding strata. Monitoring is conducted by gamma spectrometry periodically. Data obtained showed that most of the radionuclides buried into the disposal pits remained in place. This research work shows that there is no migration of radioactivity from disposal pits to the surrounding areas.

WM Descriptor(s): boreholes; gamma spectroscopy; ground disposal; low-level radioactive wastes; radiation monitoring; radionuclide migration; site characterization

Principal Investigator(s):
AKHTAR, P.

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Hussian M.; Atta M.A.

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
Pinstech; P.O. Nilore Islamabad Pakistan

Associated Organization(s):
P.A.E.C.

Recent publication info:
1072

PAK19980002

Title:
Subsurface structural study in radioactive waste disposal area using solid state nuclear track detectors technique

Title in Original Language:

Topic Code(s):
242 -Monitoring Techniques; 312 -Site Survey and Characterization

Abstract:

The use of solid-state nuclear track detectors is relatively a new technique employed to investigate subsurface structure like faults fractures etc. To study the subsurface structure in the radioactive waste disposal area of PINSTECH a number of Solid State Nuclear Track Detectors have been installed at specific locations Relevant data is being collected and analysed. The data will also be used to measure any possible movement/leakage of radionuclides from disposal points to the surrounding soil and to confirm the subsurface flow direction.

WM Descriptor(s): dielectric track detectors; geologic structures; ground disposal; radiation monitoring; radioactive waste disposal; radionuclide migration; site characterization

Principal Investigator(s):

MEHMOOD, K.

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Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

Pinstech; P.O.Nilore Islamabad Pakistan

Associated Organization(s):

P.A.E.C.

Recent publication info:

1073

PAK19980003

Title:

Chemical treatment of low-level liquid radioactive waste-separation of Ag-110m Sb-124 and other short lived radionuclides

Title in Original Language:

Topic Code(s):

112 -Liquid Waste Treatment

Abstract:

Low-Level Liquid Radioactive Waste generated from Pakistan Research Reactor (PARR-1) at Pakistan Institute of Nuclear Science and Technology contains a number of short-lived radionuclides. This waste is stored for decay of radioactivity to bring it down to release limits before its disposal into Near Surface Disposal pits However radionuclides like Ag-110m and Sb-124 in considerable concentrations cause disposal problems and require longer decay time hence large storage capacity. To separate Ag-110m and Sb-124 a number of chemical reagents and parameters were studied giving particular considerations to decontamination factor and cost economics. A method based on hydrous-oxide co-precipitation of these radionuclides at specific pH adjusted with NaOH is being optimized. Preliminary investigations have shown good prospects of the method to be adapted for large scale chemical treatment operations. It is both efficient and cost effective. Conditions are being optimized for the removal of Ag-110m and Sb-124 with activity range from few hundreds to MBq/m"3.

WM Descriptor(s): antimony 124; isotope separation; liquid wastes; low-level radioactive wastes; parr reactor; precipitation; radioactive waste processing; silver 110

Principal Investigator(s):

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Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

Pinstech; P.O.Nilore Islamabad Pakistan

Associated Organization(s):

P.A.E.C.

Recent publication info:

1074

Philippines

PHI19980001

Title:
Treatment technologies for low and intermediate level waste generated from nuclear applications. Options for cost effective treatment of low-level liquid radioactive wastes PHI/7380/RB

Title in Original Language:

Topic Code(s):
122 -Liquid Waste Treatment

Abstract:

The project aims to identify a simple low cost treatment process required for reliable liquid waste treatment and to adopt current treatment methodologies using indigenous materials. Chemical precipitation was used in the treatment of low level aqueous waste. Precipitation by the ferric hydroxide process was conducted with the addition of finely divided ion exchange materials to maximize the decontamination of specific radionuclides. The use of nickel hexacyanoferrate as a specific ion exchange material for cesium removal was investigated using the lowest possible concentration which would yield a high decontamination result. A small amount of polyelectrolyte was added to aid in the particle agglomeration of the precipitate so as to produce a floc that will ensure efficient separation. A high decontamination factor of 465 was achieved using the process. Since a simple low cost treatment/process is required for current waste methodologies volcanic ash an indigenous material was used for the adsorption of radioiodine. The solution containing waste material was passed through a column of pretreated volcanic ash. A test run was done using different oxidizing agents in order to achieve a high percent adsorption since previous experiments without oxidizing agents yielded only a maximum of 84 percent adsorption.

WM Descriptor(s): adsorption; ashes; cesium; decontamination; intermediate-level radioactive wastes; iodine; ion exchange materials; isotope separation; liquid wastes; low-level radioactive wastes; precipitation; radioactive waste processing

Principal Investigator(s):

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Organization Type:
Other

Program Duration: From: 1993-4-1 To: 1996-6-1

State of Advancement: Unknown

Sponsoring Organization(s):

Philippine Nuclear Research Institute Radiation Protection Services Nuclear Regulations Licensing and Standards Division; Commonwealth Ave. Diliman Quenzon City Philippines 1101

Recent publication info:

1075

Romania

ROM19980001

Title:
Migration of radionuclides in loess and red clay deposits

Title in Original Language:
Migrarea radionuclizior in depozitele de loess si argila rosie

Topic Code(s):
201 -Dispersion and Migration of Radionuclides;
323 -Earth Science Studies and Models

Abstract:

A study was carried out to investigated the migration potential of radionuclides Cs Sr and Co in loess and red clay from sites forseen for LLW and MLW disposal. The following items are studied: soil nature and principal mineralogical component of the soil; chemical composition of the ground water (pH TDS hardness concentrations of the competitive ions:(Na"+ Mg"2"+ Ca"2"+ and SO_4"2"-); chemical composition of the contact water; Cs Sr and Co batch distribution coefficients (K_d ml/g) for our experimental condition (pH contact-time soil-to-solution ratios concentration of the carrier in solution. Under these experimental conditions it results that the variation of K_d was dependent on the amount of mineralogical component - montmorillonite - and it has to be expressed as a range of values: K_d(Cs) 51-173 ml/g K_d(Sr) = 14-23 ml/g and K_d(Co) = 41-102 ml/g. The results of this study indicate that for practical purposes distribution coefficients (K_d) provide convenient and simple means of estimating of the retardation factor (R) and migration rate (V m/a).

WM Descriptor(s): cesium isotopes; clays; cobalt isotopes; ground water; intermediate-level radioactive wastes; low-level radioactive wastes; radionuclide migration; site characterization; soils; strontium isotopes; underground disposal

Principal Investigator(s):

POPA, A.

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Organization Type:
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Program Duration: From: 1995-1-1 To: 1997-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Institute for Nuclear Research Department for Management Radioactive Wastes; Colibasi-Pitesti Romania

Recent publication info:
1076

ROM19980002

Title:
Performance assessment of solidified waste forms containing tritium

Title in Original Language:
Estimarea performantelor formelor de deseu ce contin tritiu

Topic Code(s):
124 -Waste Immobilization

Abstract:

The research studies showed that the incorporation of tritiated liquids into matrices cement was ineffective on its own for reducing tritium releases to the environment. Even the use of additives such as volcanic tuff zealots and silicagel to make the matrices less porous the tritium release rates were 1.1-1.75 x 10"-"3 cm/day. The leach rates for tritium have been determined using liquid scintillation counting.

WM Descriptor(s): cements; leaching; liquid wastes; matrix materials; radioactive waste disposal; radionuclide migration; solidification; tritium; tritium oxides

Principal Investigator(s):

DENEANU, N.

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Other

Program Duration: From: 1995-1-1 To: 1997-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Institute for Nuclear Research Department for Management Radioactive Wastes; Colibasi-Pitesti Romania

Recent publication info:

1077

ROM19980003

Title:

Method and installation for C-14 removal from the off-gas effluents of NPP Cernavoda

Title in Original Language:

Metoda si instalatie pentru retinerea C-14 din efluentii gazosi de la CNE Cernavoda

Topic Code(s):

111 -Gaseous Waste Treatment

Abstract:

The decreasing of the environmental contamination as much as possible imposes reduction of the radionuclides concentration in the off-gases of NPP. The off-gas stream containing "1"4C is passed through a 4M/l alcaline solution which provides a 15 ppm "1"4CO_2 in the treated gases. The installation consists of: a cooling/condensation-drop collector system which controls the humidity and temperature of gas at the absorption column input; absorption column containing alcaline solution; a very efficient and fine distribution system of the gases in solution that provides a large contact surface between liquid and gaseous phases. This process will assure a very low concentration of"1"4C under MPC given by Romanian and IAEA's Regulations.

WM Descriptor(s): carbon 14; carbon dioxide; cernavoda-1 reactor; decontamination; gaseous wastes; off-gas systems; radioactive effluents; radioactive waste processing; removal

Principal Investigator(s):

BARCANESCU, I.

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Organization Type:

Other

Program Duration: From: 1993-1-1 To: 1995-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Institute for Nuclear Research Department for Management Radioactive Wastes; Colibasi-Pitesti Romania

Recent publication info:

1078

ROM19980004

Title:

The technology of liquid radioactive waste treatment resulting from decontamination

Title in Original Language:

Technologie de tratare a deseurilor radioactive lichide de la decontaminare

Topic Code(s):

112 -Liquid Waste Treatment; 122 -Liquid Waste Treatment

Abstract:

The objective of the research is a treatment method for radioactive liquid wastes. The application will assure a maximum admissible activity with respect to the evacuated effluents and the reduction of waste volume by a factor as high as possible. The main decontamination agents experimentally used were: citric acid oxalic acid EDTA and detergents. Two ways of treatment were tested: the chemical decomposition of organic substances followed by a precipitation of radionuclides from the waste: good results were obtained when oxidant agents (30% H_2O_2) and precipitation agents (phosphate calcium copper and hexacyanoferrat ions) were used; the ion-exchange method by using strong acid sulphonated polystyrene and basic polystyrene (H/OH) resins. In case of cesium loss over maximum admissible concentration the effluents were passed through a column with hexacyanoferrat of Cu(II) or Co(II). The achieved results are encouraging and the optimisation studies are in progress.

WM Descriptor(s): cesium; citric acid; decomposition; decontamination; detergents; EDTA; ion exchange; liquid wastes; oxalic acid; precipitation; radioactive effluents; radioactive waste processing

Principal Investigator(s):

BALASOIU, M.

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Other Investigators:

Organization Type:

Other

Program Duration: From: 1994-1-1 To: 1997-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Institute for Nuclear Research Department for Management Radioactive Wastes; Colibasi-Pitesti Romania

Recent publication info:

1079

ROM19980005

Title:

Treatment of radioactive waste liquids by membrane separation techniques

Title in Original Language:

Tratarea deseurilor lichide radioactive prin technici de separare pe membrana

Topic Code(s):

112 -Liquid Waste Treatment; 122 -Liquid Waste Treatment

Abstract:

The objective of the ultrafiltration tests was to produce a permeate of sufficient clarity for use in the reverse osmosis modules. Turbidities have been reduced by about 92.9% across the polysulfone membranes. Separation of metal ions is better in an alkaline medium than in an acidic medium. Zeolites and surfactants are some of the additive which have been tested for optimisation of the treatment process and for conditioning the liquid for downstream processing by reverse osmosis. Present research is examining the potential of using an ultrafiltration system for the removal of dissolved radionuclides but chemical treatment is necessary to convert soluble radionuclides organic trace and heavy metals to insoluble filterable species.

WM Descriptor(s): ion exchange materials; liquid wastes; membrane transport; membranes; osmosis; radioactive waste processing; surfactants; ultrafiltration; zeolites

Principal Investigator(s):

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Other Investigators:

Organization Type:

Other

Program Duration: From: 1995-1-1 To: 1999-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Institute for Nuclear Research Department for Management Radioactive Wastes; Colibasi-Pitesti Romania

Recent publication info:

1080

ROM19980006

Title:

Normal Atmospheric corrosion studies on the cylindrical steel liner used in CANSTOR-type storage

Title in Original Language:

Studii de coroziune in conditii atmosferice normale asupra coloanelor cilindrice de otel folosite in stocarea tip CANSTOR

Topic Code(s):

145 -Spent Fuel Packaging (Canisters, Materials. etc.)

Abstract:

Possibilities of testing at atmospheric corrosion and the accelerated types of testing made on ungalvanised and galvanised carbon-steel (salt-spray tests and electrochemical tests) are described. The corrosion rates the level of corrosion damage the corrosion compounds were determinated using gravimetric metallographic and x-ray diffraction techniques.

WM Descriptor(s): carbon steels; corrosion; corrosive effects; dry storage; materials testing; radioactive waste disposal; radioactive waste storage; spent fuel casks; spent fuel storage

Principal Investigator(s):

ROSIORU, V.

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Other Investigators:

Dinu A.; Cotolan V.

Organization Type:

Other

Program Duration: From: 1994-1-1 To: 2000-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Institute for Nuclear Research Department for Nuclear Materials and Corrosion; Colibasi-Pitesti Romania

Recent publication info:

1081

ROM19980007

Title:

The influence of pressure on corrosion behaviour of spent fuel storage container's materials

Title in Original Language:

Influenta presiunii asupra comportarii la coroziune a materialelor pentru containerul de depozitare finala a combustibilului ars

Topic Code(s):

145 -Spent Fuel Packaging (Canisters, Materials. etc.)

Abstract:

Progress in corrosion studies related to the candidate materials for the fabrication of nuclear fuel waste disposal containers in our country and in the world are presented. Corrosion behaviour in different environments was investigated for some candidate materials. The influence of the environment temperature pressure on corrosion behaviour was emphasised. Experiments at 25-30 MPA and 25-50 deg C was conducted on: Ti Cu Hastelloy C4 304L and 316 stainless steel in 600 g/l NaCl desaerated solutions and it was determined the type and the rates of corrosion attack.

WM Descriptor(s): containers; corrosion; dry storage; materials testing; pressure dependence; radioactive waste disposal; radioactive waste storage; spent fuel casks; spent fuel storage; stainless steels

Principal Investigator(s):

ROSIORU, V.

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Other

Program Duration: From: 1992-1-1 To: 2010-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Institute for Nuclear Research Department for Nuclear Materials and Corrosion; Colibasi-Pitesti Romania

Recent publication info:

1082

ROM19980008

Title:

Compressibility tests in the range 20-350 deg C on salt compacts

Title in Original Language:

Teste de compresibilitate la temperaturi cuprinse intre 20#deg i# 350#deg C# pe compacte de sare

Topic Code(s):

306 -Barrier Studies and Tests

Abstract:

Cylindrical compacts obtained by cold-pressing salt powders have been tested by compression under constant stress. Experimental condition were: compression stress: 4.15MPa and 14.45 MPa; temperatures: 6 values between 20 and 350 deg C; testing duration: from 0.4 to 72 hours depending on the testing temperature. The results of tests were: all samples strained with constant rates; their final shape tend to be a cask-type one; deformation rates varied between 0.002%/hour and 77.7%/hour. Deformation rates of the samples tested at 150 deg C suggest that the 'salt convergence' process in the spent fuel repository condition will be faster than assumed in present.

WM Descriptor(s): cold pressing; compacting; compressibility; compression; deformation; powders; radioactive waste disposal; salts; spent fuels; underground disposal

Principal Investigator(s):

MIRION, I.

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Balan V.; Ohai D.

Organization Type:

Other

Program Duration: From: 1995-1-1 To: 1998-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Institute for Nuclear Research Department for Nuclear Materials and Corrosion; Colibasi-Pitesti Romania

Recent publication info:

1083

ROM19980009

Title:

Carbon-14 removal from spent ion exchange resin wastes

Title in Original Language:

Separarea carbonului-14 prin rasini uzate

Topic Code(s):

133 -Solid Waste Treatment

Abstract:

In heavy water CANDU reactors the"1"4C activities can be as high as 6 Ci/m"3 for spent ion exchange resins from primary heat transport purification system and 210 Ci/m"3 spent resins from the moderator purification

system. There are significant advantages removing "1"4C from the spent resins and immobilising it for separate storage. Acid stripping was found to be very effective for "1"4C removal. The experiments performed on simulated spent resins (i.e. resins loaded with Na_2CO_3 or NaHCO_3) by acid stripping with HCl in an agitated batch reactor indicate that 98.5% of the C can be removed (acid concentration HCl=2-6N; acid waste production about 300-400 ml/100 ml resins; reaction time 45-60 min; agitation speed=60 rpm).

WM Descriptor(s): carbon 14; high-level radioactive wastes; hydrochloric acid; ion exchange materials; removal; resins; waste forms

Principal Investigator(s):

HAVRIS, A.

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Other Investigators:

Organization Type:

Other

Program Duration: From: 1994-1-1 To: 1997-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Institute for Nuclear Research Department for Nuclear Materials and Corrosion; Colibasi-Pitesti Romania

Recent publication info:

1084

ROM19980010

Title:

Geophysical characteristics of the site proposed for disposal of low and intermediate level radioactive wastes

Title in Original Language:

Caracteristici geofizice ale amplasamentului propus pentru depozitarea deseurilor slab si mediu radioactive

Topic Code(s):

312 -Site Survey and Characterization

Abstract:

Geological and physical investigations of the site proposed for low and intermediate level waste disposal had in view the porosity and permeability as main parameters in hydrological characterisation and minarelogy and ionic exchange capacity as parameters of radionuclide interactions with water-soil system. The stratigraphic section of this site provides two layers of loess and one of red clay. The water table is at 52-55 m from the land surface and covers a sand stone deposit. The clay content increases from 25% in the loess layers to 60% in the red clay deposit. The main mineralogical compound is the montmorillonit known as very active in the ionic exchanges. The other minerals: quartz mica feldspar and carbonates rich the loess layers. The porosity n decreases with the deepness the pore radius varying between 1 mm in loess and 0.08l#mu#m in the red clay. Consequently the hydraulic conductivity is thousand times lower in this layer that in loess and can attain to 10"-"8 cm/s. The hydraulic conductivity k depends on the pore distribution. Thus for pore radius r larger than 1 #mu#m the water flow obeys the Poiseuille law k=(#gamma# x n x r"2)/8#eta# where #gamma# is volumetric density and #eta# is the dynamic fluidity. For the pores smaller than 1 #mu#m both in the loess and in the clay we found: k=C x V"1/3 x r where V is the pore volume and C a constant that accounts for the soil mineralogical composition.

WM Descriptor(s): clays; geophysical surveys; ground disposal; hydraulic conductivity; hydrology; intermediate-level radioactive wastes; low-level radioactive wastes; mineralogy; permeability; porosity; radioactive waste disposal; site characterization

Principal Investigator(s):
DIACONU, D.

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Craciun C.; Durdun I.

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Other

Program Duration: From: 1994-1-1 To: 1997-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Institute for Nuclear Research Department for Nuclear Materials and Corrosion; Colibasi-Pitesti Romania

Recent publication info:
1085

ROM19980011

Title:
Red clay as natural barrier in the disposal of low level and medium level radioactive waste

Title in Original Language:
Argila rosie-bariera naturala in depozitarea deseurilor slab si mediu radioactive

Topic Code(s):
201 -Dispersion and Migration of Radionuclides;
306 -Barrier Studies and Tests

Abstract:
The concept for disposal of low and medium level radioactive wastes (near-surface disposal) involves the existence of natural and/or engineered barriers against radionuclide migration. The values of the physical and chemical properties such as: the clay fraction (60-80%); montmorillonite content (64-85%); porosity (34-37%); mean pore size (0.2 #mu#m); saturation degree (0.96-1.00); permeability (2.4 x 10"-"7 - 7.8 x 10"-"1"1 m/s); carbonates content (15-24%); cationic exchange capacity (17-50 mEq/100g) confirm the quality of natural barrier of the red clay against the radionuclide migration.

WM Descriptor(s): clays; experimental data; ground disposal; intermediate-level radioactive wastes; low-level radioactive wastes; permeability; porosity; radionuclide migration

Principal Investigator(s):
BALAN, V.

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Organization Type:
Other

Program Duration: From: 1995-1-1 To: 1997-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Institute for Nuclear Research Department for Nuclear Materials and Corrosion; Colibasi-Pitesti Romania

Recent publication info:

1086

Russian Federation

RUS19980001

Title:
Pumps

Title in Original Language:

Topic Code(s):

122 -Liquid Waste Treatment; 132 -Liquid Waste Treatment

Abstract:

Submerged pneumatic pumps with the output up to 10 m"3/h and jet pumps with the output up to 3 m"3/h are developed intended for pumping-out pulps from the storage of liquid radioactive wastes. The pumps are tight explosion-proof; they can operate in acids alkali and highly radioactive media.

WM Descriptor(s): liquid wastes; pneumatic transport; pumps; radioactive waste storage; slurries

Principal Investigator(s):

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Unknown

Sponsoring Organization(s):

OTJSC 'SverdNIIchimmash' Russia Ekaterinburg Griboedov str. 32

Recent publication info:

1087

RUS19980002

Title:
Barrel

Title in Original Language:

Topic Code(s):

125 -Waste Packaging; 135 -Waste Packaging (Canister Types, Materials, Corrosion Studies)

Abstract:

Tests of a barrel service life intended for packaging of solidified radioactive wastes are continued. The barrel construction material is carbon steel. It has a special cladding and is tested for corrosion flooding falling stacking transport vibration. The guaranteed service life of a barrel without change of its initial characteristics is not less than 100 years.

WM Descriptor(s): carbon steels; containers; corrosion; lifetime; materials testing; packaging; radioactive waste disposal; solid wastes

Principal Investigator(s):

MELNIKOV, V.

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Ignatov G.

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Unknown

Sponsoring Organization(s):

OTJSC 'SverdNIIchimmash' Russia Ekaterinburg Griboedov str. 32

Recent publication info:

1088

RUS19980003

Title:

Monitors

Title in Original Language:

Topic Code(s):

134 -Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies)

Abstract:

A device intended for sediment loosening and transporting into a storage of liquid radioactive wastes and a method of this storage emptying from pulps and sediments were developed.

WM Descriptor(s): hydraulic transport; liquid wastes; materials handling; monitoring; radioactive waste storage; sediments; slurries

Principal Investigator(s):

MELNIKOV, V.S.

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Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Unknown

Sponsoring Organization(s):

OTJSC 'SverdNIIchimmash' Russia Ekaterinburg Griboedov str. 32

Recent publication info:

1089

RUS19980004

Title:

Mastering of bituminization facilities for liquid radioactive wastes from nuclear power stations

Title in Original Language:

Topic Code(s):

114 -Waste Immobilization (Bituminization, Cementation, Including Tests of Properties, Leaching Studies); 124 -Waste Immobilization

Abstract:

In 1995 two typical bituminization facilities for liquid radioactive wastes were commissioned which were developed in OTJSC 'SverdNIIchimmash' for nuclear power stations with the reactors of WWER-type. In collaboration with Balakowskaja NPS and Nizhegorodsk Atomenergoproekt a method of adjustment of the manufactured equipment up to the requirements of Gosatomnadzor of Russia is developed and tested. Bitumen-salt compound is obtained and packed into containers of 200 liters in capacity. Mass fraction of salts in the compound is more than 40 per cent the residual mass fraction of moisture is less than 1 per cent.

WM Descriptor(s): bitumens; containers; liquid wastes; packaging; radioactive waste disposal; salts; solidification; WWER type reactors

Principal Investigator(s):

SIMONOV, V.I.

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Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Unknown

Sponsoring Organization(s):

OTJSC 'SverdNIIchimmash' Russia Ekaterinburg Griboedov str. 32

Recent publication info:

1090

RUS19980005

Title:

Concentrating matter for radioactive elements extraction from NPP liquid wastes

Title in Original Language:

Topic Code(s):

105 -Waste Minimisation; 112 -Liquid Waste Treatment

Abstract:

The sorbent Fezhel was developed specially for nonspecific extraction of trace elements such as cesium 137, cobalt and manganese from the technological solutions of nuclear power plants. This kind of sorbent was tested under the operational conditions of such nuclear power plants as Kalinin, Rovno, Zaporozhye, Balakovo and in the Kurchatov Institute and high decontamination efficiency toward low-level radioactive wastes was confirmed. The use of Fezhel was shown to reduce specific activity of technological liquids by factor of between 1000 and 10000 for cesium and by a factor of 100 for cobalt and manganese. The working capacity of the sorbent toward acid solutions, which create desalinating units of NPP, is about 1000 liters per liter of sorbent. The decontamination factors for the solutions of fuel detention basins and trap wastes of NPP are estimated correspondingly as 500 L/L and 1000 L/L. As a result of experiments and technological tests the final technology of Low liquid radioactive wastes decontamination has been developed. In the framework of this technology the sorbents undergo no regeneration during their service life and are then minimized into the compact form of high-level radioactive wastes. The needed form can be achieved by means of cementation and/or bituminization. This technology is included in technical Project of Nuclear Power Plants with the Highest Safety Water-Water Reactor-1000 in Russia.

WM Descriptor(s): cesium; cesium 137; contamination; liquid wastes; low-level radioactive wastes; nuclear power plants; waste

Principal Investigator(s):

Remez, Victor Pavlovich

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

none

Associated Organization(s):

none

RUS19980006

Title:

Express-control of radiocesium in the water solutions

Title in Original Language:

Topic Code(s):

109 -Waste Characterisation (Radionuclide Inventory Determination), including Computer Codes and Measuring Methods and Techniques

Abstract:

A group of perspective cyanoferrate-based sorbents has been developed, that possess high selectivity toward some radionuclides and the trace heavy metals. One of these sorbents is a granulated ferrous ferrocyanide-cellulose composition called ANFEZH. The investigations showed that ANFEZH is a multipurpose sorbent, that can be particularly used as a pre-concentrator of cesium 137 and cesium 134 from natural and artificial aqueous solutions, seawater, ground water, surface waters and so on. For example, in the set of experiments the volumes of 1000 liters of aqueous solution were filtered with different flow rates through an ion exchange column charged with ANFEZH. It was investigated that within the flow-rate range 50 -60 ml/min quantitative extraction of radiocesium can be achieved. After this stage is over, the sorbent can be reloaded to the sampler and specific radioactivity of the corresponding aqueous solution can be determined by routine gamma spectrometry. It is shown that the technique described above makes it possible to rise by a factor of 10000 the analytical sensitivity of corresponding radiochemical analysis when comparing to the commonly used methods. The particular physico-chemical properties of ANFEZH allow a significant reduction (several-fold) of the final volume of liquid radioactive wastes by combining the technology of compacting or burning together with routine column chromatography. Several techniques such as cementation and bitumization have been elaborated for the further processing of the residual highly radioactive solid wastes.

WM Descriptor(s): seawater; solutions; sorption; surface waters; waste; wastes; water

Principal Investigator(s):

Remez, Victor Pavlovitch

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
none

Associated Organization(s):
none

RUS19980007

Title:
The production of radioactive pure stock-breeding foods on the radioactive contaminated soils

Title in Original Language:

Topic Code(s):
211 -Biological Uptake Mechanisms and Models; 521 -Decontamination of Soils

Abstract:

The sorbent "BIFEZH" is being used in the production of radiochemically pure food from the products of the animal industries. Radionuclides that enter the animals through the food chain are being removed by internal sorption to "BIFEZH" that is added to fodder. It was shown that after addition of the appropriate amount (1 - 3 g / kg) of this material to the fodder of animals the specific radioactivity of milk falls to the level permissible for cesium 137. The product has been tested by the Institute of Agricultural Radiology and Agro-ecology (Obninsk, Russian) in the Bryansk region, hit by the Chernobyl accident, and permitted for use by the Main Veterinary Administration of Russia's Ministry of Agriculture. When introduced daily, for two weeks, along with the feed in amounts 10-20 g/head for sheep and 30-60 g/head for cow, the agent caused the cesium level in animal products to decline to safe limits (in muscular tissue by 12-13 fold, in internal organs 25-90 fold, in milk 10-20 fold).

WM Descriptor(s): accidents; cesium; cesium 137; food; food chains; radionuclide migration; sorbent recovery systems; sorption

Principal Investigator(s):

Remez, Victor Pavlovitch

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Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
none

Associated Organization(s):
none

Slovenia

SLO19980001

Title:
Proposal of the time schedule for the construction of the LILW repository in Republic of Slovenia

Title in Original Language:
Predlog za izdelavo globalnega mreznega nactra za izvedbo odlagalisca NSRAO v Republiki Sloveniji

Topic Code(s):
102 -Programme Strategy, Planning and Management; 305 -Design, Construction, Commissioning

Abstract:

The rough time schedule for planning and construction of LILW repository in Republic of Slovenia from the siting of the repository to the construction and operation of the facility were prepared. The project represents the basis for the future detailed time schedule.

WM Descriptor(s): construction; ground disposal; intermediate-level radioactive wastes; low-level radioactive wastes; planning; radioactive waste disposal; radioactive waste facilities; schedules; site selection; underground disposal

Principal Investigator(s):

JERAN, MARKO

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Other Investigators:

Duhovnik B.; Kastelic A.; Aljancic V.

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Unknown

Sponsoring Organization(s):

IB Elektroprojekt Hajdrihova 4 Ljubljana

Recent publication info:

1091

SLO19980002

Title:

Preparation of the basis for the construction of LILW repository

Title in Original Language:

Priprava podlog za izvedbo odlagalisca NSRAO

Topic Code(s):

102 -Programme Strategy, Planning and Management; 305 -Design, Construction, Commissioning

Abstract:

The aim of the project is to define the most appropriate way how to dispose LILW wastes in Slovenia. Different possible approaches to select the appropriate combination of site and repository type are presented. The suitable options were analyzed and the three most appropriate ones were identified and are described in more details.

WM Descriptor(s): comparative evaluations; construction; ground disposal; intermediate-level radioactive wastes; low-level radioactive wastes; planning; radioactive waste disposal; radioactive waste facilities; site selection; underground disposal

Principal Investigator(s):

JERAN, MARKO

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Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Unknown

Sponsoring Organization(s):

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Recent publication info:

1092

SLO19980003

Title:

Initial proposal for the environmental impact statement preparation

Title in Original Language:

Strokovne podlage za pripravo porocila o vplivu na okolje

Topic Code(s):

233 -Long Term Environmental Impact; 611 -Waste Policy Acts

Abstract:

Basis for environmental impact at the future repository site for low and intermediate level radioactive wastes are discussed in the study. They will be used as the ground for regulatory methodology in the environmental impact statement. At the same time they represent the first step in the reiterated procedure of the environmental impact statement preparation. General technical basis establish fundamental principles of determining the acceptable levels of intervention in the environment by examining its individual components (water soil air plants animals landscape forests and ionizing radiation).

WM Descriptor(s): environmental impact statements; environmental impacts; ground disposal; intermediate-level radioactive wastes; low-level radioactive wastes; radioactive waste disposal; radioactive waste facilities; site characterization; underground disposal

Principal Investigator(s):

JERAN, MARKO

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Other Investigators:

Duhovnik B.

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Unknown

Sponsoring Organization(s):

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Recent publication info:

1093

SLO19980004

Title:

Remediation project of temporary storage near Zavratec - phase 1

Title in Original Language:

Sanacija zacasnega skladisca v Zavratcu-1. faza

Topic Code(s):

102 -Programme Strategy, Planning and Management; 501 -Project Planning and Management

Abstract:

In temporary storage near the village Zavratec the decontamination wastes from Oncological Institute Ljubljana after an accident in 1961 are stored. These wastes are contaminated with radium and stored in an old military

barrack. The project represents the proposal for the first phase of remediation project that should include detailed waste characterization and remediation program.

WM Descriptor(s): decontamination; environmental impacts; radioactive waste storage; radium; remedial action; site characterization; waste forms

Principal Investigator(s):

JERAN, MARKO

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Other Investigators:

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Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Unknown

Sponsoring Organization(s):

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Recent publication info:

1094

SLO19980005

Title:

Survey of the abandoned mines and prospection drillings in Republic of Slovenia

Title in Original Language:

Kataster opuscenih rudnikov v Republiki Sloveniji

Topic Code(s):

322 -Site Survey and Characterization

Abstract:

The project is giving an overview of all abandoned and others mines together with tunnels and of all prospection drillings deeper than 50 meters made in Slovenia. 81 abandoned mines were evaluated due to preliminary siting criteria for an underground radioactive waste disposal and over 2.500 prospection drillings were identified. As a result of the project seven abandoned mines are recommended for further investigations regarding their suitability for underground storage or disposal of low- and intermediate-level wastes in Slovenia.

WM Descriptor(s): abandoned shafts; drilling; geologic surveys; intermediate-level radioactive wastes; low-level radioactive wastes; mines; radioactive waste disposal; underground disposal

Principal Investigator(s):

PLACER, L.

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Other Investigators:

Budkovic T.; Petkovsek B.; Uhan J.; Drobne F.; Ilic B.

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Unknown

Sponsoring Organization(s):

Geoloski Zavod Ljubljana Institut za geologijo geotechniko in geofiziko Dimiceva 14 Ljubljana Slovenia

Recent publication info:

1095

SLO19980006

Title:

Synopsis of international experience and draft proposal of HLW management program for Republic of Slovenia

Title in Original Language:

Povzetek mednarodne prakse ter predlog strategije Republike Slovenije na podrocju ravnanja z VRAO in izrabljenim gorivom

Topic Code(s):

109 -Waste Characterisation (Radionuclide Inventory Determination), including Computer Codes and Measuring Methods and Techniques; 134 -Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies)

Abstract:

A synopsis and an overview of international experiences in the field of spent fuel and high-level radioactive waste management is given. Draft proposal for Republic of Slovenia high level radioactive waste management program is outlined. This study covers also monitoring program for interim storage and final repository for HLW. At this stage only general considerations of monitoring program are discussed. In conclusions an overview of HLW immobilization technologies in glass matrix and HLW glass behavior is given. An alternative HLW immobilization method in ceramic matrix synroc is added.

WM Descriptor(s): ceramics; glass; high-level radioactive wastes; monitoring; radioactive waste processing; radioactive waste storage; reviews; spent fuels; synroc process; technology transfer

Principal Investigator(s):

GLUMAC, BOGODAN

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Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Unknown

Sponsoring Organization(s):

Institut 'Josef Stefan' Jamova 39 1000 Lubljana Slovenia

Recent publication info:

1096

SLO19980007

Title:

An overview of international practice conserning the deep geological disposal of HLW

Title in Original Language:

Povzetek mednarodnihizkusenj na podrocju ravnanja z VRAO in globinskega odlaganja VRAO-geoloski del

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 321 - General Planning and Management

Abstract:

General review of international practice concerning the deep geological disposal of HLW is presented. The most important factor for long-term safety of repository is geological system including ground water permeability as well as mechanical and chemical stability. The study indicates that locations for HLW repository in seismically stable and low water permeable geological formations in Slovenia should by searched.

WM Descriptor(s): geologic formations; geologic surveys; high-level radioactive wastes; radioactive waste disposal; safety; stability; underground disposal

Principal Investigator(s):

PETKOVSEK, B.

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Other

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State of Advancement: Unknown

Sponsoring Organization(s):

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Recent publication info:

1097

SLO19980008

Title:
Public relations and information - strategy

Title in Original Language:

Odnosi z javnostmi in informiranje - strategija

Topic Code(s):

101 -General policies

Abstract:

A model of the public relations strategy of Agency RAO is proposed. The strategy is divided into two parts: information and education. The information includes providing information to the media surveys of press clippings interviews press conferences public opinion polls and publishing articles. The education programme of PR strategy suggests a preparation of different materials like: leafleats Agency's newspaper and videos lectures for youngsters and creation of the Visitor Centre.

WM Descriptor(s): education; information dissemination; public information; public opinion; public relations; radioactive waste management; radioactive wastes

Principal Investigator(s):

DRAPAL, A.

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Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Unknown

Sponsoring Organization(s):

PRISTOP Communication GRoup Dunajska 107 1000 Ljubljana; Jozef Stefan Institute Nuclear Training Centre 'Milan Copic' Jamova 39 1000 Ljubljana

Recent publication info:

1098

SLO19980009

Title:
Transportation of LILW

Title in Original Language:

Transport nizko in srednje radioaktivnih odpadkov

Topic Code(s):

118 -Waste Transportation (Methods, Containers, Transportation Means)

Abstract:

In establishing modes and designs of technical LILW transport solutions the wastes were divided into three groups; operational wastes from NPP Krsko NPP Krsko decommissioning wastes and wastes from the other producers. On the basis of roughly estimated basic data conceptual designs of the transport system and possible technical solutions have been elaborated. A major part of low and intermediate radioactive waste is foreseen to be transported as industrial packages type 2 (IP-2) and the transport shall be carried out by road.

WM Descriptor(s): containers; intermediate-level radioactive wastes; krsko reactor; low-level radioactive wastes; road transport; waste transportation

Principal Investigator(s):

JERAN, MARKO

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Other Investigators:

Duhovnik B.; Sorli M.; Vrsic S.; Breznik B.; Prelog L.

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Unknown

Sponsoring Organization(s):

IB Elektroprojekt Hajdrihova 4 1000 Ljubljana Slovenia

Recent publication info:

1099

SLO19980010

Title:
Transportation of HLW and spent fuel

Title in Original Language:

Transport izrabljenega goriva in visoko radioaktivnih odpadkov

Topic Code(s):

138 -Waste Transportation (Methods, Containers, etc.); 148 -Spent Fuel Transportation (Methods, Casks, etc.)

Abstract:

Spent fuel and HLW transport system in Slovenia is described. In establishing modes and design of transport technical solutions the radioactive waste regarding its origin has been divided into three groups: - spent fuel from nuclear station HLW from eventual processing of spent fuel and spent fuel from research reactor. On the basis of roughly estimated basic data the conceptual design of transport system and technical solutions have been elaborated. An overview of the legislation including administrative bodies and authorized organizations which will take part in radioactive waste transport is added.

WM Descriptor(s): high-level radioactive wastes; legislation; road transport; spent fuel casks; spent fuels; transport regulations; waste transportation

Principal Investigator(s):

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Program Duration: From: Not provided To: Not provided

State of Advancement: Unknown

Sponsoring Organization(s):

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Recent publication info:

1100

SLO19980011

Title:

Preoperational radioactivity measurements in the environment of low and intermediate level waste repositories

Title in Original Language:

Predobratovalne meritve radioaktivnosti v okolju odlagalisc nizko in srednje radioaktivnih odpadkov

Topic Code(s):

241 -Monitoring Programmes; 302 -Site Survey and Characterization

Abstract:

In the report generic guides for selecting reasonable preoperational measuring methods appropriate for surveillance of natural as well as global man-made radionuclides are discussed. The factors taken into account are the following: primary objectives of preoperational measurements (reference data later monitoring optimization information to general public); regulatory requirements; site- and time-variability of environmental radioactivity; quality and comparability of results; type of waste; optimal size time span and timing of measurements. Elements for setting up an optimized preoperational measuring program are listed and explained. The relevant results of radioactivity surveillance nuclear power plant environmental monitoring as well as independent natural radioactivity studies performed up to now in Slovenia are discussed.

WM Descriptor(s): environmental exposure; intermediate-level radioactive wastes; low-level radioactive wastes; measuring methods; natural radioactivity; radiation monitoring; radioactive waste disposal; waste forms

Principal Investigator(s):
MARTINCIC, R.

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Other Investigators:
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Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Unknown

Sponsoring Organization(s):
Institut 'Jozef Stefan' Jamova 39 1000 Ljubljana Slovenia

Recent publication info:
1101

SLO19980012

Title:
An overview of materials suitable for engineered barriers in LILW repository

Title in Original Language:
Materiali primerni za izdelavo umetnih ovir pri odlaganju NSRAO

Topic Code(s):
305 -Design, Construction, Commissioning

Abstract:
In this study an overview of the materials suitable for construction of engineered barriers of the disposal facility is given. Some of the analyzed materials are acceptable only for specific type of the repository other might be used in all types. Specific materials are analyzed taking into account legal and technical requirements. Basic cost estimates are given as well. Current treatment and conditioning practices in Slovenia worldwide approaches in final repository design and candidate sites characteristics have been used as the basis for the analyzes. An overview of available natural material resources for barrier construction is also given.

WM Descriptor(s): construction; ground disposal; intermediate-level radioactive wastes; low-level radioactive wastes; materials; radioactive waste disposal; radioactive waste facilities; site characterization; underground disposal

Principal Investigator(s):
FINK, K.

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Other Investigators:
Urbanc J.; Uhan J.; Kralj P.

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Unknown

Sponsoring Organization(s):
EGS Maribor Vetrinjska 2 Maribor Slovenia

Recent publication info:
1102

SLO19980013

Title:
Evaluation of the possibilities for radioactive waste storage or disposal in the abandoned mines or other underground objects

Title in Original Language:
Ocena moznosti odlaganja radioaktivnih odpadkov v opuscenih rudnikih in drugih podzemnih objektih

Topic Code(s):
117 -Waste Disposal; 137 -Waste Disposal (including Spent Fuel)

Abstract:
Seven abandoned mines identified in earlier study (Survey of the Abandoned Mines and Prospection Drillings in Republic of Slovenia) and recommended for further investigations are described in the project. Zirovski vrh uranium mine (closed in 1990). Underground objects not situated in the ore bearing zone are potentially suitable for disposal. Kanizarica coal mine. Underground mining area and surface above situated out of the area of coal-bearing basin presented conditionally suitable location. Litija lead-zinc mine Remsnik copper-zinc-lead mine Trobni dol coal mine and Trojane antimony mine are considered as less suitable. Globoko coal mine is not suitable for disposal of radioactive waste. The catastre of other underground objects in Republic of Slovenia is presented in the project as well. There were collected data about abandoned military objects (built before the 2"n"d world war) abandoned railway galleries and other abandoned underground objects. For further examination objects Goli vrh Hlavce njive and Zakriz above Cerkno were suggested.

WM Descriptor(s): abandoned shafts; mines; radioactive waste disposal; radioactive waste storage; underground disposal; underground facilities; underground storage

Principal Investigator(s):
BUDKOVIC, T.

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Buser I.; Petkovsek B.; Hafner J.

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Unknown

Sponsoring Organization(s):
Geoloski Zavod Ljubljana Institut za geologijo geotehniko in geofiziko Dimiceva 14 Ljubljana Slovenia

Recent publication info:
1103

SLO19980014

Title:
Procedure of LILW radwaste repository site selection on the basis of a public invitation to bids

Title in Original Language:
Zasnova postoka pridobivanja lokacije odlagalisca NSRAO z zbiranjem ponudb na podlagi javnega razpisa

Topic Code(s):
301 -General Planning and Management; 701 - Public Information Programmes, Public Participation

Abstract:
Preliminary procedures of LILW repository site selection by systematic technical screening and other procedures not taking into account public opinion as well as the decisions of local communities have mostly proved unsuccessful. More success is to be expected by procedures where local communities demonstrate a

certain extent of cooperation and the eventually selected sites become in this way a result of a mutual decision-making agreements and negotiations between the local communities and the process proposer. The procedure of repository site selection on the basis of a public invitation to bids is presented in this study. According to such procedure a public official invitation shall be published to which all Slovenian Communities could respond. Individual Community shall take part in the procedure if the case will have majority support. According to the interest expressed by the community its bodies shall offer a location to the proposer in order to determine its fit-for-purpose. The repository should be constructed on one of the locations obtaining a positive safety assessment. It is proposed that all expenses which shall result form the Communities cooperation in the procedure shall be covered by the procedure proposer and moreover the Communities shall be awarded financial stimulations and other compensations for their constructive cooperation.

WM Descriptor(s): ground disposal; intermediate-level radioactive wastes; legal aspects; local government; low-level radioactive wastes; public opinion; public policy; radioactive waste disposal; regional cooperation; site selection; underground disposal

Principal Investigator(s):

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Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Unknown

Sponsoring Organization(s):

IB Elektroprojekt Hajdrihova 4 Ljubljana Slovenia

Recent publication info:

1104

SLO19980015

Title:

Public relations. Presentation of basic principles in radioactive waste management

Title in Original Language:

Odnosi z javnostmi. Predstavitev Agencije RAO in problematika radioaktivnih odpadkov

Topic Code(s):

701 -Public Information Programmes, Public Participation

Abstract:

The task is to prepare the concept for the first Agency's publications: leaflets and the newspaper. The main objective of these publications is to inform the general and targeted publics and to give them general information on various scopes of radioactive waste management in simple clear language. During this project the series of four leaflets has been made: radiation radioactive waste low and intermediate level waste disposal and high level waste disposal. Created concept for leaflets presupposes that the series will be extended. The main objective of the Agency's newspaper is to inform targeted publics on present situation concerning radioactive waste. The first number was published at the same time as the series of leaflets.

WM Descriptor(s): document types; education; public information; public relations; radioactive waste management

Principal Investigator(s):

DRAPAL, A.

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Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Unknown

Sponsoring Organization(s):

PRISTOP Communication Group Dunajska 107 1000 Ljubljana Slovenia; Jozef Stefan Institute Nuclear Training Centre 'Milan Copic' Jamova 39 1000 Ljubljana Slovenia

Recent publication info:

1105

SLO19980016

Title:

Initial state of the environment- hydrology hydrogeology and hydrobiology

Title in Original Language:

Ugotavjanje nicelnega stanja okolja-hidrologija hidrogeologija in hidrobiologija

Topic Code(s):

232 -Environmental Risk Assessment; 302 -Site Survey and Characterization

Abstract:

The project deals with initial-state parameters at the location of future repository related to either surface or ground waters. Radiologic parameters were treated separately therefore the project limits itself to other parameters which have to be known and evaluated prior to the construction of the repository. The methodology of individual investigations and periodical observations is defined. The project also determines bases for monitoring in the area of low- and intermediate-level radioactive waste disposal site during operation and institutional control.

WM Descriptor(s): environmental impacts; ground disposal; ground water; hydrology; intermediate-level radioactive wastes; low-level radioactive wastes; monitoring; radioactive waste disposal; site characterization; underground disposal

Principal Investigator(s):

URBANC, JANKO

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Other Investigators:

Brancelj A.; Gaberscik A.; Uhan J.; Urbancbercic O.; Drobne F.

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Unknown

Sponsoring Organization(s):

Geoloski Zavod Ljubljana Institut za geologijo geotehniko in geofiziko Dimiceva 14 Ljubljana Slovenia

Recent publication info:

1106

SLO19980017

Title:
Site selection of location for low- and intermediate-radioactive waste disposal-program of field investigations

Title in Original Language:

Izbor lokacij za odlagalisce nizko in srednje radioaktivnih odpadkov - Program terenskih razaskav na IV. stopnji

Topic Code(s):

117 -Waste Disposal; 302 -Site Survey and Characterization

Abstract:

In the first part of the project an overview of geological site investigation programs in countries with similar geological conditions is given. In the second 92 geological parameters important for the repository site selection process are defined and the methods defining these parameters are given. The third part consists of evaluation of parameters for six different types of LILW disposal: surface disposal of LILW above an open aquifer surface disposal of LILW on a low permeable rock underground disposal of LILW in a low permeable soft rock underground disposal of LILW with #alpha#emitters in a low permeable soft rock underground disposal of LILW in a hard rock and underground disposal of LILW with #alpha#-emitters in a hard rock.

WM Descriptor(s): alpha-bearing wastes; comparative evaluations; ground disposal; intermediate-level radioactive wastes; low-level radioactive wastes; radioactive waste disposal; rocks; site characterization; underground disposal

Principal Investigator(s):

PETKOVSEK, B.

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Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Unknown

Sponsoring Organization(s):

Geoloski Zavod Ljubljana Insitut za geologijo geotehniko in geofiziko Dimiceva 14 Ljubljana Slovenia

Recent publication info:

1107

SLO19980018

Title:
Basis for the long-term planning in the radioactive waste management

Title in Original Language:

Strokovne podlage za pripravo dolgorocnega nacrta aktivnosti

Topic Code(s):

102 -Programme Strategy, Planning and Management

Abstract:

A successful work in the area of radwaste management is highly conditioned by an integral and planned

approach. Factors influencing the areas of concern as well as a review of activities carried out by now state-of-the-art assessment and guidelines for future work regarding individual factors are given in the study. The study shall be used as a basis for a long-term activities plan elaboration and at the same time it shall represent one of the starting points of the radioactive waste management program.

WM Descriptor(s): forecasting; planning; program management; radioactive waste disposal; radioactive waste facilities; radioactive waste management; radioactive waste processing

Principal Investigator(s):

JERAN, MARKO

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Other Investigators:

Duhovnik B.

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Unknown

Sponsoring Organization(s):

IB Elektroprojekt Hajdrihova 4 Ljubljana

Recent publication info:

1108

Spain

SPA19980001

Title:

Assay of long-lived radionuclides in typical waste streams from nuclear power plants

Title in Original Language:

Analisis de radionucledios de larga vida en residuos de centrales nucleares

Topic Code(s):

109 -Waste Characterisation (Radionuclide Inventory Determination), including Computer Codes and Measuring Methods and Techniques;
188 -Radionuclide scanning

Abstract:

We have developed radiochemical methods based on ion exchange chromatography for the determination of plutonium americium and curium in typical waste streams arising from the operation of Spanish nuclear power plants: ion exchange resins and evaporator concentrates. Ion exchange chromatography however can generate substantial quantities of waste and is time consuming. In order to solve these shortcomings we are going to develop new procedures based on liquid-liquid extraction and coprecipitation techniques. For every nuclear power plant the results of plutonium americium and curium will be used to obtain correlation factors with gross alpha values which are easier to measure.

WM Descriptor(s): alpha-bearing wastes; americium; curium; ion exchange chromatography; liquid wastes; plutonium; precipitation; radioactive effluents; radiochemistry; resins; solvent extraction

Principal Investigator(s):

GASCON, J.L.

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Other Investigators:

Rodriguez M.; Suarez J.A.

Organization Type:

Other

Program Duration: From: 1995-9-1 To: 1999-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

CIEMAT; Avda. Complutense 22 28040 Madrid (Spain)

Associated Organization(s):

ENRESA

Recent publication info:

1109

SPA19980002

Title:

Development of a fast gamma scanning for cemented 220 l waste drums

Title in Original Language:

Desarrollo de un sistema rapido para el analisis gamma de bultos cementados de 220 l

Topic Code(s):

186 -Radionuclide characterization in drums; 188 -Radionuclide scanning

Abstract:

The main objective of this development is to set-up a prototype and methods for the radiological characterization of gamma emitters contained in 220 l cemented waste drums from NPPs. The system designed consists of a turntable where the drum is placed to perform the rotation movement of it and a double collimated Ge-detector. The primary collimator is a fix lead collimator close to the detector which is used to determine the detector active window. The secondary collimator is a lead-iron movable window which allows the control of vertical sections of the drum to be measured. Several studies of calibrations using mock-up scale solid secondary standards and full scale solid secondary standards have been carried out in order to obtain correlation factors between both geometries and correlation functions among the calibration points and apertures of secondary collimation.

WM Descriptor(s): calibration; cements; correlation functions; gamma detection; gamma radiography; ge semiconductor detectors; intermediate-level radioactive wastes; low-level radioactive wastes; monitored retrievable storage; nondestructive testing; radiation monitoring; radioactive waste storage; waste forms

Principal Investigator(s):

PINA, GABRIEL

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CENTRO DE INVESTIGACIONES ENERGETICAS, MEDIOAMBIENTALES Y TECNOLOGICAS C I E M A T
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Other Investigators:

Suarez J.A.; Perez C.

Organization Type:

Other

Program Duration: From: 1995-9-1 To: 1999-9-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Associated Organization(s):

Centro de Investigaciones Energeticas Medioambientales Y Tecnologicas Instituto de Tecnologia Nuclear (CIEMAT-ITN); Avenida Complutense 22 28040 Madrid Spain

ENRESA

Recent publication info:

1110

SPA19980003

Title:

Developing of procedures to measure 'critical nuclides'

Title in Original Language:

Desarrollo de procedimientos para radionucleidos criticos

Topic Code(s):

181 -Methodologies, Analytical Methods, Measurements Instrumentation; 188 -Radionuclide scanning

Abstract:

The aim is to develop and to improve some procedures to analyze nuclides which are very difficult to measure: 'critical nuclides'. These nuclides have to be determined by destructive methods. The radioactive characterization are going to carry out in the typical waste streams arising from Spanish Nuclear Power Plants: ion exchange resins and evaporator concentrates. The different procedures which are being developed are the following: procedure for the determination of total uranium and different uranium isotopes by alpha spectrometry; procedure for the determination of "3"6Cl by liquid scintillation counting and "4"1"/"4"5Ca by gamma spectrometry or by liquid scintillation counting; improvements in the determination of "5"5Fe and 9 3"m"/"9"4Nb to avoid some interfering radionuclides which appear in samples with a little concentration of the radionuclide of interest.

WM Descriptor(s): alpha spectroscopy; calcium isotopes; chlorine 36; gamma spectroscopy; ion exchange materials; iron 55; liquid scintillation detectors; niobium isotopes; radioactive effluents; resins; uranium isotopes

Principal Investigator(s):

RODRIGUEZ, A.M.

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Organization Performing the work:

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Other Investigators:

Suarez J.A.; Espartero G.A.; Gascon J.L.

Organization Type:

Other

Program Duration: From: 1995-9-1 To: 1996-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

CIEMAT; Avenida Complutense 22 28040 Madrid (Spain)

Associated Organization(s):

ENRESA

Recent publication info:

1111

SPA19980004

Title:

Spent fuel behaviour under repository condition. Dissolution and coprecipitation studies of spent fuel and analogs

Title in Original Language:

Topic Code(s):

144 -Spent Fuel Immobilization/Conditioning; 181 -

Methodologies, Analytical Methods, Measurements Instrumentation

Abstract:

Spent fuel SIMFUEL and UO_2 dissolution studies are performed under simulated granitic and saline repository conditions experiments provide a data base on reaction rates and rate controlling processes. The variables considered are: solution composition redox conditions #gamma#-radiolysis pH; pCO_2 and oxidation degree of the solid surface. Coprecipitation experiments are performed from spent fuel SIMFUEL and Uranium/Actinides solutions. Experiments provide a data base on upper limits for solution concentrations and distribution ratios of radionuclides. Stable solid phases formed of significant radionuclides which may control dissolution rates are characterized.

WM Descriptor(s): chemical reaction kinetics; dissolution; isotope ratio; precipitation; radioactive waste disposal; simulation; spent fuels; uranium oxides

Principal Investigator(s):

DIAZ-AROCAS, P.

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Other Investigators:

Garcia-Serrano J.; Serrano Agejas J.; Quinones J.; Almazan J.L.

Organization Type:

Other

Program Duration: From: 1991-1-1 To: 1999-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

CIEMAT Instituto de Tecnologia Nuclear; Avenida Complutense 22 28040 Madrid Spain

Associated Organization(s):

ENRESA FzK (INE) JRC

Recent publication info:

1112

SPA19980005

Title:

Decommissioning of the JEN-1 experimental reactor

Title in Original Language:

Proyecto de I+D para la Clausura del reactor JEN-1

Topic Code(s):

415 -Decontamination by Melting; 421 - Dismantling Techniques

Abstract:

The objective of this project has been the study and development of underwater cutting decontamination and melting techniques using some aluminium components of the JEN-1 reactor core. The cutting and melting activities were carried out in experimental facilities designed and built specifically for these tasks. Two thermal techniques plasma are and consumable electrode water jet were used during underwater cutting activities. The aluminium components cut were the following: control blade housings core grid core grid support ionization chambers support and primary circuit collector. These activities have been realized using the water as shielding. Decontamination tests were carried out by electropolishing and ultrasonic techniques on some pieces of the aluminium components previously cut. Melting tests were realized with aluminium pieces of the primary circuit collector the ionization chambers support and the core grid support components whose specific activity was lower than the limit established by the Regulatory Authority. Melting was mainly focused as a decontamination technique from a viewpoint of recycling material as well as getting a volume reduction. Relating to gaseous

effluents coming from the underwater cutting and melting facilities the environmental radiological impact has not been relevant due to the confined exhaust systems for both facilities and to the water shielding in the first one. The collective dose has been very low during these activities.

WM Descriptor(s): cutting; decontamination; jen-1 reactor; melting; reactor decommissioning; reactor dismantling

Principal Investigator(s):
MANAS-DIAZ, L.

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Organization Performing the work:
C I E M A T
AVDA COMLUTENSE 22 E-28040 MADRID SPAIN

Other Investigators:
Villoria A.; Rodriguez J.A.; Sama J.; Garcia J.L.

Organization Type:
Other

Program Duration: From: 1990-7-1 To: 1995-12-1

State of Advancement: Unknown

Sponsoring Organization(s):
CIEMAT; Avenida Complutense 22 28040-Madrid Spain Tel:+34-1-3466242

Associated Organization(s):
ENRESA ENSA LAINSA Hannover University (IW)

Recent publication info:
1113

SPA19980006

Title:
HIDROBAP Hydrogeology in fracture media

Title in Original Language:
HIDROBAP Hidrogeología en medios fracturados

Topic Code(s):
322 -Site Survey and Characterization

Abstract:

HIDROBAP is a joint CSN/ENRESA research project lasting for three years, beginning at the end of 1995 and finishing at the end of 1988. Its main objective is to design and test a structured methodology for the characterization of flow and transport processes in fracture media. This methodology has the aim of site integrating data from different disciplines (structural geology, tectonics, petrology, hydrogeology and geochemistry) and has been applied in this project to identify families of conductive fractures in geologic media. The purpose is to increase the area to be modeled. The greater part of the field data used in HIDROBAP has been previously obtained by ENRESA and CIEMAT at the experimental site of El Berrocal batholit during the El Berrocal International project. The data have been completed with tectonic, petrologic field data and with soil emanometry campaigns. The project is divided into the following areas: geological characterization, geometric simulation of the fracture network, stochastic simulation of flow and transport, uncertainty analysis and comparison of different models. So far a data base has been developed that permits the identification and selection of fracture families with similar hydrogeological behaviour. The relationship between structural, mineralogical and hydraulic characteristics of every fracture family has been studied and a representative discrete fracture network model at different scales has been built. A code coupling the discrete fracture nets generation and the fluid flow simulation has also been developed and tested. During the next phase of the project, the groundwater flow and transport will be simulated using three different models: a discrete fracture model, a model of equivalent porous media with individual fractures and a model of heterogeneous porous media with individual fractures. Each model will be calibrated and the results of the simulations will be compared with the results of previous hydraulic and tracer tests developed in the zone. Conclusions about methodological aspects of site evaluation and performance assessment of interest for both the CSN and ENRESA will be drawn from this project.

WM Descriptor(s): flow models; geologic formations; hydrology; mathematical models; permeability

Principal Investigator(s):
VELA, ANTONIO

CONSEJO de SEGURIDAD NUCLEAR

Organization Performing the work:
CONSEJO de SEGURIDAD NUCLEAR (CS
28040 MADRID SPAIN

Other Investigators:
BAJOS, Carmen (ENRESA); ELORZA, Fco. Javier (UPM); CARRERA, Jesus (UPC)

Organization Type:
Other

Program Duration: From: 1995-12-5 To: 1998-12-5

State of Advancement: Research in progress

Sponsoring Organization(s):
CSN and ENRESA

Associated Organization(s):
ENRESA
Univ. Politecnica de Madrid (UPM)
Univ. Politecnica de Cataluña (UPC)

Sweden

SWE19980001

Title:
Revised Pourbaix diagrams for the system Cu-Cl-H_2O

Title in Original Language:

Topic Code(s):
145 -Spent Fuel Packaging (Canisters, Materials. etc.)

Abstract:
The plans in Sweden for a repository for spent nuclear fuel includes the use of a copper/steel canister. The inner steel canister is to provide mechanical strength while the outer copper canister is to provide resistance to corrosion. As a part of a performance assessment of the repository the resistance of the cooper canister needs to be evaluated e.g. by modelling. This requires knowledge of the thermodynamic stability of different phases and species. The purpose of this project is to critically review thermodynamic data for the system Cu-Cl-H_2O and show the result in Pourbaix diagrams at different temperatures and chloride and copper concentrations.

WM Descriptor(s): chlorine; containers; copper; corrosion; ground water; radioactive waste disposal; spent fuels; steels; thermodynamic properties

Principal Investigator(s):
BEVERSKOG, B.

STUDSVIK MATERIAL AB
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Organization Performing the work:
STUDSVIK MATERIAL AB
S-611 82 NYKOEPING SWEDEN

Other Investigators:

Organization Type:
Other

Program Duration: From: 1996-2-1 To: 1996-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Studsvik Material AB; S-611 82 Nykoeping Sweden

Recent publication info:
1114

SWE19980002

Title:
Uncertainty and sensitivity analyses of geochemical modelling

Title in Original Language:

Topic Code(s):
202 -Dispersion and Migration Models; 303 -Earth Science Models and Studies

Abstract:

Calculations of solubilities of radionuclides and modelling of radionuclide transport are parts of a performance assessment for a repository for spent nuclear fuel. For the solubility calculations data on groundwater composition and rock mineral compositions are used together with thermodynamical data. How uncertainties in the input data influence the calculated solubilities are investigated by uncertainty and sensitivity analyses. Computer programs are developed to make analyses on different system e.g. effects on the solubility of a solid phase of uncertainties in water composition stability constants and enthalpies of reaction. The approach used is Monte Carlo or Latin Hyper Cube sampling of the input data.

WM Descriptor(s): data covariances; geochemistry; ground water; mathematical models; radioactive waste disposal; radionuclide migration; rock-fluid interactions; sensitivity analysis; site characterization; solubility; spent fuels

Principal Investigator(s):
EKBERG, C.

CHALMERS UNIVERSITY OF TECHNOLOGY,
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Organization Performing the work:
CHALMERS UNIVERSITY OF TECHNOLOGY
ELEKTROGARDEN 1 S-412096 GOETEBORG SWEDEN

Other Investigators:

Organization Type:
Other

Program Duration: From: 1994-6-1 To: 1996-6-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Chalmers University of Technology Department of Nuclear Chemistry; S-412096 Goeteborg Sweden

Recent publication info:
1115

SWE19980003

Title:
Effects of matrix diffusion and parameter variability on radionuclide migration in crystalline rock

Title in Original Language:

Topic Code(s):
201 -Dispersion and Migration of Radionuclides

Abstract:

Calculations of radionuclide transport is one important part of a performance assessment of a repository for nuclear waste. Radionuclides released from a failed canister could be transported by diffusion and advection with the groundwater through the engineered barriers and the rock and reach the biosphere. The radionuclides are retarded in the rock by processes like matrix diffusion (into micro fissures in the rock) and sorption on mineral surfaces of the rock. The uncertainties in the description of the processes can to some extent be related to heterogeneity of the rock. The purpose with this project is to get a better understanding of the mechanisms for sorption and matrix diffusion and of heterogeneity of the rock. A numerical model for groundwater flow and

radionuclide transport in a single fracture with variable aperture will be developed. Tracer experiments with borr cores of crystalline rock will be performed and the results will be compared to simulations performed with the model.

WM Descriptor(s): diffusion; geologic fractures; ground water; igneous rocks; matrix materials; radioactive waste disposal; radionuclide migration; rock-fluid interactions; sorption; underground disposal

Principal Investigator(s):

WOERMAN, A.

INSTITUTE OF EARTH SCIENCES UPPSALA UNIVERSITY
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UPPSALA

Organization Performing the work:

INSTITUTE OF EARTH SCIENCES UPPSALA UNIVERSITY
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Other Investigators:

Xu S.

Organization Type:

Other

Program Duration: From: 1995-6-1 To: 2000-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Inst. of Earth Sciences Uppsala University; Norbyvaegen 18 B S-752 36 Uppsala Sweden

Recent publication info:

1116

SWE19980004

Title:

The impact of transuranium elements on decommissioning

Title in Original Language:

Transuraner vid rivning

Topic Code(s):

153 -Solid Waste Treatment; 402 -Nuclear Power Reactor Decommissioning

Abstract:

Major fuel failures in nuclear power reactors may lead to dispersion of fuel and spread of transuranium elements in the reactor system. In this study the radiological impact and associated economical consequences of such accidents on decommissioning activities are discussed. The problems with the handling of the alpha-bearing wastes are identified and the waste volumes are estimated for different scenarios.

WM Descriptor(s): alpha-bearing wastes; fuel element failure; radioactive waste management; radioactive waste processing; radioactivity transport; reactor decommissioning; transuranium elements

Principal Investigator(s):

INGEMANSSON, T.

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ALARA ENGINEERING AB
P.O. BOX 26 S-730 SKULTANA SWEDEN

Other Investigators:

Organization Type:

Other

Program Duration: From: 1996-3-1 To: 1996-11-1

State of Advancement: Research in progress

Recent publication info:

1117

SWE19980005

Title:

Electric and Electrochemical Properties of Surface Films on Copper in Presence of Sulphide Anions

Title in Original Language:

Topic Code(s):

145 -Spent Fuel Packaging (Canisters, Materials. etc.)

Abstract:

The spent nuclear fuel in Sweden is planned to be deposited in canisters with an outer shell of copper and a cast insert of steel or iron. The copper gives corrosion protection and the insert mechanical strength. A better understanding of the corrosion resistance is needed e.g. for the performance assessment. In this project the effects of sulphides on the electric and electrochemical properties of surface films on copper are studied, with e.g. CER (Contact Electric Resistance technique) and EIS (Electrochemical Impedance Spectroscopy).

WM Descriptor(s): containers; copper; corrosion; spent fuel storage; sulfides

Principal Investigator(s):

Saario, Timo

VTT Manufacturing Technology
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Organization Performing the work:

VTT Manufacturing Technology
FIN-02044 Helsinki FINLAND

Other Investigators:

Organization Type:

Foundation or laboratory for research and/or development

Program Duration: From: 1997-5-1 To: 1998-9-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Swedish Nuclear Power Inspectorate (SKI), Sweden

Associated Organization(s):

Finnish Centre for Radiation and Nuclear Safety (STUK), Finland

SWE19980006

Title:

Theory and experiments on copper corrosion.

Title in Original Language:

Topic Code(s):

145 -Spent Fuel Packaging (Canisters, Materials. etc.)

Abstract:

The spent nuclear fuel in Sweden is planned to be deposited in canisters with an outer shell of copper and a cast insert of steel or iron. The copper gives corrosion protection and the insert mechanical strength. A better understanding of the corrosion processes is needed e.g. for the performance assessment. In this project the theories for copper corrosion, especially localized corrosion, will be developed by including information on the repository environment and thermodynamics of the copper-chloride system (especially high chloride concentrations). The possibilities for the formation of sulphide whisker will be further investigated. Electrochemical experiments will be performed to investigate the importance of some environmental factors (sulphides, chlorides, nitrites, hydrogen carbonates) as well as time aspects.

WM Descriptor(s): copper; corrosion; ground water; sulfides

Principal Investigator(s):

Hermansson, Hans-Peter

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Organization Performing the work:

Studsvik Material AB
S-611 82 Nyköping SWEDEN

Other Investigators:

ERIKSSON, Sture

Organization Type:

Private industry

Program Duration: From: 1997-5-1 To: 1998-9-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Swedish Nuclear Power Inspectorate (SKI), Sweden

Associated Organization(s):

none

SWE19980007

Title:

Development of a Discrete Fracture Network Model for Reactive Transport of Radionuclides in Fractured Crystalline Rock

Title in Original Language:

Topic Code(s):

201 -Dispersion and Migration of Radionuclides

Abstract:

The goal is to develop and validate a methodology for site-scale modelling of ground water flow and reactive transport of radionuclides, in the context of performance assessmnet for a nuclear waste repository. Detailed sub-models for surface sorption and matrix diffusion, based on laboratory-scale migration experiments, will be incorporated in a site-scale three-dimensional semi-stochastic discrete feature model of ground water flow and transport. Effects of spatial variability and heterogeneity in key transport parameters will be quantified in terms of effective transport parameters that can be used as input to consequence calculations in the performance assessment.

WM Descriptor(s): diffusion; mathematical models; radionuclide migration; sorption

Principal Investigator(s):

Geier, Joel

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97331

Organization Performing the work:

Oregon State University Geosciences Department
Corvallis 97331 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Institution of higher education

Program Duration: From: 1997-2-1 To: 1998-9-30

State of Advancement: Research in progress

Sponsoring Organization(s):

Swedish Nuclear Power Inspectorate (SKI), Sweden

Associated Organization(s):

none

SWE19980008

Title:

Evaluation of Heat Propagation from a KBS-3 Type Deep Repository

Title in Original Language:

Topic Code(s):

324 -Safety Assessment and Performance Studies

Abstract:

The heat propagation from the fuel in a repository and its influence on the natural and geochemical barriers is one important issue in a performance assessment. The repository temperatures estimated in earlier studies vary according to type of model used, other assumptions made and the intended end use of the calculated values. The objective of the current project is to compile and evaluate national and international knowledge on heat propagation and its impact on repository performance.

WM Descriptor(s): heat transfer; performance testing; spent fuel storage; temperature distribution

Principal Investigator(s):

de Marsily, Ghislain

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Organization Performing the work:

Armines
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Other Investigators:

GOBLET, Patrick

Organization Type:

Institution of higher education

Program Duration: From: 1997-12-1 To: 1998-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Swedish Nuclear Power Inspectorate (SKI), Sweden

Associated Organization(s):

none

SWE19980009

Title:

Modelling of Radiolysis and Transport of Radionuclides in the Near-field of a Repository for Spent Nuclear Fuel

Title in Original Language:

Topic Code(s):

201 -Dispersion and Migration of Radionuclides

Abstract:

An important part of a performance assessment of a repository for spent nuclear fuel is the modelling of the near-field. The models used in this project couples chemistry and transport of radionuclides, including the effects of fuel dissolution, radiolysis and radionuclide mobilization on redox conditions in the bentonite.

WM Descriptor(s): bentonite; mathematical models; radiolysis; radionuclide migration

Principal Investigator(s):

Liu, Jinsong

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Organization Performing the work:

Royal Institute of Technology Department of Chemical Engineering, Division of Chemical Engineering
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Other Investigators:
NERETNIEKS, Ivars

Organization Type:
Other

Program Duration: From: 1997-7-1 To: 1998-6-30

State of Advancement: Research in progress

Sponsoring Organization(s):
Swedish Nuclear Power Inspectorate (SKI), Sweden

Associated Organization(s):
none

Syrian Arab Republic

SYR19980001

Title:
Distribution of Cs-137 in Cement Specimens as a Function of Time after Solidification and Leaching

Title in Original Language:

Topic Code(s):
114 -Waste Immobilization (Bituminization, Cementation, Including Tests of Properties, Leaching Studies)

Abstract:

The cementation process tends to be safe and technically feasible. Perhaps its most important advantage from the safety point of view is the absence of fire and explosion risk. The leaching process of stored or disposed radioactive wastes can permit to understand the immobilization of radionuclides and the hazards arising when these wastes are stored for a long time. The distribution of radionuclides in cement specimens after solidification as a function of time allows to explain the mechanism of the leaching process.

WM Descriptor(s): cements; cesium 137; distribution; leaching; storage

Principal Investigator(s):
TAKRITI, SALAHEDDIN

ATOMIC ENERGY COMMISSION OF SYRIA
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Organization Performing the work:
ATOMIC ENERGY COMMISSION OF SYRIA
DAMASCUS SYRIAN ARAB REPUBLIC

Other Investigators:
Ahmad Fares Ali; Mustafa Kheitou

Organization Type:
Other

Program Duration: From: 1998-6-1 To: 1999-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Atomic Energy Commission of Syria

Associated Organization(s):
none

SYR19980002

Title:
Migration Study of Radioisotopes Incorporated in Cement to Aqueous Phase

Title in Original Language:

Topic Code(s):
201 -Dispersion and Migration of Radionuclides

Abstract:

The migration kinetics of Sr-90 and Cs-137 from cylindrical and rectangular cement specimens have been investigated in static and dynamic states with different kinds of water at room temperature. The results show

that Cs-137 migrates slower than Sr-90 and its migration rates in dynamic state are quicker than in static state. It was found that the migration speed depends on the type of reactions between migrating radionuclides and surrounding water, one of these reactions is diffusion of radionuclides through the specimens followed by its migration to the water container. It can be seen from the results that the cylindrical form is a better form to retain radioisotopes, which could be migrated due to the smaller surface of aqueous sample contact and/or the exposed surface area to volume ratio.

WM Descriptor(s): cements; cesium 137; radionuclide migration; strontium 90

Principal Investigator(s):

TAKRITI, SALAHEDDIN

ATOMIC ENERGY COMMISSION OF SYRIA
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Organization Performing the work:

ATOMIC ENERGY COMMISSION OF SYRIA
DAMASCUS SYRIAN ARAB REPUBLIC

Other Investigators:

Ahmad Fares Ali; Mustafa Kheitou

Organization Type:

Other

Program Duration: From: 1996-1-1 To: 1997-12-1

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):

Atomic Energy Commission of Syria

Associated Organization(s):

none

SYR19980003

Title:

A Study Of Uranium And Thorium Series Isotopes In Groundwater Of Proposed Sites For The Nuclear Waste Disposal

Title in Original Language:

Topic Code(s):

201 -Dispersion and Migration of Radionuclides

Abstract:

We investigate in this project uranium and thorium series isotopes in groundwater of proposed sites for nuclear waste disposal in Syria. The study will help to understand water flux and the aquatic ecosystem in areas around possible places for nuclear waste deposition. X-ray fluorescence, neutron activation analysis, and alpha and gamma spectroscopy are used for analysing water samples after collection and preconcentration. The equilibrium between the isotopes of the series and isotope ratios are calculated.

WM Descriptor(s): actinides; aquatic ecosystems; equilibrium; radium; thorium; water; water influx

Principal Investigator(s):

Abdul-Hadi, A.

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Organization Performing the work:

ATOMIC ENERGY COMMISSION OF SYRIA
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Other Investigators:

Albassanieh, O.; Ghafar, M.

Organization Type:

Other

Program Duration: From: 1998-3-1 To: 1999-9-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Atomic Energy Commission of Syria

Associated Organization(s):

none

SYR19980004

Title:
Study of distribution coefficient of some radionuclides in liquid/solid phase system

Title in Original Language:

Topic Code(s):
201 -Dispersion and Migration of Radionuclides

Abstract:

We investigate in this project the distribution of some radioisotopes (Ra, Th, U, Pu, Sr, Cs, Eu) between various solid and water phases and the migration of the isotopes between the phases under various conditions (variation of time, pH, concentration, et cetera). The solid and water samples are taken from various areas of Syria. This will help us to find possible places for deposition of nuclear wastes in Syria. X-ray fluorescence, neutron activation analyses, alpha and gamma spectroscopy are used for analysing the samples and for activity measurements.

WM Descriptor(s): adsorption; americium; cesium; distribution; europium; plutonium; rock-fluid interactions; rocks; solids; thorium; uranium; water

Principal Investigator(s):
Ghafar, M.

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Organization Performing the work:
ATOMIC ENERGY COMMISSION OF SYRIA
P.O. Box 6091 DAMASCUS SYRIAN ARAB REPUBLIC

Other Investigators:
O. Albassanieh; A. Abdul-Hadi

Organization Type:
Private industry

Program Duration: From: 1998-3-1 To: 2000-3-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Atomic Energy Commission of Syria

Associated Organization(s):
none

SYR19980005

Title:
Investigation of Radon Diffusion Through Different Thicknesses of Cement Used for Waste Storage and Disposal

Title in Original Language:

Topic Code(s):
156 -Waste Storage

Abstract:

Radioactive airborne waste management presents a complex set of problems. Storage and disposal of such wastes vary enough to require independent types of storage facility. A decision must be made for the treatment of radioactive wastes containing Ra-226, which produce by the decay of radium the radioactive radon gas Rn-222. This study aims to determine the behavior of radon gas arising from the cement matrix used for immobilization and conditioning of radioactive wastes, which contain Ra-226.

WM Descriptor(s): diffusion; gaseous wastes; radioactive waste storage; radioactive wastes; radium 226; radon 222

Principal Investigator(s):

Shweikani, Riad

ATOMIC ENERGY COMMISSION OF SYRIA
Mazze Villat Gharbieh Ghazzawi
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Organization Performing the work:

ATOMIC ENERGY COMMISSION OF SYRIA
DAMASCUS SYRIAN ARAB REPUBLIC

Other Investigators:

Takriti, Salaheddin; Kheitou, Mustafa; Ali, Ahmad Fares; Hushari, Muhammed

Organization Type:

Other

Program Duration: From: 1997-2-1 To: 1999-2-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Atomic Energy Commission of Syria

Associated Organization(s):

none

SYR19980006

Title:

Preliminary Report on General Setting of Tibni-Salt Mine for an Interim and Final Storage of Radioactive Waste in Syria

Title in Original Language:

Topic Code(s):

117 -Waste Disposal

Abstract:

This preliminary report studies the geological structure, hydrological, tectonical and geotechnical setting of the 150 meters deep underground Tibni-salt mine in Syria. The aim is to make a preliminary assessment of this mine, in connection with international radioactive waste disposal, applied considerations and basis in the field.

WM Descriptor(s): geology; hydrology; mines; site characterization; waste disposal; waste storage

Principal Investigator(s):

ALIMOUSA, MOHSSEN

ATOMIC ENERGY COMMISSION OF SYRIA
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Organization Performing the work:

ATOMIC ENERGY COMMISSION OF SYRIA
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Other Investigators:

Organization Type:

Private industry

Program Duration: From: 1997-5-1 To: 1998-5-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Atomic Energy Commission of Syria

Associated Organization(s):

none

SYR19980007

Title:

Study on Radioactive Decontamination of Surfaces

Title in Original Language:

Topic Code(s):

412 -Chemical Decontamination Methods

Abstract:

The decontamination of radioactive elements, which exist on different surfaces of the laboratory equipment have been investigated using Shobart solution. The decontamination process was carried out by immersing different contaminated laboratory equipment in Shobart solution with different concentrations and pH values. The results show that the concentration of EDTA has a direct effect on the value of decontamination factor. It was found that ceramic materials could not be used for lining the surfaces of benches, tables and walls of radioactive laboratories because this kind of material will be contaminated in high concentration and the diffusion process will continue until it reaches the other side. Also cotton materials could not be used for making working uniforms in hot laboratories.

WM Descriptor(s): ceramics; decontamination; glass; stainless steels

Principal Investigator(s):

TAKRITI, SALAHEDDIN

ATOMIC ENERGY COMMISSION OF SYRIA
Mazze Villat Gharbieh Ghazzawi
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Organization Performing the work:

ATOMIC ENERGY COMMISSION OF SYRIA
DAMASCUS SYRIAN ARAB REPUBLIC

Other Investigators:

Ahmad Fares Ali; Mustafa Kheitou

Organization Type:

Other

Program Duration: From: 1996-12-1 To: 1996-12-1

State of Advancement: Research in progress

Preliminary report(s) available: Yes

Sponsoring Organization(s):

Atomic Energy Commission of Syria

Associated Organization(s):

none

Turkey

TUR19980001

Title:

Development of carrier usage for the treatment of radioactive effluent

Title in Original Language:

Topic Code(s):

122 -Liquid Waste Treatment

Abstract:

Some non-radioactive carriers which are capable of adsorbing various radionuclides are investigated. Cesium and uranium precipitation with the most suitable carriers and chemical conditions have been studied.

WM Descriptor(s): carriers Q1; cesium; precipitation; radioactive effluents M1; stable isotopes; uranium

Principal Investigator(s):

KAHRAMAN, ALPER

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ISTANBUL

Organization Performing the work:

TAEK
TR-06530 ANKARA TURKEY

Other Investigators:

Altunkaya M; Soenmez M.; Kocak M.

Organization Type:

Other

Program Duration: From: 1994-11-1 To: 1996-3-1

State of Advancement: Research in progress

Sponsoring Organization(s):

TAEK; 06530 Ankara-Tuerkiye

Recent publication info:

1118

Ukraine

UKR19980001

Title:
Systems of tritium containing in oxygenous and oxygenless gaseous waste. Effective coupling and adsorption

Title in Original Language:

Topic Code(s):

111 -Gaseous Waste Treatment; 121 -Gaseous Waste Treatment

Abstract:

Elaboration of method of catalytic cleaning of gaseous waste containing tritium by tritium oxidation by air oxygen with consequent adsorbtion of forming T_2O steams is planned. As catalyst-absorbent palladium containing zeolites owing to high activity in oxidation reaction of hydrogen isotopes high adsorption capacity will be used. It is expected that catalysts-adsorbents will work efficiently at temperatures of 283-303 K. Summary degree of tritium conversion and degree of forming tritium water seizing will be approximately 99.2-99.7 %. At decrease of tritium water adsorbtion efficiency the catalysts-adsorbents may be regenerated by thermovacuum treatment. For oxygenless gases cleaning from tritium it is suggested to use metallic oxide contacts which can couple tritium topochemically with water formation at 553-623 K temperatures also adsorbents-zeolites with high adsorbtion capacity for steams of tritium water seizing. After gaseous mixture cleaning from hydrogen isotopes their content on outlet of absorbtion system will be not more than 5.5 x 10"-"5 vol% (concentration of hydrogen isotopes in gaseous mixture before cleaning is 0.1 vol%). Systems containing catalysts-adsorbents can be used for small concentrations of tritium determination in atmosphere. Developed catalysts-adsorbents also can be used as main components of capsules-adsorbers at transportation and opening of containers containing tritium materials. Systems working in oxygenless medium can be used at helium isotope from tritium cleaning also at tritium targets and sources with high activity production. Efficient work of systems of cleaning from tritium is possible during several years.

WM Descriptor(s): adsorbents; adsorption; catalysis; catalysts; gaseous wastes; oxidation; palladium; radioactive waste processing; removal; tritium; tritium oxides; zeolites

Principal Investigator(s):

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Organization Performing the work:

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PROSPEKT NAUKI 31 252028 Kiev-28 UKRAINE

Other Investigators:

Shmyrko Yu.I.; Pavlenko N.V.

Organization Type:

Other

Program Duration: From: 1997-1-1 To: 1998-12-1

State of Advancement: Unknown

Sponsoring Organization(s):

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Recent publication info:

1133

UKR19980002

Title:
Studies of "1"3"7Cs 9 0Sr and "2"3"8" 2 3"9" 2 4"0Pu migration through ecological chains as pertinent to their state and forms

Title in Original Language:

Topic Code(s):
201 -Dispersion and Migration of Radionuclides

Abstract:
The forms of accidental isotopes in soil have been found. Up to the present there have been continued the processes of distribution between the forms of "1"3"7 Cs 2 3"8" 2 3"9 2 4"0Pu presence in soil and their migration from the upper soil layers into the lower ones. We have developed the mathematical model depending on the interlinks of isotopes forms and their migration into food chains. Using this model we may predict the internal irradiation doses associated with milk intake as the main contribution to radiological public doses.

WM Descriptor(s): cesium 137; contamination; environmental exposure pathway; food chains; milk; plutonium 238; plutonium 239; plutonium 240; radiation doses; radioactive waste disposal; radionuclide migration; soils; strontium 90

Principal Investigator(s):
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Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Unknown

Sponsoring Organization(s):
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Recent publication info:
1134

UKR19980003

Title:
Radionuclide concentrations in air of forests located in the Chernobyl excluding zone due to different wood actions

Title in Original Language:

Topic Code(s):
233 -Long Term Environmental Impact

Abstract:
The concentrations of "1"3"7Cs 9 0Sr 2 3"8" 2 3"9" 2 4"0Pu in air of inhalation zone have been studied for assessment of the harmful effects for forest workers in forestries of the Chernobyl excluding zone with different density of radiation "1"3"7Cs contamination. It has been shown that the concentrations of plutonium isotopes in air of inhalation zone are the most dangerous both in the forests with high contamination degree and with low one. In the first case the concentrations of plutonium isotopes are recorded to be 2-3 times greater than allowable concentrations for population segment A according to Radiation Safety Norms 76/87 in the second

case these concentrations are equal to allowable concentrations for population segment A; it should be noted here that specific activity of 1 3"7Cs and "9"0Sr in air is recorded to be in 4 times lower than allowable concentrations for population segment A. At present the irradiation dose for workers' lungs is mainly associated with plutonium isotopes and equal to 99% of total dose.

WM Descriptor(s): cesium 137; chernobylsk-4 reactor; dose commitments; environmental exposure pathway; forests; isotope ratio; plutonium 238; plutonium 239; plutonium 240; radiation doses; radionuclide kinetics; radionuclide migration; reactor accidents; strontium 90

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Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Unknown

Sponsoring Organization(s):

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Recent publication info:

1135

United Kingdom

UK19980001

Title:

The assessment of radiation effects in aquatic ecosystems

Title in Original Language:

Topic Code(s):

117 -Waste Disposal; 232 -Environmental Risk Assessment

Abstract:

The disposal of either liquid or solid radioactive wastes into fresh or marine waters can result in increased radiation exposure of indigenous populations of aquatic organisms. Models to provide a basis for estimating the potential exposure or populations of wild organisms in contaminated natural environments are under continuous development. The results provide a means of assessing the possible consequences of the increased radiation exposure and this is one factor which must be considered when judging the acceptability of a waste disposal practice. Efforts are being directed towards developing criteria for the protection of aquatic fauna from radiation exposure arising from radioactive waste disposal. Studies are directed at examining endpoints relevant to damage at the population level and reproduction is one of the most important of these. The effects of chronic low dose rate irradiation on the gonads of mature male plaice (Pleuronectes platessa) are being investigated and further similar studies on the effects of irradiation on immature fish are planned. Previous studies examined the effects of continuous gamma irradiation over several generations on reproduction of the small marine worm Ophryotrocha diadema. Further studies are comparing gamma and beta irradiation for this end point. The possibility is being investigated that there is a stage early in the development of this worm which is radiosensitive for damage which results in decreased reproduction output in maturity.

WM Descriptor(s): aquatic ecosystems; biological radiation effects; environmental exposure pathway; fishes; gonads; marine disposal; radiation doses; radioactive waste disposal; radionuclide kinetics; waste forms

Principal Investigator(s):

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Woodhead D.S.

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Unknown

Sponsoring Organization(s):

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Recent publication info:

1119

UK19980002

Title:

The accumulation and metabolism of radionuclides in aquatic biota

Title in Original Language:

Topic Code(s):

232 -Environmental Risk Assessment

Abstract:

Bioaccumulation and metabolism of radionuclides may be affected by interaction with many biological and environmental factors. Information on such effects is generally lacking both for natural (eg polonium) and anthropogenic (eg plutonium) radionuclides. An understanding of such interactions is essential for any impact assessment. A possible example of such an interaction where winkles subject to increased cadmium concentrations had increased retention of radioactive polonium has recently been examined (see ref). Biological studies are now in progress to examine the mechanisms whereby heavy metal contaminants may affect radionuclide metabolism and retention. Different radionuclides may be taken up and metabolised in various different ways. Similarly the same radionuclide may be taken up quite differently by different animal species. We have shown this for Technetium uptake which is 100-200x greater in lobster than in the crab. The metabolic basis for this difference is being investigated. Comparisons should not only give a better general understanding of radionuclide metabolism but also possibly allow prediction of species likely to take up technetium or other related substances (not necessailry radioactive) to unexpectedly high levels.

WM Descriptor(s): aquatic ecosystems; biological radiation effects; buildup; crabs; environmental exposure pathway; lobsters; metabolism; radioecological concentration; radionuclide kinetics; technetium

Principal Investigator(s):

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Organization Type:

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Program Duration: From: Not provided To: Not provided

State of Advancement: Unknown

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Recent publication info:

1120

UK19980003

Title:

Impact of discharges of naturally occurring radionuclides from a phosphoric acid production plant

Title in Original Language:

Topic Code(s):

103 -Effluents and Discharges; 233 -Long Term Environmental Impact

Abstract:

The Albright and Wilson phosphoric acid plant at Whitehaven Cumbria has discharged waste containing elevated levels of naturally occurring U-decay series radionuclides into the Irish Sea from 1954 to the present day. Processes at the plant changed during mid-1992 these resulted in a significant reduction in the quantity of nuclides discharged. An extensive field survey and analysis programme of the marine environment near the Albright and Wilson plant was carried out to follow the changes in radionuclide levels following the process changes. This consisted of sampling at approximately 6 month intervals form February 1992 to December 1994. Surface sediment and surface water samples (dissolved and particulate phase) were analysed for "2"3"8U 2 3"4U 2 3"2Th 2 3"0Th 2 2"6Ra 2 1"0Pb and "2"1"0Po with the radionuclide inventories in each phase being calculated. Measurements of physical parameters such as salinity biological radionuclide concentrations and effluent composition were also made. This research programme has enabled predictions of future changes in the environmental levels of natural radionuclides to be made and the radiation doses to the human population as a consequence of the discharges from the Albright and Wilson plant have been calculated.

WM Descriptor(s): activity levels; environmental exposure pathway; environmental impacts; lead 210; marine disposal; polonium 210; radioactive effluents; radionuclide migration; radium 226; thorium 230; thorium 232; uranium 234; uranium 238

Principal Investigator(s):

POOLE, A.J.

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Organization Type:
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Program Duration: From: 1992-2-1 To: 1996-7-1

State of Advancement: Unknown

Sponsoring Organization(s):
Directorate of Fisheries Research Pakefield Road Lowestoft Suffolk NR33 OHT United Kingdom

Recent publication info:
1121

UK19980004

Title:
Contaminant transport within the water column

Title in Original Language:

Topic Code(s):
103 -Effluents and Discharges; 201 -Dispersion and Migration of Radionuclides

Abstract:
The study is providing an improved basis for the quantification of radionuclide transport processes in space and time. It will also provide more detailed information for the prediction of general (non radioactive) contaminant distributions and assessments of their overall fate. The specific aims of the project are: to monitor the dispersion of episodic inputs of radioactive tracers from a point source (Sellafield initially); to provide more precise determinations of transport rates of contaminants generally in the Irish Sea along the Scottish coastal waters to the North Sea; to provide data essential to validate a high resolution North Channel model; to determine the present contribution of artificial radionuclides from the Sellafield discharges to the contamination of the Arctic Seas and using isotopic signatures differentiate this from other sources; to establish the observed distributions of the contaminant radionuclides in Arctic Seas in a hydrographic context; to examine the record of past inputs of artificial radionuclides into the Arctic as preserved in the surface seabed sediments.

WM Descriptor(s): arctic ocean; coastal waters; environmental exposure pathway; Irish Sea; long-range transport; marine disposal; north sea; radioactive effluents; radionuclide migration; Sellafield reprocessing plant; tracer techniques

Principal Investigator(s):
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Organization Type:
Other

Program Duration: From: 1993-4-1 To: 1998-3-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Directorate of Fisheries Research Pakefield Road Lowestoft Suffolk NR33 OHT United Kingdom

Recent publication info:
1122

UK19980005

Title:
The relative significance of historical and current discharges from Sellafield as sources of present human radiation exposure

Title in Original Language:

Topic Code(s):
103 -Effluents and Discharges; 201 -Dispersion and Migration of Radionuclides

Abstract:
The project will continue studies to improve the prediction of future concentrations of long-lived radionuclides (e.g. plutonium and americium) in water and on sediment particles from both current and historic discharges in the Irish Sea and provide an improved assessment of the radiological implications of authorised discharges by distinguishing the relative contributions of discharges in critical pathways.

WM Descriptor(s): americium; environmental exposure pathway; Irish Sea; long-range transport; marine disposal; plutonium; radiation doses; radioactive effluents; radionuclide migration; Sellafield reprocessing plant

Principal Investigator(s):
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Organization Type:
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Program Duration: From: 1993-4-1 To: 1998-3-1

State of Advancement: Research in progress

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Recent publication info:
1123

UK19980006

Title:
Impact of remobilisation of artificial radionuclides form contaminated sediments in the Irish Sea

Title in Original Language:

Topic Code(s):
103 -Effluents and Discharges; 201 -Dispersion and Migration of Radionuclides

Abstract:
This project is examining the redistribution of radionuclides released from the temporary sink of contaminated sediments in order to assess the continuing impact and transport of radionuclides in the waters of the Irish Sea the northwest European shelf and beyond. More specifically the aims are: to determine the long term sorption/desorption behaviour of artificial radionuclides from Irish Sea sediments at the water/sediment interface; to establish and quantify the effects of chemical geochemical and environmental variables upon the sorption/desorption of artificial radionuclides between surface sediments and overlying waters; to estimate from the rates of desorption the time scales and quantities of radionuclides remobilised from Irish Sea sediments

which are available for transport to the waters of the northwest European shelf and beyond; to assess the role of small (submicron) particles in geochemical cycling of radionuclides in nearshore waters.

WM Descriptor(s): contamination; desorption; distribution; Irish Sea; long-range transport; radionuclide migration; removal; sediment-water interfaces; sediments; sorption

Principal Investigator(s):

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Organization Type:

Other

Program Duration: From: 1993-4-1 To: 1998-3-1

State of Advancement: Research in progress

Sponsoring Organization(s):

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Recent publication info:

1124

UK19980007

Title:
The fate of Irish Sea sediments

Title in Original Language:

Topic Code(s):

103 -Effluents and Discharges; 201 -Dispersion and Migration of Radionuclides

Abstract:

The seabed sediments of the eastern Irish Sea act as a significant temporary 'sink' of large quantities of radionuclides discharged from the Sellafield reprocessing plant since operations started in the early 1950's. This is particularly true for the muddy sediments that occur close to the Cubrian coast in waters <40 m deep. Of the decay-corrected environmental inventories of radionuclides discharged from Sellafield it is estimated that 5% of the "1"3"7Cs and 55-60% of both "2"3"9" 2 4"0Pu and "2"4"1Am remained within the Irish Sea in 1988 and that between 70 and 80% of these activities was retained in the eastern Irish Sea predominantly in the muddy sub-tidal sediments. Further quantities of artificial radionuclides are found in the intertidal and estuarine zones on the margins of the Irish Sea. The intertidal zones in some places are experiencing and increase in radionuclide inventories. The project is presently addressing the effect of various physical biological and chemical processes on the mobility of the particle bound activity and hence the longevity of the sub-tidal sediments of the eastern Irish Sea as a 'sink' for this activity. These studies include an attempt to estimate the relative importance of trawling and storm events on the resuspension of sediments. Estimates of the total inventory of activity residing in the subtidal sediments of the Irish Sea during 1983 and 1988 are presently being updated following a research cruise in June 1995. Preliminary results from this cruise should be available later this year.

WM Descriptor(s): contamination; Irish Sea; long-range transport; radioactive effluents; radioactive waste disposal; radionuclide migration; sediments; Sellafield reprocessing plant

Principal Investigator(s):

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Organization Type:

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Program Duration: From: 1992-2-1 To: 1999-3-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Directorate of Fisheries Research Pakefield Road Lowestoft Suffolk NR33 OHT United Kingdom

Recent publication info:

1125

UK19980008

Title:

Criteria for establishing harmonised categories of radioactive waste based on the storage and disposal route

Title in Original Language:

Topic Code(s):

109 -Waste Characterisation (Radionuclide Inventory Determination), including Computer Codes and Measuring Methods and Techniques; 181 -Methodologies, Analytical Methods, Measurements Instrumentation

Abstract:

Radioactive waste comprises a great variety of materials with different physical chemical and radioactive characteristics. The diversity results in widely varying potential hazards. Therefore international bodies national authorities and waste operators have established radioactive waste classifications in their sector of competence or responsibility (these being areas such as waste treatment transport waste disposal communication within the international scientific community and with the public etc). These group wastes with similar characteristics and hazards into a class with a view to improving management and safety. The objective of this study was to evaluate possible ways for establishing criteria for radioactive waste classification and categorisation and to propose one or more possible schemes for categorisation of wastes based on radioactive risk and the storage and disposal route. To do this the radiological impact of combinations wastes and waste forms allocated to different storage and disposal methods were explored. Comparison of these impacts with risk criteria together with other considerations such as heat generation was used to allocate wastes to appropriate storage and disposal methods thereby classifying them.

WM Descriptor(s): environmental impacts; radioactive waste disposal; radioactive waste storage; risk assessment; waste forms

Principal Investigator(s):

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Organization Type:
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Program Duration: From: 1995-1-1 To: 1996-3-1

State of Advancement: Research in progress

Sponsoring Organization(s):
National Radiological Protection Board; Chilton Didcot Oxon
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Recent publication info:
1126

UK19980009

Title:
Criteria for release of contaminated land

Title in Original Language:

Topic Code(s):
505 -Criteria

Abstract:

Contamination of land by natural radionuclides has occurred as a result of various types of mineral and chemical processing. Contamination of land by artificial radionuclides will be an important consideration in the decommissioning of nuclear facilities. The aim of this work is to develop criteria for the remediation and release of such contaminated sites. This will involve consideration of existing radiation protection recommendations and policies and the radiation exposure of current and future occupants of such sites.

WM Descriptor(s): contamination; decommissioning; decontamination; land reclamation; radiation doses; radiation protection; recommendations; remedial action

Principal Investigator(s):
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Organization Type:
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Program Duration: From: 1993-8-1 To: 1997-3-1

State of Advancement: Research in progress

Sponsoring Organization(s):
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Recent publication info:
1127

UK19980010

Title:
The occurrence and behaviour of zeolites with reference to the Maqarin natural analogue programme

Title in Original Language:

Topic Code(s):
313 -Earth Science Studies and Models; 323 -Earth

Science Studies and Models

Abstract:

A review of the geological occurrence thermodynamic stability and behaviour of zeolites with reference to the understanding of the occurrence of zeolites at Maqarin Jordan and as potential products of the migration of a hyperalkaline plume form a cementitious repository for radioactive wastes has been conducted. A compilation of the most up to date thermodynamic data for zeolites has been produced. These data were employed to construct activity diagrams to investigate zeolite stability in groundwaters from the natural analogue site at Maqarin Jordan. Here hyperalkaline groundwaters are not in chemical equilibrium with zeolite minerals and major aqueous species (activities of hydrogen ion calcium silica and aluminium) are probably controlled by the hydrolysis of portlandite and an ettringite-thaumasite solid-solution. Extrapolation of the above information to the understanding of the migration of a hyperalkaline plume from a cementitious repository for radioactive wastes suggests that zeolites will form at the distal edges of any such plume where pH will be in the range 7-10 and enough aluminium and silica has been dissolved from the host rock to stabilise aluminosilicates. Early-formed zeolites will be dissolved and replaced by cement minerals as the alkaline plume continues to migrate away from the repository. At all stages of repository evolution the precise composition and amounts of zeolites forming in the system will depend as much upon the rates of growth of these minerals as upon thermodynamic stability.

WM Descriptor(s): cements; environmental transport; geochemistry; ground disposal; ground water; natural analogue; natural occurrence; radioactive waste disposal; rock-fluid interactions; thermodynamics; underground disposal; zeolites

Principal Investigator(s):

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State of Advancement: Unknown

Sponsoring Organization(s):

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Recent publication info:

1128

UK19980011

Title:

Kinetic model development for the dissolution of the UO_2 spent nuclear fuel. Application of the RES methodology on the near field for a HLW repository

Title in Original Language:

Topic Code(s):

146 -Spent Fuel Storage; 182 -Waste from form characterization

Abstract:

The application of models to study the behaviour of the spent-fuel after its storage in a repository system is a field which has been considered in our research. In this line recent work has been addressed to develop a kinetic model to define the stability of the spent fuel matrix and its resistance to intrinsic and external geochemical disturbances. The model has integrated the basic and experimental evidence about the redox capacity of the spent fuel matrix itself. This model has included the methodological framework of heterogeneous redox reactions and dissolution kinetics. The Rock Engineering Systems (RES) approach has been applied to the waste matrix including as well the cladding and the canister in order to assess the function of these barriers in a repository. This work will be integrated in the safety assessment exercise that SKB in preparing.

WM Descriptor(s): dissolution; geologic models; high-level radioactive wastes; safety analysis; spent fuel storage; stability; underground disposal; uranium dioxide; waste forms

Principal Investigator(s):

BRUNO, J.

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Organization Type:

Other

Program Duration: From: 1995-5-1 To: 1996-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

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Recent publication info:

1129

UK19980012

Title:

The development and application of coprecipitation codissolution models to describe the behaviour of trace elements in natural groundwaters

Title in Original Language:

Topic Code(s):

221 -Environmental Transfer Models; 323 -Earth Science Studies and Models

Abstract:

The modelling of the behaviour of trace components (U Ba Mn Sr Zn Ni and Cu) in natural systems has been one of our main focus in the period 94-96. We have followed a predictive modelling strategy in order to validate our present ability to foresee the concentration of hazardous trace components in natural groundwaters. In this regard the cycle of trace metals has been coupled to the major components of groundwater by applying different approaches already validated in well controlled laboratory experiments. Two main approaches have been used: Co-precipitation and co-dissolution. These two models have proven to given better estimates of the concentrations of trace metals in natural waters with larger reliability than the uncoupled 'trace metals-major components' system. Our work has also considered kinetic versus thermodynamic control especially in natural sites where fast water flows have been measured as is the case of El Berrocal a granitic site located in Toledo (Spain).

WM Descriptor(s): barium; copper; dissolution; environmental transport; ground water; manganese; nickel; precipitation; strontium; trace amounts; uranium; zinc

Principal Investigator(s):

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Organization Type:

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Program Duration: From: 1995-4-1 To: 1996-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

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Recent publication info:

1130

UK19980013

Title:

Assessment of the consequences of the presence of toxic elements in some common radioactive waste streams

Title in Original Language:

Topic Code(s):

162 -Liquid Waste Treatment; 232 -Environmental Risk Assessment

Abstract:

QuantiSci has recently completed a contract for DGXI of the European Commission to demonstrate how disposal limits could be derived for a range of toxic substances in low-level and exemptible radioactive waste streams for a range of disposal facilities consistent with human health and environmental quality standards. Separate disposal levels were calculated for generic shallow and deep disposal facilities and a range of organic and inorganic toxic substances. These levels were then compared against concetnrations of the substances in representative low level radioactive waste streams to illustrate how the approach could be used to help determine appropriate disposal options for the waste streams. It was concluded that whilst many of the waste streams considered had contaminant concentrations well above the derived generically acceptable levels for shallow disposal more detailed waste and facility specific calculations could be expected to show that most were likely to be acceptable for disposal in an appropriate shallow facility. In a further study awarded by DGXI QuantiSci will undertake more detailed waste and facility specific risk-based calculations. The following waste streams and associated toxic contaminants will be considered: decommissioning steels (Cr Ni Mo and Co); evaporator concentrates (B); fuel flasks (Pb Mo); an operational low level radioactive waste stream (Cd Hg Be Se toluene xylene and trichloroethane). The categories of disposal facilities to be considered are: an inert waste facility; a solid municipal waste facility; a hazardous waste facility; and an engineered near surface radioactive waste facility. The principal output from the project will be the assessment of the risks arising from the disposal to typical shallow facilities of toxic contaminants in real waste streams. These results will then be compared against the generic levels derived under the previous study and conclusions concerning the robustness of the generic levels drawn. Secondary outputs will be: the comparison of toxic and radiological risks arising from the wastes; and the collation of further data concerning inventories health risks and the behaviour of organics in the environment.

WM Descriptor(s): activity levels; chemical wastes; environmental impacts; environmental transport; ground disposal; low-level radioactive wastes; radioactive waste disposal; risk assessment; toxic materials; waste forms

Principal Investigator(s):

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Program Duration: From: 1995-12-1 To: 1997-12-1

State of Advancement: Unknown

Sponsoring Organization(s):

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Recent publication info:

1131

UK19980014

Title:

Review of radionuclide transport and bioaccumulation processes in natural and seminatural environments

Title in Original Language:

Topic Code(s):

201 -Dispersion and Migration of Radionuclides; 211 -Biological Uptake Mechanisms and Models

Abstract:

The project is being undertaken by QuantiSci Limited on behalf of the UK Ministry of Agriculture Fisheries and Food (MAFF). The aim of the project is to collate and review information on the transport of relevant radionuclides such as Cl-136 Cs-135 I-129 Ra-226 Se-79 and Tc-99 or appropriate analogues in natural and semi-natural upland boreal alpine and arctic ecosystems. This will aid an understanding of the importance of the various food chain pathways in contributing to doses to man from repository derived radionuclides in future environmental conditions which will be different from the present day temperate environment. Relevant data and model parameters including Kds concentration ratios transfer factors/coefficients and relevant radionuclide-independent parameters will be documented to aid MAFF in their continued quality checks in support of the assessment of safety cases for solid radioactive waste disposals.

WM Descriptor(s): cesium 137; ecosystems; environmental exposure pathway; iodine 129; radioactive waste disposal; radioecological concentration; radionuclide migration; radium 226; selenium 79; technetium 99; uptake

Principal Investigator(s):

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Organization Performing the work:

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Other Investigators:

Jones H.; Little R.; Mortimer A.; Towler P.

Organization Type:

Other

Program Duration: From: 1995-6-1 To: 1997-5-1

State of Advancement: Unknown

Sponsoring Organization(s):

QuantiSci Limited Chiltern House 45 Station Road Henley-on-Thames Oxon RG9 1AT UK

Recent publication info:

1132

UK19980015

Title:

United Kingdom High Level Waste and Spent Fuel Disposal Research Strategy

Title in Original Language:

Topic Code(s):

10 -RADIOACTIVE WASTE; 102 -Programme

Strategy, Planning and Management; 130 -HIGH LEVEL WASTE; 133 -Solid Waste Treatment; 150 -ALPHA BEARING/TRU WASTE; 320 -STUDIES FOR GEOLOGICAL REPOSITORIES; 321 -General Planning and Management; 430 -MANAGEMENT OF DECOMMISSIONING WASTE; 60 -LEGAL, REGULATORY AND GOVERNMENTAL ISSUES; 70 -PUBLIC INFORMATION/INTERACTION

Abstract:

The UK government is currently carrying out a two year review to develop an R&D strategy for a potential future programme which may lead to the deep geological disposal of vitrified high-level waste and, possibly, spent fuel. The UK has not had a significant domestic R&D programme in this area since 1981 and the present review arises from a commitment made in a 1995 government White Paper on radioactive wastes to reconsider the options for HLW. It is probable that the results of the review will form the basis for a consultation paper to be issued by the government in 1999. Much of the review is based upon experience in other national programmes over the last ten to fifteen years. The core of the work is to establish the likely nature of a future deep repository programme in the UK in terms of the major activities that would be involved and to identify the R&D that would be necessary to support such a programme. This involves identifying and prioritising programme milestones and outstanding R&D questions that are either generically still open matters (i.e. unlikely to be solved in the short term by ongoing international R&D) or which will require UK site-specific or concept-specific work. The review considers technical and scientific issues, legal and regulatory matters and issues of risk perception and communication with the public. Apart from looking at vitrified HLW and spent fuel, the study is also evaluating the impacts of placing other materials which might eventually be classed as wastes in the same disposal system (notably, plutonium and depleted uranium) as well as decommissioning wastes which will arise late in the next century.

WM Descriptor(s): government policies; radioactive waste disposal; radioactive waste management; radioactive wastes; research programs; reviews

Principal Investigator(s):

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Other Investigators:

MAUL, Philip MILLER, William

Organization Type:

Other

Program Duration: From: 1997-4-1 To: 1999-3-31

State of Advancement: Research in progress

Sponsoring Organization(s):

United Kingdom Department of the Environment, Transport and the Regions

Associated Organization(s):

NNC Ltd, UK
Simmons & Simmons Ltd, UK

UK19980016

Title:

RADIOACTIVITY IN AIR AND RAINWATER: UK RESULTS TO THE END OF 1996

Title in Original Language:

Topic Code(s):

240 -ENVIRONMENTAL MONITORING; 241 -Monitoring Programmes

Abstract:

Samples of atmospheric particulate material and rainwater from sampling stations in the United Kingdom have been collected and analysed for selected radionuclides. Results of the analyses of these samples are presented for 1995 and 1996.
Average concentrations of Cs-137 in air during 1996 are similar to those observed in 1995. The measured concentrations remain less than 0.1% of those in 1986, the year of the Chernobyl nuclear power reactor accident, and are of negligible radiological significance. Pu-(239+240) concentrations in air and rainwater were a very small fraction of the National Radiological Protection Board's Generalized Derived Limit for members of the public. Estimates are given of the world-wide deposit of Cs-137 and Sr-90 to the end of 1996. There has been no significant input of these radionuclides into the global environment since 1986 and the estimated deposits continue to decline through radioactive decay.

WM Descriptor(s): air; cesium 137; fallout; monitoring; nuclear weapons; radioactivity; rain water; strontium 90

Principal Investigator(s):
Playford, Keith

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Organization Performing the work:
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Other Investigators:
Steve Baker

Organization Type:
Other

Program Duration: From: 1996-1-1 To: 1997-12-31

State of Advancement: Unknown

Sponsoring Organization(s):
Environment Agency, Lancaster, UNITED KINGDOM

Associated Organization(s):
none

UK19980017

Title:
Assessment of the operation of a spectrometric monitor installed at Eskdalemuir: Phase Two

Title in Original Language:

Topic Code(s):
201 -Dispersion and Migration of Radionuclides; 240 -ENVIRONMENTAL MONITORING; 242 -Monitoring Techniques

Abstract:

AEA Technology plc was commissioned by the former Department of the Environment (DOE) to undertake the testing of a prototype alpha, beta and gamma particulate in air spectrometer. The device supplied by Canberra Packard was installed on the site of the British Geological Survey’s Eskdalemuir Earth Magnetic Observatory in Dumfriesshire, Southern Scotland. The objective of the work was to test and evaluate the spectrometric monitor to assess the suitability of incorporating such devices into the UK Radioactive Monitoring Network (RIMNET) Phase 2 system on a permanent basis. A report of the first years operation has been issued previously. The objectives of the second phase of operation were:
· to continue the evaluation of the reliability of the sampler;
· to carry out tests to determine the minimum detectable activity of the gamma-ray spectrometer particularly for Cs-137;
· to assess the operation of the alpha detector;
· to compare the variation of radioactivity measured by the spectrometric monitor and the RIMNET Phase 2 monitor at Eskdalemuir during periods when either detector indicated a significant increase in observed activity.
No significant gamma emitting radionuclides attributable to anthropogenic sources were detected during the test periods, although three natural gamma emitting radionuclides were often recorded. Communication with the RIMNET computer system in London has continued to be problematical mainly because of the frequency of

electrical storms and resultant failure of the communications interface. Other communication faults observed may be associated with changes to the RIMNET Packet Assembler Disassembler (PAD). A major equipment failure associated with the cooling system used for the detector occurred during 1996 which resulted a lengthy stoppage.

WM Descriptor(s): accidents; aerosols; air samplers; fallout; lead 210; natural radioactivity; radioactivity; radon; real time systems; sampling

Principal Investigator(s):

Playford, Keith

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Organization Performing the work:

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Other Investigators:

Steve Baker;

Organization Type:

Other

Program Duration: From: 1995-11-1 To: 1997-10-1

State of Advancement: Unknown

Sponsoring Organization(s):

Department of Environment Transport and the Regions
Ashdown House, UNITED KINGDOM

Associated Organization(s):

none

UK19980018

Title:

Measurement of Lead-210 and Polonium-210 in Airborne Particulate Material: Feasibility Study

Title in Original Language:

Topic Code(s):

240 -ENVIRONMENTAL MONITORING; 242 - Monitoring Techniques

Abstract:

On behalf of the Environment Agency's National Centre for Compliance Assessment, AEA Technology has undertaken a short feasibility study to develop a programme of sampling and analysis that will provide reliable measurements of Pb-210 and Po-210 in air particulate material. This programme would form the basis for a protocol for the routine monitoring of ambient levels of Pb-210 and Po-210 in air. Weekly samples of airborne particulate material were collected using a suitable air sampler at selected intervals during the period January to March 1997 at a semi-rural site at Chilton, Oxfordshire. Determination of Po-210 in the samples was undertaken within one week of collection, with Pb-210 determined at a later date by counting ingrown Po-210. The effect of varying ingrowth (Pb-210 to Po-210) periods, from two to four months, on the counting uncertainty of the Pb-210 measurement was investigated. The benefit of longer ingrowth times was also demonstrated by normalizing differences in sampling/analytical parameters that occurred between the collected samples. An ingrowth period of at least three months is recommended, if the delay in reporting the Pb-210 measurement can be tolerated. The lower limit of uncertainty on the overall analytical results will be governed by the method precision of approximately 10%. Concentrations of Po-210 and Pb-210 in air (mBq per cubic metre) at Chilton ranged from 0.006 - 0.026 and 0.028 - 0.151, respectively. In general, the ratios of Po-210/Pb-210 in air particulate ranged from 0.11 - 0.21 and were comparable with both historical data for Chilton and typical values in ground-level air published in the literature. The possibility of measuring Po-210 and Pb-210 in a portion of weekly air particulate samples obtained from AEA Technology's UK-wide radioactive fallout sampling network has also been demonstrated.

WM Descriptor(s): aerosols; air samplers; lead 210; polonium 210; radioactivity

Principal Investigator(s):
Baker, Steven J

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Organization Performing the work:
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Other Investigators:
Keith Playford

Organization Type:
Other

Program Duration: From: 1996-1-1 To: 1997-9-30

State of Advancement: Unknown

Sponsoring Organization(s):
Environment Agency Lancaster United Kingdom

Associated Organization(s):
none

UK19980019

Title:
Probabilistic Modelling in Food chain Models

Title in Original Language:

Topic Code(s):
103 -Effluents and Discharges; 20 -ENVIRONMENTAL IMPACT/ASSESSMENT STUDIES; 201 -Dispersion and Migration of Radionuclides; 202 -Dispersion and Migration Models; 220 -ENVIRONMENTAL TRANSFER; 221 -Environmental Transfer Models; 223 -Effects of Gaseous Releases; 231 -Radiological Assessment Models; 232 -Environmental Risk Assessment

Abstract:
The United Kingdom Ministry of Agriculture Fisheries and Food (MAFF) has invested considerable resources in the last ten years or so on a suite of codes, and the associated parameter values, for food chain modelling. The parameter database represents a valuable source of information on radionuclide behaviour in different soils, crops and animals. However, the code was not written using modern software engineering techniques and is not as flexible as modelling tools such as QuantiSci's AMBER code which has built in capabilities to enable, for example, sensitivity analyses and probabilistic sampling to be undertaken. A project has been initiated to reproduce the MAFF Soil/Plant/Animal models in AMBER to demonstrate the use of probabilistic calculations for radiological assessments involving atmospheric deposition to crops. If this can be done successfully, the aim would be to produce AMBER files which would enable the existing food chain model to be run, making full use of the both the accumulated information on parameter values, and the flexibility and power of modern objected-oriented windows-based software.

WM Descriptor(s): computer codes; food chains; probabilistic estimation; radionuclide migration; soils

Principal Investigator(s):
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Other Investigators:

Organization Type:
Private industry

Program Duration: From: 1998-6-1 To: 1999-12-31

State of Advancement: Research in progress

Sponsoring Organization(s):

Associated Organization(s):

MAFF none

UK19980020

Title:

Assessment of the Consequences of the Presence of Toxic Elements in Some Common Radioactive Waste Streams

Title in Original Language:

Topic Code(s):

10 -RADIOACTIVE WASTE; 110 -LOW AND INTERMEDIATE LEVEL WASTE FROM NFC FACILITIES; 117 -Waste Disposal; 160 -HAZARDOUS/MIXED WASTE; 167 -Waste Disposal; 20 -ENVIRONMENTAL IMPACT/ASSESSMENT STUDIES; 200 -ENVIRONMENTAL IMPACT/ASSESSMENT; 201 -Dispersion and Migration of Radionuclides; 204 -Impacts from Landfill Sites; 220 -ENVIRONMENTAL TRANSFER; 230 -RADIOLOGICAL ASSESSMENT; 232 -Environmental Risk Assessment; 233 -Long Term Environmental Impact

Abstract:

In 1995, QuantiSci completed study for the European Commission (EC) to investigate the application of procedures and disposal criteria developed for radioactive waste to cases involving chemical toxicity. A methodology was used to derive disposal limits for a range of toxic (nonradioactive) contaminants and disposal facilities consistent with human health and environmental quality standards. Generic, acceptable disposal levels were calculated separately for selected shallow and deep disposal facilities, and a range of organic and inorganic toxic contaminants. These levels were then compared against concentrations of the corresponding contaminants in representative low level radioactive waste streams. It was concluded that, whilst many of the waste streams considered had contaminant concentrations above the conservatively derived acceptable levels for shallow disposal, more detailed waste and disposal system specific calculations could be expected to show that most were likely to be acceptable for disposal in an appropriately sited and/or engineered shallow facility. In the light of the above conclusion, the aim of the follow up EC study is to undertake more detailed waste and facility specific calculations. The overall philosophy of the approach taken is the same as under the previous contract, but the broad simplifications needed for the initial study have been replaced by more waste and disposal system specific data and more detailed modelling. The principal output from the study is the assessment of the impacts arising from the disposal, to typical shallow facilities, of toxic (nonradioactive) contaminants in low level radioactive waste streams. These results have been compared against the generic levels derived under the previous contract and conclusions concerning the robustness of the generic levels drawn. Secondary outputs are: the comparison of the impacts of nonradioactive and radioactive contaminants; and the collation of further data concerning inventories, health risks, and the behaviour of organic contaminants in the environment.

WM Descriptor(s): chemical wastes; environmental impacts; low-level radioactive wastes; non-radioactive waste disposal; non-radioactive wastes; radioactive waste disposal; radioactive wastes; waste disposal; wastes

Principal Investigator(s):

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Other Investigators:

Organization Type:
Other

Program Duration: From: 1996-1-1 To: 1998-9-1

State of Advancement: Research in progress

Sponsoring Organization(s):
European Commission

Associated Organization(s):
none

UK19980021

Title:
Partition and transmutation strategies

Title in Original Language:

Topic Code(s):
127 -Waste Disposal; 200 -ENVIRONMENTAL IMPACT/ASSESSMENT

Abstract:

To minimise the risk to man, it is proposed that high level waste (HLW) is disposed of in a deep geological repository either as spent fuel (SF) or in a vitrified form after reprocessing. The environmental impact of the deep geological disposal of HLW arising in the UK has been assessed for two pathways (release via groundwater flow and human intrusion into the repository) for generic repository design and site characteristics. The assessments have shown that the key contributing radionuclides are C-14, Cl-36, Se-79, Tc-99, Sn-126, I-129, Cs-135 and Am-241, as well as decay daughters of uranium. The potential for partition and transmutation (P and T) strategies to reduce the initial inventories of these radionuclides has been considered.

WM Descriptor(s): environmental impacts; high-level radioactive wastes; partition; radioisotopes; transmutation; waste disposal

Principal Investigator(s):
BUSH, RICHARD

AEA TECHNOLOGY
DIDCOT

Organization Performing the work:
AEA TECHNOLOGY
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Other Investigators:
Jane Smith-Briggs; Howard Sims

Organization Type:
Private industry

Program Duration: From: 1996-3-1 To: 1999-6-30

State of Advancement: Research in progress

Sponsoring Organization(s):
Commission of the European Communities, UK Dept. of Environment

Associated Organization(s):
none

United States of America

USA19980001

Title:
Technical and Programmatic Support to Environmental Management and Nuclear Energy

Title in Original Language:

Topic Code(s):
101 -General policies; 102 -Programme Strategy, Planning and Management; 701 -Public Information

Programmes, Public Participation

Abstract:

This project includes 3 tasks to provide technical and programmatic support to the DOE offices of Nuclear Energy and Environmental Management.TASK 1: COOPERATIVE LABORATORY AGREEMENTS. This task continues support to the International Programs Division, Office of the Assistant Secretary for Nuclear Energy (NE-14). Nuclear development programs and U.S. interests in international safety and nonproliferation are being reshaped to meet new missions--from removal of actinides in waste to undertaking studies and new reactor R&D to establishing the most feasible techniques and processes for weapons plutonium disposition. DOE requires support for its nuclear programs that relate to these international nuclear activities, as well as for U.S. programs regarding foreign reactor safety. These include activities involving development of R&D programs with potential international cooperative support, agreements, and cooperation with international agencies, as well as those activities with international proliferation implications. The Special Projects Office of Argonne National Laboratory provides assistance to NE-14 for U.S. nuclear development programs that can support international efforts to dispose of excess weapons plutonium, to enhance high level waste management, and to further the peaceful use of nuclear power. The LMR and associated fuel cycle programs, the HTGR, the ALWR, and other nuclear programs are included. In addition, continuing effort is provided to support U.S. initiatives to address safety of Soviet designed reactors in the Newly Independent State (NIS) and Central and Eastern European Countries. Efforts also are provided in program planning, review, and implementation; in preparation of reports and studies; and in supporting and participating in international and domestic meetings and conferences.TASK 2: ADDRESSING ENVIRONMENTAL ISSUES OF SCIENCE, POLICY, AND PARTICIPATION CLEAN WATER ACT ANALYSIS. The objective of this task is to support the U.S. Department of Energy's (DOE's) Office of Integrated Risk Management in addressing issues central to DOE and other state, federal, and local agencies related to the overriding question, "How clean is clean?" Task activities involve implementing a broad-based set of activities directed toward increasing public and decision-maker (particularly local, state, and federal policy-makers) awareness of scientific, economic, and institutional aspects of the central issue to environmental controversy, namely, "How clean is clean and for what purpose?" These activities will include creating a Working Group to investigate and report on specific "sectors;" organizing an open symposium to consider issues addressed by the Working Group; convening a series of meetings (e.g., roundtable luncheons) with recognized environmental science or policy experts as speakers; and focusing efforts on involving state, federal, and local officials in coming to closure on the "How clean is clean and for what purpose?" issue. TASK 3: EM PROGRESS VIDEO. Produce an informational thirty minute video program to document the overall activities of Environmental Management operations (EM-33). Production activities will include scripting, location taping to document activities animation, and editing.

WM Descriptor(s): analysis, education & risk management; environmental management; program management; public information; public opinion; public relations

Principal Investigator(s):

Helt, J.

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management;
USDOE Nuclear Energy

Associated Organization(s):

none

Recent publication info:

US0013665

USA19980002

Title:

Technical Support for Waste Operations Oversight

Title in Original Language:

Topic Code(s):

101 -General policies; 102 -Programme Strategy, Planning and Management; 104 -Database & Information Systems, including Technology Transfer Systems. Technical Assistance and Costs

Abstract:

This project modifies support to the Office of Spent Fuel Management begun in FY 1990. The technical content requires knowledge of: (1) spent nuclear fuel, radioactive, hazardous, and mixed waste characteristics and environmental effects; (2) environmental regulatory compliance; and (3) compliance with procedures of the National Environmental Policy Act of 1969 (NEPA). Argonne National Laboratory's (ANL) Special Projects Office (SPO) will provide technical and associated administrative support in, but not limited to, the following areas: (1) assuring waste management operations' compliance with NEPA procedures and relevant DOE directives; (2) assuring waste operations' compliance with Federal, State, and local governments; environmental regulatory requirements and relevant DOE directives; (3) conducting technical reviews of selected phases of waste operations; (4) developing databases for recording, tracking, and evaluating regulatory activities, safety functions, and waste and spent nuclear fuel operations, and management functions; and (5) developing program planning documents as may be necessary.

WM Descriptor(s): compliance; data base management; environmental management; program management; waste management; waste management (defense)

Principal Investigator(s):

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013671

USA19980003

Title:

Technical Review Group and Support for Defense Waste

Title in Original Language:

Topic Code(s):

101 -General policies; 102 -Programme Strategy, Planning and Management; 134 -Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies)

Abstract:

This project includes two tasks in support of defense waste processing: TASK 1: WASTE ACCEPTANCE TECHNICAL REVIEW GROUP. The Defense Waste Processing Facility (DWPF) and the West Valley Demonstration Project (WVDP) have documented the methods and procedures for vitrifying liquid high-level

radioactive wastes existing at the Savannah River and West Valley sites. This documentation is identified as the Waste Compliance Plan (WCP) and the Waste Qualification Report (WQR). The WQR consists or will consist of at least six volumes or packages for each site. The Department of Energy (DOE) has organized a Waste Acceptance Technical Review Group (WATRG) to review/critique this documentation to determine its validity and technical soundness. The WATRG consists of one or more Technical Review Groups (TRG). This activity is authorized by the Vitrification Projects Division (VPD) of DOE. The TRGs will operate in accordance with charters approved by the appropriate DOE Headquarters (HQ) organization. This task consists of providing a member to serve on several TRGs. The duties of a member include, but are not limited to, the following: (1) Review and critique each package (or volume) of the WQR or the WCP that has been prepared by the DWPF or WVDP. All comments, observations, and questions resulting from the review are to be forwarded to the Executive Secretary of the TRG. (2) Attend and participate in scheduled meetings of the TRG to arrive at TRG consensus judgments. These consensus judgments are documented by the TRG Executive Secretary and approved by the TRG members. (3) Prepare and document all minority views. Such documentation is to be forwarded to the TRG Executive Secretary. (4) Together with other TRG members, evaluate the proposed and actual (two phases) responsive actions of the DWPF or the WVDP. This may be done by a combination of meetings, telephone conversations, and correspondence. (5) At the completion of the review (or an individual package or volume), assist in the preparation of a final evaluation report and attest to the accuracy, concurrence, and agreement with its contents. (6) Perform other functions as directed by the TRG Chairman.TASK 2: TECHNICAL ASSESSMENT AND SUPPORT TO EM-34. Provide technical and administrative assistance to the Office of Waste Isolation Pilot Plant Program (EM-34) in the conduct of their line management responsibility for the formulation, execution, and evaluation of their programs, including: the review of technical and programmatic documents; the planning, design, construction, and operation of facilities to treat, store, and dispose of radioactive, hazardous, mixed, and sanitary wastes; the incorporation of waste minimization concepts; and the planning and conduct of decontamination and decommissioning, remedial actions, and surveillance and maintenance activities. The review(s), such as the Waste Compendium and Technical Review Group, are to be conducted by recognized technical experts on nuclear waste forms.

WM Descriptor(s): documentation; environmental management; program management; reviews; vitrification; waste management (defense); waste processing

Principal Investigator(s):

Helt, J.E.

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Organization Performing the work:

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Argonne 60439 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013672

USA19980004

Title:

Technical and Programmatic Support to the DOE Offices of Waste Management and Environment, Safety, and Health

Title in Original Language:

Topic Code(s):

101 -General policies; 102 -Programme Strategy, Planning and Management; 106 -Quality Assurance Aspects; 701 -Public Information Programmes,

Public Participation

Abstract:

This project includes seven tasks to provide technical and programmatic support to the DOE Offices of Waste Management (EM-30) and Environment, Safety, and Health (EH-10). TASK 1: DECISION SUPPORT FOR TECHNICAL AND PROGRAMMATIC ACTIVITIES. The overall objective of this task is to provide decision support for technical and programmatic activities in DOE's Office of Waste Management (EM-30). The efforts for fiscal year (FY) 1995 include activities to (1) provide technical support for EM-30's line-item prioritization efforts, (2) develop a waste management strategic planning simulation system, and (3) conduct an experiment in resource allocation across all DOE sites by using the Resource Allocation Support System (RASS) methodology. The objectives of this experiment are to assess the usefulness of RASS-developed insights for budget decision making. This work builds on experience gained over several years in working with waste management program planning and integration at DOE headquarters. The experience with prior work, which involved a significant number of interactions with field office and contractor program managers, will help in conducting this task.TASK 2: TECHNICAL ASSESSMENT AND MANAGEMENT SYSTEMS SUPPORT TO EM-30. Provide technical and administrative assistance to the Office of the Deputy Secretary for Waste Management (EM-30), Office of Program Integration (EM-33), in the conduct of their line management responsibilities for the formulation, execution, evaluation, integration, and management of their programs, including: the planning, design, construction, and operation of facilities to treat, store, and dispose of radioactive, hazardous, mixed, and sanitary wastes; the incorporation of waste minimization concepts; the planning and conduct of decontamination and decommissioning, remedial actions, and surveillance and maintenance activities. At the request of DOE/EM, Argonne National Laboratory (ANL) Special Projects Office (SPO) will maintain a cadre of highly experienced experts, from both ANL and non-ANL sources. The cadre of experts will assist EM by conducting studies and training, and developing guidelines and approaches for the conduct of headquarters and field operations; providing assistance in the conceptualizing, developing, and implementation of quality assurance programs, practices, and activities; assisting in the development and establishment of technically sound, safe, environmentally acceptable, and cost-effective operations in field operations; and assisting in the conduct of reviews, evaluations, and assessments to ensure the adequacy, compliance and effectiveness of the same. TASK 3: TECHNICAL ANALYTICAL PROGRAMMATIC AND ADMINISTRATIVE SUPPORT TO EH-10. The purpose of this task is to provide technical, programmatic, and administrative support to the DOE Office of Environment, Safety, and Health (EH). This support will assist EH in providing safety assessment and oversight and technical and programmatic assistance to DOE nuclear facilities.TASK 4: OFFICE OF WASTE MANAGEMENT SAFETY ANALYSIS REPORT IMPLEMENTATION. The purpose of this task is to provide technical and programmatic support to the Safety and Environmental Support Division, EM-331 in the execution of several aspects of the EM Safety Program. The effort will include, but is not limited to four subtasks. {und Sub-Task 1}--Review of Safety Analysis Report Implementation Plans developed by the DOE M&O Contractors. These Plans are required by Order 5480.23. This action will be carried out through the auspices of the EM-Safety Steering Committee via the Work Group on SAR Implementation Plans, headed by EM-23. {und Sub-Task 2}--Development of guidance for the implementation of various DOE Safety and Health Programs. Programs include, but are not limited to: preparation and review of Safety Analysis Reports, preparation of Safety Evaluation Reports, Hazards Analyses, and other related actions. For safety documentation, this Sub-Task may include the development of Format and Content Guides. {und Sub-Task 3}--Support for the review of Safety Analysis reports for EM facilities and operations. This may include the drafting of Safety Evaluation Reports, participation on SAR review teams (i.e., EM-30 not the lead review organization), or providing leaders for SAR review teams. Coordination with other EM-30 organizations (especially EM-32 Program Managers and EM Project Managers) will be required. {und Sub-Task 4}--Provide technical support in the conduct of inspections, assessments, and appraisals covering Safety and Health programmatic elements. These inspections, assessments, and appraisals shall be carried out to the specifications contained in various DOE Orders, Directives, and guidance such as the DOE Radiation Control Manual, Tiger Team Assessment Manuals, and Progress Assessment.TASK 5: SUPPORT OF FEDERAL FACILITIES COMPLIANCE ACT. Argonne National Laboratory (ANL) will provide technical support to the Office of Program Support regarding the Federal Facilities Compliance Act. This support will include issues analysis, strategic planning, and stakeholder interaction. Issues analysis support shall focus on resolving policy concerns that affect the ability of the U.S. Department of Energy (DOE) and applicable states to develop mutually acceptable site-specific plans. Strategic planning support shall focus on developing options and procedures for sites to achieve compliance with the Act

and applicable environmental regulations. Stakeholder interaction support shall focus on ensuring optimal working relationships with states and other stakeholders, including Indian tribes, the public, and various boards, committees, panels, and site representatives, to produce acceptable site-specific plans.TASK 6: EM-TT/TSA REVIEW. Under this task, Argonne National Laboratory (ANL) will assist the Office of Program Integration (EM-33), Regulatory Integration Division (EM-331), in the following areas: developing guidelines for waste operations based on Tiger Team/Technical Safety Appraisal Performance Objectives; reviewing Field Office procedures and standards against these Performance Objectives; following-up on corrective actions for Tiger Team findings regarding waste operations; and reviewing safety and safety analysis documentation.TASK 7: OFFICE OF WASTE OPERATION PROGRAM VIDEO. Distribution of the waste management video program. Research, script, and all related production activities to produce an informational video about radiation and its uses and effects.

WM Descriptor(s): compliance; environmental management; environmental policy; planning; program management; technology development; waste management; waste management (defense)

Principal Investigator(s):

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Organization Performing the work:

Argonne National Laboratory
Argonne 60439 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management;
USDOE Environment Safety & Health

Associated Organization(s):

none

Recent publication info:

US0013673

USA19980005

Title:

Compliance/Audit Review and Waste Regulation Impact Study

Title in Original Language:

Topic Code(s):

101 -General policies; 102 -Programme Strategy, Planning and Management

Abstract:

This program will provide technical expertise and assistance to the U.S. Department of Energy (DOE), Office of Environmental Management (EM), Office of Waste Operations, Regulatory Compliance Branch. This support will include review and assessment of the potential impact to EM operations of orders, guidance, regulations, and standards; radiological risk assessment related to the shipment, treatment, and storage of DOE wastes; guidance development; and technical document reviews. This project also includes an analysis of the impact to DOE waste management systems and operations from the ending of DOE self-regulation in the areas of nuclear and radiological safety (including radioactive and mixed waste management).

WM Descriptor(s): compliance; environmental management; program management; safety; waste management (defense)

Principal Investigator(s):

Helt, J.

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013674

USA19980006

Title:

Technical Support for DOE Office of Waste Management, Office of Technical Support

Title in Original Language:

Topic Code(s):

101 -General policies; 102 -Programme Strategy, Planning and Management

Abstract:

This project covers three tasks to support the U.S. Department of Energy (DOE), Office of Waste Management (EM-30) in the Office of Environmental Management (EM), in developing policies and procedures for waste management that are environmentally sound and comply with applicable environmental laws and regulations.TASK 1: PROGRAMMATIC EIS. The initial principal activity will be to support development of the waste management component of the Programmatic Environmental Impact Statement (PEIS) that will evaluate alternatives for integrating the DOE environmental restoration and waste management activities. The ANL technical support in developing the PEIS includes the following major areas: (1) characterizing waste management technologies, (2) developing and applying methods for evaluating the risk associated with waste transportation, and (3) providing technical and administrative assistance in preparing PEIS documents and reviewing them as required to complete the National Environmental Policy Act (NEPA) process. Additional activities will include support in developing and evaluating procedures for implementing new laws and regulations for waste management, such as the evolving requirements for waste minimization. TASK 2: DOE WASTE MANAGEMENT OPERATIONS COMMITTEE SUPPORT. The U.S. Department of Energy (DOE) Waste Management Operations Committee (WMOC) requires assistance in planning, conducting, and documenting periodic committee meetings. Argonne National Laboratory (ANL) has staff with expertise in the required areas (e.g., radioactive and mixed waste management) and previous experience working with the WMOC and its predecessor organization, the DOE Ad Hoc Waste Operating Contractors Committee. ANL will provide technical assistance in planning, conducting, and documenting the committee meetings and related technical support to DOE.TASK 3: APPLIED TECHNOLOGY PROGRAM & MW FOCUS AREA. This task provides technical consultation and assistance to the Mixed Waste Focus Area Technology Resource Team. Areas of support will include: (1) serving on Technology Support Teams to assist sites in the preparation of Site Treatment Plans and communicate information on emerging technologies as candidate treatment options; (2) serving as a key member of the Technology Resource Team's Engineering Assessment and Evaluation Workgroup to develop strategies and perform work on integrated engineering assessment and evaluation of baseline and emerging technologies as candidate mixed waste treatment options; (3) reviewing Site Treatment Plans; (4) participating in planning, review, and technical workshops for the Technology Resource Team; and (5) providing consultation on Mixed Waste Focus Area programmatic and technical activities.

WM Descriptor(s): environmental impact statements; environmental management; environmental restoration; planning; program management; waste management

Principal Investigator(s):

Helt, J.

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013675

USA19980007

Title:

Technical Assessment and Management Systems Support to the Office of the Deputy Assistant Secretary for Waste Management

Title in Original Language:

Topic Code(s):

101 -General policies; 102 -Programme Strategy, Planning and Management; 106 -Quality Assurance Aspects

Abstract:

Provide technical and administrative assistance to the Office of the Deputy Assistant Secretary for Waste Management (EM-30), Office of Program Integration (EM-33), in the conduct of their line management responsibilities for the formulation, execution, evaluation, integration, and management of their programs, including: the planning, design, construction, and operation of facilities to treat, store, and dispose of radioactive, hazardous, mixed, and sanitary wastes; the incorporation of waste minimization concepts; the planning and conduct of decontamination and decommissioning, remedial actions, and surveillance and maintenance activities. At the request of DOE/EM, Argonne National Laboratory (ANL) Special Projects Office (SPO) will maintain a cadre of highly experienced experts, from both ANL and non-ANL sources. The cadre of experts will assist EM by conducting studies and training, and developing guidelines and approaches for the conduct of headquarters and field operations; providing assistance in the conceptualizing, developing, and implementation of quality assurance programs, practices, and activities; assisting in the development and establishment of technically sound, safe, environmentally acceptable, and cost-effective operations in field operations; and assisting in the conduct of reviews, evaluations, and assessments to ensure the adequacy, compliance and effectiveness of the same.

WM Descriptor(s): environmental management; planning; program management; quality assurance; quality control; waste management (defense)

Principal Investigator(s):

Helt, J.

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013676

USA19980008

Title:

Waste Minimization Support

Title in Original Language:

Topic Code(s):

101 -General policies; 102 -Programme Strategy, Planning and Management; 105 -Waste Minimisation

Abstract:

This project includes six tasks to support DOE waste minimization efforts: TASK 1: WASTE MINIMIZATION INFORMATION EXCHANGE. This task covers ANL-East pollution Prevention/Waste Minimization (PP/WMIN) Efforts. The current funding is for development of a baseline program. The task also includes completion of the EM-334 "Information Exchange Report" funded in FY93. The baseline program plan entails development of a PP/WMIN program plan in response to DOE Orders 5400.1, 5820.2a, and SEN-37. This program plan will outline ANL efforts to achieve DOE goals in the PP/WMIN area. Other components of this plan will include: (1) developing an ANL training program; (2) completing the required DOE and EPA reports; and (3) developing basic programs in the assessment and prioritization area. ANL site-wide source reduction activities are also included.TASK 2: REVISE ANALYTICAL PROCEDURES FOR WASTE MINIMIZATION/POLLUTION. Procedures exist for waste characterization, but waste minimization has not usually played a role in development of these procedures. The DOE expects to require a large number of characterizations over a multi year period to accomplish the Department goals in environmental restoration and waste management (U.S. DOE Environmental Restoration and Waste Management Five-Year Plan). The waste generated by the analytical procedures used for characterizations is a significant source of new DOE waste. Success in reducing the waste volume and costs of handling this waste would significantly decrease the overall cost of this DOE program. This work is expected to have application to other kinds of chemical analyses done at DOE facilities. Argonne National Laboratory will address the analytical procedures in three areas, leading to four sub tasks: Sub task 1--microanalysis using flow injection; Sub task 2--reduction of solvent volume required for dissolution of waste samples for radiochemical analysis; Sub task 3--alternative sample preparation for analysis of organic constituents in waste samples; Sub task 4--evaluation of analytical procedures to identify priorities for additional waste minimization/pollution prevention.TASK 3: TECHNICAL SUPPORT TO MIXED WASTE FOCUS AREA. The scope of this task involves participation in the Technical Review Team (TRT) that has been set up to support EM-332 in identification, evaluation, and development of technologies needed to support treatment of mixed waste. Specific activities include review of the Site Treatment Plans as they are developed, preparation of fact sheets for key emerging technologies, and technical support for the development of the strategic plan for the Mixed Waste Focus Area. The benefit of this work is that it supports identification of technology needed for treating mixed waste to comply with the Federal Facilities Compliance Act.TASK 4: RETURN ON INVESTMENT PROJECT. This task provides technical and administrative assistance to the Office of Program Integration (EM-33), Waste Minimization Division (EM-334), in the conduct of waste minimization. The project covers the decontamination of 10,000 on-site lead bricks through the use of carbon dioxide ice pellet blast cleaning equipment in a manner that results in a return-on-investment greater than 300 percent. The Argonne National Laboratory Special Projects Office will purchase and operate the blast cleaning equipment and will produce progress reports and a final report covering the financial and operational aspects of the project.TASK 5: NUCLEAR POWER INDUSTRY'S EXPERIENCE IN WMIN APPLICATION TO DOE/CH. The nuclear industry has been highly successful in low-level radioactive waste (LLRW) minimization, with dramatic reductions in sources creating this waste and in operational waste volumes. For example, over a period of less than ten years, the volume of dry active waste per reactor has

decreased to one-fifth of the volume produced previously. The nuclear industry has extensive experience in decommissioning and decontamination activities, especially in waste management related to steam generator replacement. The industry employs a variety of strategies and a vast array of volume reduction technologies for solid and liquid radioactive wastes. The objective of this task is to perform an in-depth analysis of the industry experience with LLRW and identify strategies and technologies that can be used in the DOE-CH Operations for achieving waste minimization goals. Databases and reports from the Electric Power Research Institute and the nuclear industry will be examined, key waste managers in the industry will be interviewed, and a mini-workshop will be organized with key personnel. Each of the strategies and the technologies will be analyzed vis-a-vis applicability to DOE needs. A final report detailing relevant strategies and volume reduction technologies will be prepared for DOE-CH.TASK 6: WASTE MINIMIZATION FOR NEW DOE FACILITIES. Argonne National Laboratory (ANL), in conjunction with Westinghouse Hanford Corporation, has conducted a complete analysis to identify waste minimization options during the design and construction of new facilities. Specific changes in materials of construction, architecture, and engineering construction practices have been identified for waste minimization. Modification, as appropriate, of the DOE design and construction manuals to obtain maximum recycling and minimization of wastes during the construction, operation, and final demolition phases has been suggested. Building on this background, ANL will review current program results and assemble and evaluate a database of available "green" building material. ANL will participate in as many on-site construction activities as possible to bring pollution prevention and waste minimization (P2/Wm) philosophies and principles into building design. ANL will continue to pursue relevant demonstration projects to illustrate and operate as a test bed so that the effectiveness and feasibility of P2/Wm principles can be evaluated in respect to building design and construction.

WM Descriptor(s): environmental management; minimization; pollution abatement; program management; training; US DOE; waste characterization; waste management (defense)

Principal Investigator(s):

Helt, J.E.

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Organization Performing the work:

Argonne National Laboratory
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013677

USA19980009

Title:

Technical Assessment and Support to the Office of Waste Isolation Pilot Plant Program

Title in Original Language:

Topic Code(s):

101 -General policies; 102 -Programme Strategy, Planning and Management; 106 -Quality Assurance Aspects

Abstract:

Provide technical and administrative assistance to the Office of Waste Isolation Pilot Plant Program (EM-34) in the conduct of their line management responsibility for the formulation, execution, and evaluation of their programs, including: the review of programmatic and technical documents; the planning, design, construction, and operation of facilities to treat, store, and dispose of radioactive, hazardous, mixed, and sanitary wastes; the

incorporation of waste minimization concepts; and the planning and conduct of decontamination and decommissioning, remedial actions, and surveillance and maintenance activities. ANL will maintain a cadre of highly experienced experts on nuclear waste forms, from both ANL and non-ANL sources. The cadre of experts will continue to assist EM by: conducting studies and training, and developing guidelines and approaches for the conduct of headquarters and field operations; providing assistance in the conceptualizing, developing, and implementation of quality assurance programs, practices, and activities; assisting in the development and establishment of technically sound, safe, environmentally acceptable, cost-effective, and timely operations in field operations; and assisting in the conduct of reviews (such as operational readiness), evaluations, and assessments to ensure the adequacy, compliance and effectiveness of the same.

WM Descriptor(s): documentation; environmental management; planning; program management; quality assurance; quality control; waste management

Principal Investigator(s):

Helt, J.

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013679

USA19980010

Title:

Provide technical and administrative assistance to the Office of the Deputy Assistant Director for Waste Management

Title in Original Language:

Topic Code(s):

101 -General policies; 102 -Programme Strategy, Planning and Management

Abstract:

Provide technical and administrative assistance to the Office of the Deputy Assistant Director for Waste Management (EM-30), Office of Western Waste Management Operations (EM-351), in the conduct of their line management responsibility for the formulation, execution, and evaluation of their programs, including: the planning, design, construction, and operation of facilities to treat, store, and dispose of radioactive, hazardous, mixed, and sanitary wastes; the incorporation of waste minimization concepts; the planning and conduct of decontamination, decommissioning, remedial actions, and surveillance and maintenance activities; and the development and definitions of management systems associated with this function.

WM Descriptor(s): decommissioning; environmental management; management; monitoring; planning; program management; remedial action; waste management

Principal Investigator(s):

Helt, J.

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Organization Performing the work:

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Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0013681

USA19980011

Title:
Vitrification Project

Title in Original Language:

Topic Code(s):
101 -General policies; 102 -Programme Strategy, Planning and Management; 134 -Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies); 160 - HAZARDOUS/MIXED WASTE

Abstract:
This project supports the Office of Waste Operations (EM-30), and focuses on the Vitrification Facilities at Hanford and the total Tank Waste Remediation System (TWRS EM-36). The technical content requires knowledge of: (1) nuclear reactor and non-reactor facilities' generated wastes; (2) radioactive, hazardous, and mixed waste characteristics; (3) treatment, storage, and disposal technology, including environmental effects; (4) the technical safety appraisal function; (5) environmental regulatory compliance; and (6) compliance with procedures of the National Environmental Policy Act of 1969 (NEPA). The Argonne National Laboratory Special Projects Office (ANL/SPO) will provide technical and associated administrative support in, but not limited to, the following areas: (1) assuring waste management operations' compliance with NEPA procedures and relevant DOE directives; (2) assuring waste operations' compliance with Federal, State, and local governments' environmental regulatory requirements and relevant DOE directives; (3) conducting technical reviews of selected phases of waste operations; (4) advising EM relative to the waste producer/repository interface; and (5) developing program planning documents as may be necessary. The project includes six tasks:TASK 1: TECHNICAL SUPPORT FOR PLUME FOCUS AREA. Provide technical and administrative assistance to the Office of Hanford Waste Management Operations (EM-36) in the conduct of their line management responsibility for the formulation, execution, and evaluation of their programs, including: the planning, design, construction, and operation of facilities to treat, store, and dispose of radioactive, hazardous, mixed, and sanitary wastes; the incorporation of waste minimization concepts; the planning and conduct of decontamination, decommissioning, remedial actions, and surveillance and maintenance activities; and the development and definition of management systems associated with this function. TASK 2: REPORT ANALYSIS AND REVIEW. Argonne National Laboratory (ANL) will assist in the preparation, review, and analysis of major documents and reports concerning the U.S. Department of Energy's (DOE's) Hanford Program Office (EM-36). This task will include supporting EM-36 in its responses to external items from the Defense Nuclear Facilities Safety Board, the U.S. Environmental Protection Agency, and the Washington State Delegation. These assignments will be completed on an as-needed basis.TASK 3: RISK MANAGEMENT DECISION TOOL/IDP/TECHNICAL MANAGEMENT SUPPORT. This task consists of three subtasks. The first subtask concerns the DOE-EM Tank Waste Remediation System (TWRS). Argonne will develop a decision tool for use in management of the TWRS that will allow easy integration and manipulation of technical, budget, and schedule elements of the program at the Headquarters level. This tool will link the TWRS technical baseline to current budget and schedule projections and will identify critical interfaces between activities. In addition, Argonne will review the TWRS technical baseline from a system management perspective and evaluate the baseline for potentially high-risk activities. Finally, Argonne will conduct management risk analyses based on the outcome of our review of the TWRS technical baseline. The purpose

will be to assist the TWRS management team in integrating key activities by identifying weak programmatic areas and critical links. In the second subtask, Argonne will coordinate the Individual Development Plan (IDP) training program for the Hanford Waste Management Operations Office Headquarters staff. In the third subtask, Argonne will provide ongoing technical and management support to the Director of the Hanford Waste Management Operations Office. This subtask will be performed by a senior program analyst, who will work in Germantown, providing direct support to the DOE-HQ staff. TASK 4: PROGRAMMATIC RISK ASSESSMENT FOR THE TANK WASTE REMEDIATION SYSTEM PRIVATIZATION. Programmatic risk is defined as uncertainty regarding how a strategy will achieve cost, schedule and performance criteria. Key risks will be identified through several techniques, including qualitative and quantitative estimates of their likelihood and severity. Systems modeling may help assess the impact of risks that affect multiple areas. Economic modeling, such as equilibrium analysis, will be used to forecast possible behavior of potential vendors and bidders in a market established by DOE. Experts interviews and computer models will provide complementary insight. Findings from this study will inform RFP preparation, and possibly DOE decisions afterward. By identifying major risks and their potential impact, DOE can design strategies to mitigate risks and improve the service it received for its budget. Major risks left unaddressed could make the privatization program prohibitively uncertain or expensive. Major elements of risk management strategies include a means to share risks with vendors in a way that is fair to DOE, but does not pose prohibitive obstacles to potential vendors; other elements of risk management are expected to include technological risks, and risks related to the operation of a market-style economic environment.TASK 5: TWRS PRIVATIZATION. The objective of this task is to develop acceptance specifications for the low-level waste forms that will result from processing of the wastes currently stored in tanks at Hanford. The approach involves identifying the durability and other performance characteristics of the waste form products that are needed to ensure that these products can meet the regulatory and operational requirements associated with their handling, storage, and disposal. The benefit of this work is that development of a satisfactory set of specifications will allow work to proceed on processing the waste, currently stored in a mobile liquid form, into a durable solid form for ultimate disposal. TASK 6: MIXED LOW-LEVEL WASTE FORM OPTIONS. The Special Projects Office (SPO) of Argonne National Laboratory (ANL) will analyze MLL waste form options to develop comparative costs for each option. SPO will contribute to the selection of the most efficient and effective option.

WM Descriptor(s): cost estimation; documentation; environmental management; Hanford reservation; program management; risk assessment; tanks; vitrification; waste management

Principal Investigator(s):

Helt, J.

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Organization Performing the work:

Argonne National Laboratory
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013682

USA19980012

Title:

Technical Support for DOE Spent Nuclear Fuel

Title in Original Language:

Topic Code(s):

101 -General policies; 102 -Programme Strategy, Planning and Management

Abstract:

This project covers three tasks by Argonne National Laboratory (ANL) in support of the U.S. Department of Energy (DOE) Office of Spent Nuclear Fuel Management in developing policies and plans for spent nuclear fuel (SNF) management that are environmentally sound and comply with applicable environmental laws and regulations.TASK 1: SNF/INEL EIS. The initial principal activity will be to support development of the environmental impact statement for the Programmatic SNF Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management (SNF/INEL EIS). The ANL support to the EIS will focus on (1) determining SNF facility requirements for various alternative management configurations, (2) conducting transportation analyses for these configurations, and (3) coordinating information and analytical approaches between the DOE Environmental Management Programmatic Environmental Impact Statement (EM PEIS) and the SNF/INEL EIS.TASK 2: TECHNICAL AND REVIEW SUPPORT TO SPENT NUCLEAR FUEL PROGRAM. This task covers technical support and review assistance to the DOE Spent Nuclear Fuel Program. Activities include service on various Technical Working Groups and participation in review committees as requested by the DOE. ANL personnel have served on technical working groups for technology development, foreign research reactor spent fuel, spent fuel inventory database, and spent fuel storage facilities. In addition, ANL has responded to requests for information on spent fuel and facilities at ANL-E and ANL-W, in support of database development and reviews of vulnerabilities associated with DOE spent fuel storage. TASK 3: COOPERATIVE LABORATORY AGREEMENTS. This task continues support to the International Programs Division, Office of the Assistant Secretary for Nuclear Energy (NE-14). Nuclear development programs and U.S. interests in international safety and nonproliferation are being reshaped to meet new missions--from removal of actinides in waste to undertaking studies and new reactor R&D to establishing the most feasible techniques and processes for weapons plutonium disposition. DOE requires support for its nuclear programs that relate to these international nuclear activities, as well as for U.S. programs regarding foreign reactor safety. These include activities involving development of R&D programs with potential international cooperative support, agreements, and cooperation with international agencies, as well as those activities with international proliferation implications. The Special Projects Office of Argonne National Laboratory provides assistance to NE-14 for U.S. nuclear development programs that can support international efforts to dispose of excess weapons plutonium, to enhance high level waste management, and to further the peaceful use of nuclear power. The LMR and associated fuel cycle programs, the HTGR, the ALWR, and other nuclear programs are included. In addition, continuing effort is provided to support U.S. initiatives to address safety of Soviet designed reactors in the Newly Independent State (NIS) and Central and Eastern European Countries. Efforts also are provided in program planning, review, and implementation; in preparation of reports and studies; and in supporting and participating in international and domestic meetings and conferences.

WM Descriptor(s): compliance; documentation; environmental impact statements; environmental management; program management; spent fuels; waste management; waste transportation

Principal Investigator(s):

Helt, J.

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Organization Performing the work:

Argonne National Laboratory
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management;
USDOE Nuclear Energy

Associated Organization(s):

none

Recent publication info:

US0013684

USA19980013

Title:
Eastern Area Program Technical Assistance

Title in Original Language:

Topic Code(s):

101 -General policies; 102 -Programme Strategy, Planning and Management; 104 -Database & Information Systems, including Technology Transfer Systems. Technical Assistance and Costs

Abstract:

The objective of this work is to provide technical assistance to the U.S. Department of Energy (DOE), Office of Environmental Management, Division of Eastern Area Programs, in fulfilling its technical responsibilities under the Formerly Utilized Sites Remedial Action Program (FUSRAP) and the Eastern Decontamination and Decommissioning Program. The technical assistance consists of four subtasks: (1) maintain and update the RESRAD code and the guideline manual and collect, generate, and assemble the data required to improve the code or its methodology; (2) derive cleanup criteria and estimate potential postremedial action doses at decontaminated sites; (3) conduct RESRAD training sessions as directed by DOE; and (4) maintain and update RESRAD-PROBABILISTIC, RESRAD-BUILD, RESRAD-CHEM, RESRAD-BASELINE, RESRAD-RECYCLE, and other related codes.

WM Descriptor(s): environmental management; environmental restoration; program management; r codes; technology development; training

Principal Investigator(s):

Helt, J.

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013691

USA19980014

Title:
Minimum Additive Waste Stabilization (MAWS) Program

Title in Original Language:

Topic Code(s):

101 -General policies; 105 -Waste Minimisation

Abstract:

The objective of the Minimum Additive Waste Stabilization (MAWS) program is to develop, install, and demonstrate a system which, through the treatment and blending of multiple waste streams, results in a waste stabilization process with minimum additives. The innovative system will be demonstrated at the Fernald Environmental Management Project (FEMP) in Fernald, Ohio. The program provides for a production-scale water treatment system, a soil treatment system, and on-site vitrification to be fully integrated and operated on site. The objective of this program is to demonstrate a system which, through the treatment and blending of multiple waste streams (initially Pit 5 sludges, spent ion exchange resins, and the contaminated fraction from

soil washing), results in a MAWS process. By blending these streams in the optimum proportions, overall volume reduction of the final waste form is maximized, and the requirement for additives that would otherwise be necessary for the vitrification process is minimized. The program relies on integration of soil washing, ion exchange, and vitrification processes at the Fernald site and is supported by laboratory studies at the Vitreous State Laboratory (VSL) of the Catholic University of America (CUA) and Lockheed Environmental Services and Technology Co. Phase II of the program provides for operation of a soil washing system, a water treatment system, and a 300 kg/day melter vitrification system at FEMP, as well as a 100 kg/day melter vitrification system at the VSL of the CUA.

WM Descriptor(s): environmental management; environmental restoration; minimization; program management; vitrification; waste management; waste processing

Principal Investigator(s):

Helt, J.

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Organization Performing the work:

Argonne National Laboratory
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013692

USA19980015

Title:

Technical Assessment and Support to the Office of Eastern Area Programs

Title in Original Language:

Topic Code(s):

101 -General policies; 102 -Programme Strategy, Planning and Management

Abstract:

Provide technical and administrative assistance to the Office of Eastern Area Programs (EM-42), Oak Ridge Program Division (EM-422), in the conduct of their line management responsibility for the formulation, execution, and evaluation of their programs, including: the planning, design, construction, and operation of facilities to treat, store, and dispose of radioactive, hazardous, mixed, and sanitary wastes; the incorporation of waste minimization concepts; the planning and conduct of decontamination and decommissioning, remedial actions, and surveillance and maintenance activities. At the request of DOE/EM, Argonne National Laboratory (ANL) will establish/maintain a cadre of highly experienced experts, from both ANL and non-ANL sources. The cadre of experts will assist EM by conducting studies and training, and developing guidelines and approaches for the conduct of headquarters and field operations; providing assistance in the conceptualizing, developing, and implementation of quality assurance programs, practices, and activities; assisting in the development and establishment of technically sound, safe, environmentally acceptable, and cost-effective operations in field operations; and assisting in the conduct of reviews, evaluations, and assessments to ensure the adequacy, compliance and effectiveness of the same.

WM Descriptor(s): environmental management; environmental restoration; minimization; planning; program management; waste management; waste processing

Principal Investigator(s):

Helt, J.

Argonne National Laboratory
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Organization Performing the work:

Argonne National Laboratory
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013693

USA19980016

Title:

Technical Support to DOE Decontamination and Decommissioning Programs and Northwestern Area Programs

Title in Original Language:

Topic Code(s):

101 -General policies; 102 -Programme Strategy, Planning and Management

Abstract:

The U.S. Department of Energy (DOE) Office of Environmental Management (EM) requires assistance in planning and executing environmentally related inventories. Argonne National Laboratory (ANL) has staff with expertise in required areas (e.g., interpretation of technical characterization data related to facility assessments and cleanups, establishment of guidelines for transfer of technical information, and environmental management quality assurance/quality control [QA/QC]). ANL staff will provide analysis in these and related areas to DOE. Much of this analysis must be done within very constrained schedules and must be quickly modified on the basis of reviews and data provided by EM staff. To meet these requirements, ANL staff members who work on this program will be detailed to work in EM offices. The U.S. Department of Energy (DOE), Office of Environmental Restoration and Waste Management, Office of Northwestern Area Programs (EM-44), has asked Argonne National Laboratory (ANL) to provide program management, technology development, laboratory performance assessment, and legislative monitoring support to DOE headquarters, operations offices, and EM-44 sites. Under EM-44 direction, ANL will assist in the effective management and oversight of technical programs addressing safety and health (S&H), quality assurance (QA), and legislative policy analysis. ANL will also assist EM-44 in assessing training needs for headquarters staff to effectively accomplish environmental restoration activities associated with the programmatic mission. ANL will identify requirements associated with S&H and QA programs; evaluate those requirements with respect to current and developing procedures; and provide tools for effective program implementation at headquarters, operations offices, and EM-44 sites. Upon EM-44's request, ANL will assist headquarters and the operations offices and sites in reviewing documents that address National Environmental Policy Act (NEPA); Resource Conservation and Recovery Act (RCRA); and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) issues. Under EM-44's direction, ANL will assist in identifying the technology needs, problems, and issues that affect EM-44. Finally, ANL will provide EM-44 with the information needed to maintain its understanding of the implications and requirements of existing and proposed statutes, regulations, and DOE orders related to environmental restoration. This effort will address internal DOE requirements, as well as federal, state, and local laws and regulations.

WM Descriptor(s): environmental management; environmental restoration; planning; program management; technology development; waste management; waste processing

Principal Investigator(s):

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Organization Performing the work:

Argonne National Laboratory
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013699

USA19980017

Title:

Technical Assessment and Support

Title in Original Language:

Topic Code(s):

101 -General policies; 102 -Programme Strategy, Planning and Management

Abstract:

This project includes three tasks to support EM-40:TASK 1: TECHNICAL SUPPORT 70 EM-42. Provide technical and administrative assistance to the Office of Eastern Area Programs (EM-42) in the conduct of their line management responsibility for the formulation, execution, and evaluation of their programs, including: the planning, design, construction, and operation of facilities to treat, store, and dispose of radioactive, hazardous, mixed, and sanitary wastes; the incorporating of waste minimization concepts; the planning and conduct of decontamination and decommissioning, remedial actions, and surveillance and maintenance activities. At the request of DOE/EM, Argonne National Laboratory (ANL) will establish/maintain a cadre of highly experienced experts, from both ANL and non-ANL sources. The cadre of experts will assist EM by conducting studies and training, and developing guidelines and approaches for the conduct of headquarters and field operations; providing assistance in the conceptualizing, developing, and implementation of quality assurance programs, practices, and activities; assisting in the development and establishment of technically sound, safe, environmentally acceptable, and cost-effective operations in field operations; and assisting in the conduct of reviews, evaluations, and assessments to ensure the adequacy, compliance, and effectiveness of the same.TASK 2: REVIEW OF LANDLORD AND MAINTENANCE. The task provides technical and administrative assistance to the Fernald Environmental Management Project Division (EM-423), Office of Eastern Area Programs (EM-42). This task consists of reviews of the Maintenance and Landlord operations at the Fernald facility. Specifically this will include Operations Readiness Reviews of several proposed clean-up projects, reviews and assessment of the ongoing Maintenance Operations and the associated costs, and value engineering and cost engineering of various remediation projects.TASK 3: COST VALIDATION STUDY. This task consists of reviews and assessments of cost estimates for the Oak Ridge (OR) Environmental Restoration Program projects. Specifically, this will include a bottoms-up detailed review and validation of the Current Year Work Plans (CYWP) for each of the sites. This task will involve a review of all technical scopes, schedules, and cost estimates for each Activity Data Sheet (ADS) in the CYWP, the quality of back-up and the value and use of the CYWP and its application to day-to-day management of the programs. This task also include a review and assessment of the FY 1995 Monthly Reviews, Mid-year Review, and Year-end Review for K-25, Portsmouth, and Paducah. Also included, is a review and assessment of the Cost Estimates for ten to twelve Oak Ridge ADSs. These reviews will consist of independent life-cycle cost estimates for the selected ADSs.

WM Descriptor(s): environmental management; environmental restoration; planning; program management; reviews; technology development; waste disposal; waste processing; waste storage

Principal Investigator(s):

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013702

USA19980018

Title:

High-Level Waste Technology

Title in Original Language:

Topic Code(s):

134 -Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies)

Abstract:

The activity consists of tasks to develop information on the behavior of high-level waste glasses. Based on a thorough review of the literature as identified in the document "High-Level Waste Borosilicate Glass: A Compendium of Corrosion Characteristics," inadequacies in the knowledge base related to glass performance were noted. The ongoing tasks were developed to address these inadequacies within a time frame to support the startup of vitrification facilities at Savannah River, West Valley, and Hanford [Tank Waste Remediation System (TWRS)]. Argonne National Laboratory (ANL) will continue to develop information to support the qualification of waste forms within the Vitrification Branch of DOE. The continued activity would take advantage of the facilities and expertise developed to date in the Program and would provide independent credibility to the performance of vitrified waste. The planned approach is to continue and conclude ongoing tasks as scheduled. No new experimental tasks are planned. Long-term tests using fully radioactive, actinide-doped, and simulated waste glasses, including the EA glass, will continue. Radioactive glasses include those based on actual tank sludge compositions from the Defense Waste Processing Facility and West Valley Demonstration Project. Information and test methods developed in the Program will be used to provide insight to the development of glass compositions for TWRS waste. All work will be done at Quality Level I.

WM Descriptor(s): borosilicate glass; corrosion; radioactive wastes; tanks; vitrification; waste processing

Principal Investigator(s):

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0013706

USA19980019

Title:
Analytical Laboratory Effort for the Waste Isolation Pilot Plant Waste Characterization Program

Title in Original Language:

Topic Code(s):
106 -Quality Assurance Aspects; 181 -Methodologies, Analytical Methods, Measurements Instrumentation; 184 -Mixed waste characterization

Abstract:
The Analytical Chemistry Laboratory (ACL) is providing support to the Waste Isolation Pilot Plant (WIPP) Waste Characterization Program under the National Transuranic Program Office (NTPO). The ACL will contribute to the Waste Characterization Program in three ways. First, ACL has been selected by the NTPO as the laboratory to prepare and distribute analytical samples for a Performance Demonstration Program involving waste sludge. A program is under way to characterize transuranic (TRU) solidified waste prior to its eventual shipment to the WIPP site for disposal. As part of this program, laboratories that are to perform analyses of the sludge must demonstrate the ability to accurately determine the level of target analytes in the sludge. The ACL will prepare synthetic waste sludge to be spiked with carefully measured amounts of toxic metals, semivolatile organic compounds (SVOCs), volatile organic compounds (VOCs), or polychlorinated biphenyls (PCBs). The sample material will be tested for accurate composition and shipped to participating laboratories. Laboratories participating in the Program include Oak Ridge, Los Alamos, and Rocky Flats Plant. Second, the ACL will analyze waste-drum headspace samples for volatile organic and inorganic gases. Qualification for conducting the analyses will be demonstrated by participation in a WIPP-directed Performance Demonstration Program. The methods used will be those given in the WIPP Quality Assurance Program Plan (QAPP) for analysis and ANL-East Quality Assurance Project Plan (QAPP). Third, as part of the NTPO effort to set up the capability for characterization of transuranic waste at small generator sites, the ACL will develop and field test methods for collection of headspace gas samples over TRU waste in drums at the Argonne-East site.

WM Descriptor(s): analytical methods; environmental management; hazardous materials; organic compounds; pilot plants; polychlorinated biphenyls; quality assurance; sludges; volatile matter; waste characterization; waste management

Principal Investigator(s):
Helt, J.

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Organization Performing the work:
Argonne National Laboratory
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Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0013707

USA19980020

Title:
Waste Isolation Pilot Plant (WIPP) Support

Title in Original Language:

Topic Code(s):
182 -Waste from form characterization; 184 -Mixed waste characterization

Abstract:
This project includes two tasks that support the DOE WIPP:TASK 1: WIPP WASTE CHARACTERIZATION. Contact-handled transuranic and alpha low-level mixed waste requires characterization to meet State and Federal requirements for the Resource Conservation and Recovery Act (RCRA) and Federal Facilities Compliance Act (FFCA). Characterization of waste is also required to supply data to performance assessment modeling which is necessary to get the DOE Waste Isolation Pilot Plant (WIPP) open as a permanent disposal facility. Over 130,000 containers of this waste are retrievably stored at the Radioactive Waste Management Complex, operated by Lockheed Idaho Technologies Company (LITCo). LITCo does not currently have a facility to characterize this waste. A LITCo facility is planned for construction, but is not expected to be operational until at least early FY98. Argonne-West has developed a new waste characterization facility within the Hot Fuel Examination Facility (HFEF), the Waste Characterization Area (WCA). Since 1991, 75 55-gal. drums of debris waste have been characterized in HFEF for the WIPP program; 32 in the spray chamber and 43 in the new WCA which became operational in April 1994. Equipment to perform sludge waste characterization is being added to the WCA, which is expected to become operational in March 1995. Approximately 90 drums of waste will be characterized and repackaged each year in the WCA. Characterization at ANL-W entails collection of gas samples from various regions within the drum and waste matrix, removal and visual examination of waste contents during which various physical parameters are estimated or measured (e.g., weight, surface area, volume), and repackaging of the waste contents into a new drum. Contamination levels of waste and within the WCA are monitored throughout the process. Fissile assay, real-time radiography, and container integrity data are provided to ANL-W prior to receipt of the waste from LITCo. TASK 2: WIPP GAS GENERATION EXPERIMENTS. Gas generation production caused by the decomposition of cellulosic waste, corrosion of metals, and radiolysis of water and waste may impact performance of the WIPP waste repository. A computer model is needed to predict gas generation species and rates from the date of first emplacement in the repository throughout the period of regulatory concern. An element necessary for model development is data from actual Gas Generation Experiments (GGE). Argonne-West and LITCO were selected by DOE to perform the GGE. The GGE entail development of the test equipment and containers, loading the containers with the real waste, sampling the containers over the test period, and development of necessary analytical methods/equipment necessary to analyze the by-product left after the test period, and analysis of the test by-products. ANL will capitalize on the work already conducted/funded by the WIPP program. The GGE are anticipated to be initiated by the end of FY95.

WM Descriptor(s): contamination; environmental management; gaseous wastes; pilot plants; sludges; waste characterization; waste management

Principal Investigator(s):
Helt, J.

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Organization Performing the work:
Argonne National Laboratory
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Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:

US0013708

USA19980021

Title:
Rehabilitation of Waste Management Building

Title in Original Language:

Topic Code(s):
401 -D&D Programme Strategy, Planning and Management

Abstract:

The purpose of this project is to rehabilitate the General Radioactive Waste Operations Area and Liquid Radioactive Waste Processing Areas in Building 306. Rehabilitation of these areas is important if the Laboratory is to continue to meet waste disposal requirements under RCRA and to ensure safe working conditions for Waste Operations employees.

WM Descriptor(s): compliance; decontamination; environmental management; personnel; remedial action; safety; waste management (non-defense)

Principal Investigator(s):
Helt, J.E.

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Organization Performing the work:
Argonne National Laboratory
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Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:

US0013713

USA19980022

Title:
Project Support to the Formerly Utilized Sites Remedial Action Program (FUSRAP)

Title in Original Language:

Topic Code(s):
501 -Project Planning and Management; 503 -Environmental Risk Evaluation including models

Abstract:

This work covers the activities necessary for full compliance with (1) the National Environmental Policy Act (NEPA); (2) the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA); and (3) other environmental requirements for the Formerly Utilized Sites Remedial Action Program (FUSRAP). The objective of this effort includes essential projectwide technical support activities as assigned by the U.S. Department of Energy (DOE) Project Manager of the Former Sites Restoration Division to fulfill its technical responsibilities under FUSRAP. These activities will include (1) providing project management support, (2) developing and reviewing technical guidance, (3) providing general technical assistance, (4) providing peer review of documents developed by others, (5) providing technical guidance to support treatment of radioactively contaminated soils, and (6) developing risk assessments and hazard analyses of site contamination. Because of Argonne National

Laboratory's (ANL's) prior involvement and special expertise in FUSRAP, ANL staff will be assigned to the DOE Oak Ridge Office to provide on-site technical assistance.

WM Descriptor(s): compliance; environmental management; environmental restoration; program management; risk assessment; Us National Environmental Policy Act

Principal Investigator(s):

Helt, J.

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013717

USA19980023

Title:

Experimental Boiling Water Reactor (EBWR) Facility Decommissioning

Title in Original Language:

Topic Code(s):

403 -Research Reactor Decommissioning

Abstract:

This project includes the following activities for decommissioning the EBWR at ANL: Removal of Biological Shield, Size reduce & package Reactor Internals, Size reduce & package D&D Support Systems, Facility Decontamination, Final Survey, and Ongoing surveillance and maintenance.

WM Descriptor(s): BWR type reactors; maintenance; monitoring; reactor decommissioning; research reactors

Principal Investigator(s):

Helt, J.E.

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013722

USA19980024

Title:
Decommissioning and Decontamination of the CP-5 Research Reactor

Title in Original Language:

Topic Code(s):
403 -Research Reactor Decommissioning

Abstract:
This project includes CP-5 reactor complex removal activities, decontamination and decommissioning of the JANUS reactor, submission of the JANUS closeout package, and surveillance and maintenance of both facilities.

WM Descriptor(s): decontamination; maintenance; monitoring; reactor decommissioning; research reactors

Principal Investigator(s):
Helt, J.E.

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Organization Performing the work:
Argonne National Laboratory
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Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0013723

USA19980025

Title:
Facility Operations and Maintenance

Title in Original Language:

Topic Code(s):
102 -Programme Strategy, Planning and Management; 112 -Liquid Waste Treatment; 152 -Liquid Waste Treatment; 162 -Liquid Waste Treatment

Abstract:
This project includes 11 tasks supporting Environmental Management (EM) Program activities at ANL-West. (1) Development and revision to the ANL-W site EM Activity Data Sheets, Task Description documents, Site-specific Plans, Baseline Cost Documents. (2) Operation, packaging and disposal of the Radioactive Liquid Waste Treatment Facility (RLWTF) Shielded Hot Air Drum Evaporator (SHADES) which receive radioactive low-level waste water from STET facilities. (3) Proper shipment and storage of TRU and mixed waste contaminated with sodium. (4) Proper shipment and disposal of low-level radioactive waste to the Radioactive Waste Management Complex (RWMC) at the Idaho National Engineering laboratory (INEL). (5) Proper shipment and disposal of hazardous waste. It also includes the support to the hazardous waste program at the Idaho National Engineering Laboratory (INEL) for operations and maintenance of the Hazardous Waste Storage Facility (HWSF). (6) Activities related to several Tiger Team Findings, including waste water characterization, evaluations of land application permit applicability and National pollution Discharge Elimination System (NPDES) applicability (includes storm water discharges). (7) Development and implementation of a comprehensive waste management training program and the continuance of this training in the out years. In addition, this task includes annual updates to the HFEF & FCF Sampling and Analysis and Waste Certification and Characterization Plans. (8) Activities related to submitting a RCRA Part B Storage Permit Application. (9) Operational activities at the Radioactive Scrap and Waste Facility (RSWF) providing

compliance with the RSWF RCRA Permit, including removal or relocation of low-level waste that was stored in the RSWF prior to availability of waste casks, program support activities (e.g. contracts, documentation, scheduling) and maintenance and inspections as identified in the RSWF RCRA Storage Permit. (10) Proper shipment and disposal of Transuranic (TRU) Waste to the Radioactive Waste management Complex (RWMC) at the Idaho Nuclear Engineering Laboratory (INEL). Disposal is scheduled to be at WIPP. The RWMC provides interim storage while awaiting the opening of WIPP. (11) Proper shipment and storage of mixed waste. It also includes the support to the mixed waste program at the Idaho National Engineering Laboratory (INEL) for operations and maintenance of the Radioactive Mixed Waste Storage Facility (RMWSF).

WM Descriptor(s): environmental management; hazardous materials; liquid wastes; program management; training; waste management (non-defense); waste transportation

Principal Investigator(s):

Helt, J.E.

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Organization Performing the work:

Argonne National Laboratory
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013725

USA19980026

Title:

Central Liquid Processing Area Decontamination & Decommissioning

Title in Original Language:

Topic Code(s):

401 -D&D Programme Strategy, Planning and Management

Abstract:

This project includes surveillance and maintenance activities for the Central Liquid Processing Area.

WM Descriptor(s): decommissioning; decontamination; liquid wastes; monitoring; program management; waste processing

Principal Investigator(s):

Helt, J.E.

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013729

USA19980027

Title:

Contract Administration and Technical Support for DOE's Minimum Additive Waste Stabilization Program

Title in Original Language:

Topic Code(s):

102 -Programme Strategy, Planning and Management; 105 -Waste Minimisation

Abstract:

The objective of the Minimum Additive Waste Stabilization (MAWS) program is to determine a system which, through the treatment and blending of multiple waste streams, results in a waste stabilization process with minimum additives. The innovative system will be demonstrated at the Fernald Environmental Management Project (FEMP) in Fernald, Ohio. The program provides for a production-scale water treatment system, a soil treatment system, and a vitrification system to be fully integrated on a site within 10 months. The chemical nature of individual waste streams will be exploited. By blending them in the optimum proportions, overall volume reduction of the final waste form can be maximized, and the requirements for additives that would otherwise be necessary for the vitrification process can be minimized. The program relies on the integration of soil washing, ion exchange, and vitrification technologies, all of which individually impart substantial volume reductions. These volume reductions are further enhanced by the synergistic use of their waste products in combination with other waste streams. The end result is an integrated process, based on stabilization by vitrification, which maximizes volume reduction and minimizes the overall cost of treatment and disposal of multiple waste streams through a minimum additive process. The vitrification system shall be capable of vitrifying asbestos (transite) with little or no modification. This capability is necessary for future DOE development and R&D programs on nuclear and hazardous waste management.

WM Descriptor(s): environmental management; minimization; program management; technology development; vitrification; volume; waste management; waste processing; waste processing plants

Principal Investigator(s):

Helt, J.E.

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Organization Performing the work:

Argonne National Laboratory
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013740

USA19980028

Title:

Minimum Additive Waste Stabilization Compositional Envelope

Title in Original Language:

Topic Code(s):

102 -Programme Strategy, Planning and

Management; 104 -Database & Information Systems, including Technology Transfer Systems. Technical Assistance and Costs; 105 -Waste Minimisation

Abstract:

Most DOE sites have a large variety of predominantly inorganic waste streams (e.g. sludges, ashes, contaminated soils/water, and transite/asbestos) to which the Minimum Additive Waste Stabilization (MAWS) concept can be applied and has potential for significant cost savings resulting from remediation and treatment activities. Vitrification is a viable process where organic components are destroyed and toxic metals and radionuclides are incorporated into the glass matrix. The leachability of the resulting waste glass is dependent upon the waste matrix. Therefore it is important to understand the range of waste materials that can be treated to produce a leach resistant glass. In addition, it is also important to know how quality glass can be produced with high waste loading to render vitrification a cost effective alternative for the vast amount of low level mixed waste. This can be accomplished by minimizing additives while substituting wastes with similar molecular constituents for the glass formers and fluxes. This is known as the Minimum Additive Waste Stabilization (MAWS) approach. The objective of this project is to provide a database of waste glass properties (both processing and leach performance) and models to guide, focus, and expedite continuing development studies required for new LLW/LLMW streams. This will help to reduce overall development costs, and reduce cycle time from waste characterization to technology implementation. This glass compositional envelope information should permit more rapid identification of optimal formulations and provide an evaluation of the applicability and potential benefits of the MAWS technology for relevant remediation problems. Also, this effort should be coordinated with efforts in developing the glassy slag (ceramic) waste forms compositional envelope so that where possible similar data are obtained to fill the database and similar models can be applied for predicting performance. This will require considerable communication and coordination concerning sharing of techniques so that data are consistent and data base/model structures filled so that a single product can be obtained.

WM Descriptor(s): environmental management; inorganic compounds; materials testing; minimization; program management; slags; technology development; vitrification; waste management

Principal Investigator(s):

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013751

USA19980029

Title:

Extension of Minimum Additive Waste Stabilization Approach to Glassy Slag Final Waste Forms

Title in Original Language:

Topic Code(s):

101 -General policies; 102 -Programme Strategy, Planning and Management; 105 -Waste Minimisation

Abstract:

Many DOE sites have large volumes of waste which may not be amenable to disposal in glass waste forms. These wastes contain large amounts of scrap metals, high contents of elements which form crystals within the waste form (such as Cr, Ni, Ti, Fe, Ca, and Mg) and low contents of flux materials (such as alkalis and boron), which are required for adequate viscosity and electric conductivity of the glass melt. Vitrification of these waste streams would require low waste loadings and the addition of large amounts of expensive additives, which are contrary to the goals of volume reduction and cost savings during remediation and treatment of these waste streams. The objective of this program is, by utilizing tailored slag waste forms, to expand the range of waste streams that can be treated using the Minimum Additive Waste Stabilization (MAWS) approach to include those waste streams not amenable to glass waste forms. Composition ranges appropriate for the production of tailored slag waste forms will be identified for these waste streams. These will complement the composition envelope being studied by GTS Duratek and the Catholic University of America (CUA) for glass waste forms. The applicability of the MAWS approach to any DOE waste streams could then be assessed, including whether a glass or tailored slag waste form was suitable and what additives are required. These composition envelopes will serve as guides for remediation of various waste streams and reduction of overall disposal costs.

WM Descriptor(s): environmental management; minimization; scrap metals; slags; technology development; vitrification; waste characterization

Principal Investigator(s):

Helt, J.E.

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Organization Performing the work:

Argonne National Laboratory
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013752

USA19980030

Title:

TRUEX Model Validation

Title in Original Language:

Topic Code(s):

102 -Programme Strategy, Planning and Management; 130 -HIGH LEVEL WASTE; 150 - ALPHA BEARING/TRU WASTE

Abstract:

In this program, the Center for TRUEX Technology Development at Argonne National Laboratory (ANL) will perform tasks to broaden the applicability of TRUEX processing of high-level waste (HLW) and transuranic-containing (TRU) waste streams. Treatment of stored wastes by the TRUEX process will lower the costs of final disposal significantly, treatment of waste streams as they are generated will allow recycle of streams and avoidance of future waste treatment and disposal costs. Specific tasks center on writing a report on the status of TRUEX process development. Special emphasis will be paid to where and on what streams use of the TRUEX process is anticipated and the timing of these activities.

WM Descriptor(s): environmental management; high-level radioactive wastes; program management; technology development; transuranium compounds; waste processing

Principal Investigator(s):

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Organization Performing the work:

Argonne National Laboratory
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013753

USA19980031

Title:

Advance Chemical Separation Processes-Clean Option Strategy

Title in Original Language:

Topic Code(s):

105 -Waste Minimisation; 132 -Liquid Waste Treatment; 152 -Liquid Waste Treatment

Abstract:

The objective of this project is to develop and test new advanced extraction/recovery processes in support of the Clean Option strategy. The new processes begin with the Sr-TRU fraction obtained from a front-end Combined TRUEX-SREX Extraction/Recovery Process carried out on simulated dissolved sludge waste. The new processes are designed to remove all inert constituents from Sr, Np, Pu, and Am(Cm) including Ba from Sr and lanthanides and Bi from Am(Cm). By combining the advanced processes with the front-end TRUEX-SREX process, the volume of waste requiring vitrification will be reduced to a minimum. Research and development efforts will focus on cold and hot testing flowsheets in a continuous countercurrent mode using centrifugal contactors. The success of the processes will be evaluated in terms of the reduction of Sr in Ba and Am(Cm) in lanthanides.

WM Descriptor(s): americium isotopes; environmental management; extraction; minimization; radioactive waste processing; sludges; strontium isotopes; technology development; vitrification

Principal Investigator(s):

Helt, J.E.

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Organization Performing the work:

Argonne National Laboratory
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013755

USA19980032

Title:
Biphasic Systems for Radioactive Waste Pretreatment

Title in Original Language:

Topic Code(s):
162 -Liquid Waste Treatment

Abstract:

The objective of this task is to determine the feasibility of using Aqueous Biphasic Separation (ABS) systems based on polyethylene glycols (PEGs) for the selective extraction and recovery of I, Se, and Tc from caustic solutions containing high concentrations of nitrate, nitrite, and carbonate. Partitioning of the targeted anions will be measured by batch extractions and correlated with aqueous feed composition, PEG molecular weight, and PEG concentration. Phase diagrams will be constructed for aqueous biphase systems using supernatant compositions from a simulated single-shell tank. The biphase system will be optimized with respect to selective extraction of I, Se, and Tc. The partitioning behavior of the major ions present in the supernatant feeds will also be determined. Ion stripping from loaded PEG phases will be investigated using electrodialysis. Other stripping techniques using water-soluble complexants will also be examined. Preliminary flowsheet evaluation will involve a countercurrent extraction test using a simulated tank waste feed. This test will permit a realistic assessment of decontamination factors and processing costs. This task will be carried out jointly with researchers at Northern Illinois University. A final technical assessment report will be provided 36 months after the start of the program.

WM Descriptor(s): decontamination; electrodialysis; environmental management; extraction; feasibility studies; phase diagrams; polyethylene glycols; radioactive waste processing; separation processes; technology development

Principal Investigator(s):
Helt, J.E.

Argonne National Laboratory
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60439

Organization Performing the work:
Argonne National Laboratory
Argonne 60439 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:

US0013756

USA19980033

Title:
Plasma Hearth Process (PHP) Radioactive Testing

Title in Original Language:

Topic Code(s):
112 -Liquid Waste Treatment; 152 -Liquid Waste Treatment

Abstract:

The DOE has large volumes of diverse mixed waste; storage and disposal options are lacking, as well as

treatment capability and capacity. Argonne will apply its shielded and alpha-qualified facilities to development and demonstration of technologies for remediating DOE mixed wastes. One such demonstration that is currently under development at ANL-W is the Plasma Hearth Process (PHP). Radioactive testing of a bench-scale and later a field-scale PHP unit will be conducted in the Transient Reactor Test (TREAT) facility at ANL-W over the next few years. ANL-W is teamed principally with SAIC and Lockheed Idaho Technologies Company in the PHP demonstrations; the project has been chosen for evaluation by the Western Governor's Association, which includes involvement from regulatory agencies and stakeholders. This project involves the design, construction, testing, and evaluation of the PHP in the treatment of surrogate and actual radioactive waste. The testing will be performed initially on a bench-scale (approximately 150 kW) system that is closely configured to the near-full scale, nonradioactive PHP pilot system currently being developed and tested at the Retech facility in Ukiah, CA under separate projects. A full size field-scale demonstration system will then be designed, permitted, constructed, and demonstrated at TREAT on drums of actual INEL stored alpha contaminated low-level mixed waste.

WM Descriptor(s): alpha-bearing wastes; bench-scale experiments; environmental management; hazardous materials; low-level radioactive wastes; radioactive waste processing; technology development

Principal Investigator(s):

Helt, J.E.

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Organization Performing the work:

Argonne National Laboratory
Argonne 60439 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013757

USA19980034

Title:

Process Monitoring and Control

Title in Original Language:

Topic Code(s):

162 -Liquid Waste Treatment; 163 -Solid Waste Treatment

Abstract:

This project supports a direct, user-identified need for waste stream diagnostic and control (WSD&C) technologies and methodologies to support the thermal and non-thermal treatment of low-level mixed wastes (LLMW). The primary tasks/objectives of the FY95 project are: (1) install an alpha glove box and associated equipment for comparison testing of X-ray fluorescence and ICP-AES on selected wastes; (2) perform instrumentation testing of FTIR and glow discharge monitors; (3) evaluate a radio-frequency inductively coupled plasma/catalytic gas treatment system, and (4) perform presentations and travel as necessary. The above activities will be coordinated with the DIAL laboratory at Mississippi State University. This work is in direct support of the plasma hearth process bench and field-scale demonstrations.

WM Descriptor(s): environmental management; gloveboxes; instrumentation; low-level radioactive wastes; technology development

Principal Investigator(s):

Helt, J.

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60439

Organization Performing the work:

Argonne National Laboratory
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013767

USA19980035

Title:

Phosphate Bonded Ceramics for Stabilizing Problem Low-Level Mixed Waste

Title in Original Language:

Topic Code(s):

164 -Waste Immobilization

Abstract:

The goal of this project is to demonstrate chemically bonded phosphate ceramics as a low-temperature solidification and stabilization technology for "real" secondary mixed waste streams generated from high-temperature processes, such as plasma hearth. This work will complement the plasma hearth process (PHP) demonstration and make it a truly integrated demonstration by solidifying secondary waste streams generated from the PHP off-gas cleanup. In addition, this work will show that phosphate ceramics can stabilize other "problem" waste streams (e.g., wastes containing volatiles, fluorides, pyrophorics, etc.) that are not amenable to solidification using high-temperature processes. In this project, major tasks include performing 1) solidification and stabilization of actual mixed waste and 2) scale-up of the fabrication processes.

WM Descriptor(s): ceramics; environmental management; hazardous materials; phosphates; radioactive waste processing; solidification; technology development

Principal Investigator(s):

Helt, J.E.

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Organization Performing the work:

Argonne National Laboratory
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013768

USA19980036

Title:

Plasma Hearth Process (PHP) Slag Chemistry and Slag/Metal Processing

Title in Original Language:

Topic Code(s):

152 -Liquid Waste Treatment; 162 -Liquid Waste Treatment

Abstract:

The purpose of this task is to define the design basis and validate the final design of the slag/metal removal and handling system to be built for the field-scale radioactive PHP system by SAIC and Retech, Inc. This task will ensure that the design will meet DOE nuclear facility design and safety requirements for plutonium service. To complete the PHP system design, a process and equipment for separating, handling, solidifying, and packaging the slag and metal will be developed and integrated with the plasma hearth furnace. Further, this system must meet confinement requirements for the handling alpha-bearing materials (i.e., plutonium). Many of the DOE mixed wastes contain a mixture of hazardous organics and heavy metals in some heterogeneous matrix, for which available treatment technologies are limited. Disposal of these mixed wastes is driven by the EPA's Land Disposal Restrictions (LDRs), requiring treatment to defined levels of allowable concentrations prior to final disposal. There is currently no proven, commercially available technology available that will treat a majority of these wastes, especially the alpha-contaminated wastes. The PHP concept, when applied to waste treatment, produces a final waste product that is expected to be in full conformance with LDR standards. Materials that are not converted to chemically benign gas phase by the plasma process will form a molten vitreous slag that, when removed from the furnace, solidifies into a physically and chemically stable and compact waste form.

WM Descriptor(s): alpha-bearing wastes; environmental management; hazardous materials; organic wastes; radioactive waste processing; slags; solidification; technology development

Principal Investigator(s):

Helt, J.E.

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Organization Performing the work:

Argonne National Laboratory
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013769

USA19980037

Title:

Improved Concrete Cutting Methods

Title in Original Language:

Topic Code(s):

421 -Dismantling Techniques

Abstract:

This task will develop improved concrete cutting methods for the dismantlement of contaminated concrete structures. The purpose and scope requires improvements on concrete cutting technologies. The site selection transmitted to meet this requirement. An informal estimate of total projected cost for the previous month should be included in each month's report. The principal investigator must attend the May 1995 D&D ID TST Technical Support Group (TSG) mid-year technical review of all ongoing work sponsored by the Facilities

Transitioning, Decommissioning, and Final Disposition focus Area.

WM Descriptor(s): concretes; contamination; cutting; cutting tools; environmental management; technology development

Principal Investigator(s):

Helt, J.

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60439

Organization Performing the work:

Argonne National Laboratory
Argonne 60439 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013772

USA19980038

Title:

Focus Area Cost Savings

Title in Original Language:

Topic Code(s):

400 -D&D - GENERAL

Abstract:

Argonne National Laboratory will provide quantitative cost data to the U.S. Department of Energy (DOE) Office of Technology Development (EM-541) and will evaluate various cost savings opportunities that may exist in ongoing and future decontamination and decommissioning (D&D) activities. These data will allow EM-451 to evaluate ongoing research and development programs, refocus those programs if necessary, and assure that DOE resources are used in a cost-effective manner.

WM Descriptor(s): cost; cost estimation; decommissioning; decontamination; environmental management; program management; technology development

Principal Investigator(s):

Helt, J.

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013776

USA19980039

Title:
TUCS/Phosphate Immobilization

Title in Original Language:

Topic Code(s):

201 -Dispersion and Migration of Radionuclides; 333 -Landfill site remedial actions

Abstract:

The Efficient Separations and Processing Integrated Program needs statement ES-3 requests technologies for stabilization of radionuclide and hazardous buried waste contaminants to reduce and/or eliminate the potential for migration of these contaminants from the buried waste matrix. A primary release mechanism for buried wastes is contaminant leaching from the matrix by groundwater. This initiative is designed to reduce the solubility of heavy metals (in particular, actinides) in ground waters and surface soils by phosphate mineralization. It comprises the measured addition of an organophosphorous reagent designed to release phosphate (the precipitant) to the groundwater or soil in a manner which is most favorable for the formation of thermodynamically stable insoluble phosphate mineral phases. This strategy also could be applied to stabilize heavy metals in mill tailings piles.

WM Descriptor(s): environmental management; ground water; leaching; mill tailings; mineralization; phosphates; radioisotopes; remedial action; technology development

Principal Investigator(s):

Helt, J.E.

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013777

USA19980040

Title:
Transportation Management Support

Title in Original Language:

Topic Code(s):

118 -Waste Transportation (Methods, Containers, Transportation Means); 148 -Spent Fuel Transportation (Methods, Casks, etc.); 168 -Waste Transportation (Methods, Containers, etc.)

Abstract:

This project includes six transportation management support activities: TASK 1: TRANSPORTATION MANAGEMENT SUPPORT. The purpose of this task is to provide transportation/traffic management technical support to the Transportation Management Division (EM-26). This support is provided through the ANL Transportation and Hazardous Waste Technical Office. For this activity, ANL contracts with experienced transportation staff to perform the tasks required. The work required involves a variety of activities. However, each task is determined by EM-26 on an as-needed basis. The work is coordinated with ANL through the CH

transportation manager.TASK 2: TRAINING SUPPORT. In August 1994, representatives from EM-26, Westinghouse Hanford, Transportation Consulting Services, and Argonne National Laboratory met to formulate a development plan for a DOE training course to integrate DOT, OSHA and EPA requirements. This new course would avoid training overlaps and ensure that necessary topics for mid-level managers were adequately covered. The present DOT/OSHA/EPA course is designed for DOE contractor personnel engaged in operations involving transportation of hazardous materials and hazardous waste. This course, while useful to managers and supervisors, does not create a bridge or integration of the three regulatory agencies and the current OSHA coverage is minimal. The course being developed will be two days designed for the manager/supervisor who is employed by a DOE contractor and has responsibility for HazMat employees.TASK 3: INFORMATION AND EVALUATION. Develop films and videos for a variety of audiences, update existing films and identify new topics for videos. Support other Transportation Management Program activities such as instructional material for Shipping Campaign Guide and media video clips focusing on current shipping activities. Also provide technical assistance to DOE on a variety of generic transportation issues and problems. TASK 4: EMERGENCY PREPAREDNESS GUIDANCE DEVELOPMENT, TRAINING, PLAN REVIEW, AND EXERCISE SUPPORT. The U.S. Department of Energy (DOE) has issued orders that govern emergency planning (5500 series) and list requirements for categorizing, notifying, and reporting reportable occurrences that take place at DOE facilities and that are related to transportation activities (5000.3A). DOE Program Secretarial Officers (PSOs) must ensure that adequate emergency plans and emergency preparedness plans are developed for facilities and activities under their purview, in accordance with DOE Orders and Emergency Management Guides issued by the Director of Emergency Operations (DEO). Under work performed for the DOE Office of Defense Programs (DP), Argonne National Laboratory (ANL) prepared a document entitled {ital Criteria for Evaluation of Operational Emergency Plans}.TASK 5: HAZTRANZ: EDUCATIONAL MATERIALS DEVELOPMENT. The purpose of this task is the distribution and utilization of the curricular package called The Haztranz Experience in community schools where a significant concern over the transportation of radioactive materials has raised public concern. The Haztranz curricular package is designed for the use of students from middle school to high school and is designed to give students a good understanding of the nature of radioactivity and the system that exists for the safe transportation of radioactive materials. The package contains a video, a Teachers Guide, and a simulation game of the transportation process for radioactive materials. The game is called the Haztranz game and it gives students an experiential review of the organization and safety of the transportation system. The curricular package and the game were developed in a collaborative process by teachers, scientists, and technicians involved in the radioactive materials transportation process. The request will support teacher training, evaluation, distribution, and implementation of the curricular in a number of communities with concerns. TASK 6: TRANSPORTATION OUTREACH EVALUATION. Argonne National Laboratory will provide continued support to the U.S. Department of Energy, Office of Special Programs, in evaluating liaison and communications activities for transporting hazardous and radioactive materials.

WM Descriptor(s): environmental management; program management; public information; training; transportation management; waste transportation

Principal Investigator(s):

Helt, J.

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Organization Performing the work:

Argonne National Laboratory
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013779

USA19980041

Title:
Technical Assessment and Support to the Office of Waste Isolation Pilot Plant Program

Title in Original Language:

Topic Code(s):
101 -General policies; 102 -Programme Strategy, Planning and Management; 106 -Quality Assurance Aspects

Abstract:
Provide technical and administrative assistance to the Office of Waste Isolation Pilot Plant Program (EM-34) in the conduct of their line management responsibility for the formulation, execution, and evaluation of their programs, including: the planning, design, construction, and operation of facilities to treat, store, and dispose of radioactive, hazardous, mixed, and sanitary wastes; the incorporation of waste minimization concepts; the planning and conduct of decontamination and decommissioning, remedial actions, and surveillance and maintenance activities. At the request of DOE/EM, Argonne National Laboratory (ANL) will maintain a cadre of highly experienced experts, from both ANL and non-ANL sources. The cadre of experts will assist EM by conducting studies and training, and developing guidelines and approaches for the conduct of headquarters and field operations; by providing assistance in the conceptualizing, developing, and implementation of quality assurance programs, practices, and activities; by assisting in the development and establishment of technically sound, safe, environmentally acceptable, and cost-effective and timely operations in field operations; and by assisting in the conduct of reviews (such as operational readiness), evaluations, and assessments to ensure the adequacy, compliance, and effectiveness of the same.

WM Descriptor(s): construction; design; pilot plants; program management; radioactive waste disposal; radioactive waste facilities; radioactive waste management; radioactive waste processing

Principal Investigator(s):
Helt, J.

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Organization Performing the work:
Argonne National Laboratory
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Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0013782

USA19980042

Title:
Environmental Management Baseline Cost Estimation

Title in Original Language:

Topic Code(s):
400 -D&D - GENERAL; 401 -D&D Programme Strategy, Planning and Management

Abstract:
This project is to complete a multi-year baseline cost estimate at Battelle Columbus Laboratories (BCL) as part of their Decontamination and Decommissioning (D&D) Project. The activity will be for selected facilities and

conducted by Argonne National Laboratory (ANL) in accordance with Department of Energy (DOE) guidance for the preparation of cost estimates, and with project specific requirements. The first phase of this effort consists of the final consolidation and transmittal of a technical scope baseline. The objective of this phase is to establish a consistent, defensible and fully traceable technical scope baseline utilizing as much existing data as possible. Where data is lacking, field observations will be made for the necessary information or assumptions documented to provide a complete scope. In the second phase, a baseline cost estimate will be prepared utilizing the technical baseline developed under Phase I and the data available from prior estimates and historic job performance. Results of this effort will be a technical baseline consisting of "building books" for each building and definition of activities or scope associated with the non-D&D elements of the project.

WM Descriptor(s): cost estimation; decommissioning; decontamination; environmental management; environmental restoration

Principal Investigator(s):

Helt, J.

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Organization Performing the work:

Argonne National Laboratory
Argonne 60439 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013783

USA19980043

Title:

Site A Technical Planning

Title in Original Language:

Topic Code(s):

211 -Biological Uptake Mechanisms and Models;
241 -Monitoring Programmes

Abstract:

The purpose of this work is to provide whole body counting services in support of Bechtel Corporation, a DOE contractor working at Site A. Site A is a contaminated former site of Argonne and Metallurgical Laboratory activities where radioactive waste was stored and where contamination of the environment has occurred. The whole body counting support was requested from the Argonne ESH Division by DOE-CH personnel in FY94 for Bechtel's internal dosimetry program. Whole body counting data provide a quantitative basis for the estimation of internal doses attributable to work at Site A.

WM Descriptor(s): dose rates; environmental exposure; monitoring; personnel; radioactive waste storage; uptake

Principal Investigator(s):

Helt, J.

Argonne National Laboratory
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60439

Organization Performing the work:

Argonne National Laboratory
Argonne 60439 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0013784

USA19980044

Title:
Surveillance and Monitoring: Piqua Nuclear Power Facility, Ohio

Title in Original Language:

Topic Code(s):
403 -Research Reactor Decommissioning

Abstract:
The Piqua Nuclear Power Facility (PNPF) located in western Ohio is owned by the City of Piqua and controlled by the Piqua Municipal Power System. The PNPF was an organic cooled nuclear power plant constructed by the Atomic Energy Commission and the City of Piqua as part of the AEC Power Demonstration Reactor Program. The AEC financed the construction, while the City of Piqua provided the site, provided the electrical generating portion of the plant, and operated the facility. Decommissioning of this facility was completed in 1969. All fuel was removed and the reactor was entombed. Since this time the facility has been surveyed annually. The facility is retained in the SFMP due to the radiological survey requirements. Routine activities included under this task are the physical inspection of the facility for containment deterioration, radiological sampling in the vicinity of the facility, and the preparation of an annual report summarizing the current facility status. In FY 1993, additions to the routine activities may include collection and analysis of water samples from sump P-17, additional non-radiological analysis of facility tap water to establish complete and comparable background data, and will include replacement of radon canisters for continued long-term assessment. Sampling will indicate the need, or lack thereof, for further sampling or remediation of facility sumps.

WM Descriptor(s): containment; demonstration programs; environmental management; environmental restoration; ground water; monitoring; reactor decommissioning

Principal Investigator(s):
Helt, J.E.

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Organization Performing the work:
Argonne National Laboratory
Argonne 60439 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0013785

USA19980045

Title:
Remedial Action Surveillance

Title in Original Language:

Topic Code(s):

221 -Environmental Transfer Models; 241 -Monitoring Programmes; 522 -Decontamination of Groundwaters

Abstract:

The surveillance and maintenance program is for the former site of the Metallurgical and Argonne National Laboratories in the Palos Park Forest Preserve southwest of Chicago, Illinois. The site consisted of two parts: Site A, a 20-acre area that contained several reactors and laboratory buildings; and Plot M, a one-acre radioactive-waste burial ground. Continued radiological surveillance constitutes the present remedial action program for this site, as determined from a radiological and geohydrological survey and an environmental analysis report based on that survey. Other remedial actions may be taken in the future, and may require modifications in the current surveillance program. The program is designed to monitor the elevated hydrogen-3 (as tritiated water) content in some of the picnic wells in the Forest Preserve, determine the migration pathway of water from the burial ground to the wells, establish if other buried radionuclides or hazardous substances have migrated, and otherwise characterize the radiological and pollutant environment of the area. The work consists of: 1) analyses of water from all wells and surface streams in the area; 2) monitoring of water levels and pollutant concentrations in the dolomite aquifer and glacial till overburden; and 3) a study of the geohydrology of the area.

WM Descriptor(s): environmental management; environmental restoration; ground water; hydrology; monitoring; pollutants; radioactive waste disposal; radionuclide migration; remedial action; tritium oxides

Principal Investigator(s):

Helt, J.

Argonne National Laboratory
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Organization Performing the work:

Argonne National Laboratory
Argonne 60439 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013786

USA19980046

Title:

Development and Implementation of Environmental Technology

Title in Original Language:

Topic Code(s):

162 -Liquid Waste Treatment; 163 -Solid Waste Treatment; 502 -Feasibility Studies

Abstract:

The initial objective of the program is to provide a methodology and the necessary fiscal and management controls to develop, demonstrate, and implement treatment technologies for mixed low-level radioactive and hazardous wastes that exist at DOE/AL sites. The goal is to establish treatment capacity for LLMW, and provide a systematic and defensible mechanism for meeting the requirements of the Federal Facilities Compliance Act (FFC Act). Once proven, this program can be expanded to include mixed wastes at other sites within the DOE complex, and to include other types of waste, such as those resulting from environmental

remediation activities and transuranic-contaminated (TRU) wastes. This project has the following goals: - Develop sampling and analytical protocols, especially for non homogeneous solid wastes. Establish analytical capacity and characterize legacy wastes. - Continue development of promising treatment processes at bench scale, and investigate new promising technologies, in cooperation with other DOE/AL sites. - Build treatment units, whenever a technology has been demonstrated for specific wastes, that are portable and can be used at other sites. - Demonstrate treatment units to confirm or improve equipment design and operating conditions. Operate treatment units to treat wastes. - Transfer demonstrated technologies to private or federal entities. Engineer treatment units as required by other entities. - Provide operation experience to other entities. Develop new analytical techniques specific to wastes and treatments, or to meet more stringent regulations.

WM Descriptor(s): environmental management; environmental restoration; feasibility studies; hazardous materials; low-level radioactive wastes; sampling; technology development; waste management (defense); waste processing

Principal Investigator(s):

DEVAURS, MICHELINE

Los Alamos National Laboratory
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87545

Organization Performing the work:

Los Alamos National Laboratory
Los Alamos 87545 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0021698

USA19980047

Title:

Technology Development

Title in Original Language:

Topic Code(s):

163 -Solid Waste Treatment; 169 - Removal/Recycling of Organics

Abstract:

Waste treatment processes in progress include Reactive Metals treatment, lead contaminated soils, barium sand skid, gas cylinder treatment, electro-oxidation of organics, electroplating waste treatment, the DETOX skid, a portable utility skid, ash immobilization and the uranium chips skid. TDD 4165 scope contained the development of improved methods for treating radioactively contaminated wastewater, including analytical development, primary treatment and specific treatment problems. The gas cylinder treatment skid involves development and testing of equipment which will safely destroy hazardous and toxic gases from waste gas cylinders by scrubbing with caustic acid and other liquids. Many hazardous, toxic, flammable and radioactive gases cannot be shipped off-site for treatment and can be treated by this skid-mounted, gas scrubbing system. Ash immobilization supports development of the ash immobilization process which will complement the incineration of waste using the Controlled Air Incinerator (CAI). The process will verify ash generated by the CAI in borosilicate glass for safe transportation, storage, and disposal. Development activities include ash characterization, glass development bench scale testing and nonradioactive full-scale testing. Primary responsibility for purchase of capital equipment, final location of the system, preparation of safety documents and operational procedures, as well as routine processing of ash lies with the CAI team.

WM Descriptor(s): ashes; environmental management; metals; soils; technology development; waste management (defense); waste processing

Principal Investigator(s):

DEVAURS, MICHELINE

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Organization Performing the work:

Los Alamos National Laboratory
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0021699

USA19980048

Title:

WASTE ISOLATION PILOT PLANT

Title in Original Language:

Topic Code(s):

157 -Waste Disposal

Abstract:

The Waste Isolation Pilot Plant (WIPP) has been authorized (Public Law 96-164) "as a defense activity of the DOE for the express purpose of providing a research and development facility to demonstrate the safe disposal of radioactive wastes resulting from the defense activities and programs of the United States." The WIPP will demonstrate disposal of defense transuranic (TRU) waste stored retrievably at several DOE sites and will permit the conduct of experiments to elucidate and verify the expected behavior of the TRU waste emplacement. Sandia National Laboratories will support the WIPP project by conducting scientific research into disposal room drift systems and transuranic waste experiments.

WM Descriptor(s): alpha-bearing wastes; environmental management; high-level radioactive wastes; pilot plants; radioactive waste disposal; transuranium compounds; waste management (defense)

Principal Investigator(s):

WEART, WENDELL D.

Sandia National Laboratories
Albuquerque
87115

Organization Performing the work:

Sandia National Laboratories
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0022463

USA19980049

Title:

MEASUREMENT WHILE DRILLING

Title in Original Language:

Topic Code(s):

242 -Monitoring Techniques

Abstract:

The aim of this project is to develop, demonstrate, and evaluate a measurement-while-drilling system within new boreholes for the characterization of buried radioactive and mixed wastes. The end product of this effort will be a commercially viable gamma radiation detector and data transmission system with real-time data gathering and data reduction capabilities. Significant cost savings involving sampling and analysis are expected when compared to baseline methods and procedures. Research objectives include (1) successful field testing of prototype and final designs (radiation sensor, communication linkage); and (2) transfer of technology to DOE Environmental Restoration groups and/or the private sector (i.e., drilling companies).

WM Descriptor(s): drilling; environmental management; gamma detection; monitoring; real time systems; technology development; waste characterization

Principal Investigator(s):

NELSON, JENNIFER E.

Sandia National Laboratories
Albuquerque
87115

Organization Performing the work:

Sandia National Laboratories
Albuquerque 87115 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0022521

USA19980050

Title:

Titanate Ion Exchanges

Title in Original Language:

Topic Code(s):

122 -Liquid Waste Treatment

Abstract:

The objective of this project is to develop crystalline silicotitanates (CSTs) to selectively remove cesium, including radioactive Cs-137, strontium and other radionuclides from radioactive wastes. CSTs are a new class of inorganic ion exchanger invented by Sandia National Laboratories and Texas A&M University. A spectrum of defense radioactive wastes such as those found at Idaho National Engineering Lab, Oak Ridge National, Savannah River Site, and West Valley will be tested. The goal is to separate radioactive wastes into high level and low level wastes for more efficient storage and disposal. Testing includes chemical, physical, and radiation stability of CST in the various solutions, and radiation levels up to 10 exp 9 Rads (Si). Our CRADA partner, UOP, has demonstrated the commercial preparation of CST powder by the preparation of a large amount of material with excellent ion exchange properties. UOP has also a binder and forming technology to convert the sub micron powder to an engineered form. The engineered form is being evaluated for ion exchange performance, chemical, physical, and radiation stability in simulant test solutions. Testing of preliminary materials has begun on radioactive waste solutions at several DOE facilities. This program is closely integrated with a program entitled "Develop Engineered Form of CST" funded by Westinghouse Hanford and the

Technology Development Program office under case number 8660.000. Emphasis is placed on treatment of the highly alkaline solutions at WHC.

WM Descriptor(s): cesium 137; cesium isotopes; environmental management; ion exchange; ion exchange materials; strontium isotopes; technology development; waste processing

Principal Investigator(s):

BROWN, NORMAN E.

Sandia National Laboratories
Albuquerque
87115

Organization Performing the work:

Sandia National Laboratories
Albuquerque 87115 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0022527

USA19980051

Title:

EVALUATION OF GROUT TECHNOLOGY

Title in Original Language:

Topic Code(s):

314 -Safety Assessment and Performance Studies;
316 -Barrier Studies/Tests/Impacts

Abstract:

This program is to address the use of innovative grouts to form subsurface barriers for use in remediation of aqueous waste radiochemicals contained in underground storage tanks at Hanford and elsewhere. The DOE has over 200 such underground storage tanks for storing radioactive and mixed waste at their operations across the United States. The tank vary in their design, age and conditions and a number of the tanks are known to be breached. The remediation of these facilities is one of the most complex environmental challenges facing DOE. This project evaluates the application of proprietary liquid grouts (montan wax, from Germany, and sodium silicate, from France) for constructing subsurface barriers in granular soils beneath landfills and under waste tanks.

WM Descriptor(s): environmental management; grouting; hazardous materials; liquid wastes; tanks; underground storage

Principal Investigator(s):

MATALUCCI, RUDOLPH V.

Sandia National Laboratories
Albuquerque
87115

Organization Performing the work:

Sandia National Laboratories
Albuquerque 87115 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

Associated Organization(s):

USDOE Environmental Restoration and Waste Management none

Recent publication info:

US0022535

USA19980052

Title:

SEPARATION TECHNOLOGIES FROM RUSSIA

Title in Original Language:

Topic Code(s):

102 -Programme Strategy, Planning and Management

Abstract:

A small contract involving Russian separations technologies was established between SNL, SAIC, and the Khlopin Radium Institute (KRI) in the summer of 1992. The work, directed towards the application of the cobalt dicarbollide process to the treatment of Hanford wastes, was completed successfully in September 1992. The purpose of this task is for SNL to monitor technical progress of the KRI's feasibility study for the application of Russian technology for processing U.S. radioactive wastes. The KRI will perform laboratory testing and dynamic hot cell testing using Russian technology on simulated U.S. radioactive wastes over the period of one year. Includes waste separations, laboratory testing also at the Czech University, Prague, regarding the use of a polyacryonitrile (PAN) binder material for liquid wastes at INEL and potentially Hanford.

WM Descriptor(s): environmental management; feasibility studies; international cooperation; radioactive waste processing; separation processes; technology development

Principal Investigator(s):

MATALUCCI, RUDOLPH V.

Sandia National Laboratories
Albuquerque
87115

Organization Performing the work:

Sandia National Laboratories
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0022564

USA19980053

Title:

Uranium Mill Tailings Remedial Action

Title in Original Language:

Topic Code(s):

501 -Project Planning and Management

Abstract:

As part of the Uranium Mill Tailings Remedial Action (UMTRA) project, environmental technologies will be required to solve contamination problems and meet regulatory requirements at a large number of sites. This project will provide information to aid decision support and problem delineation, evaluate technology options, and complete near-term, high return innovative technology demonstrations that are linked to commercial entities capable of full scale deployment at UMTRA sites.

WM Descriptor(s): contamination; environmental management; environmental restoration; mill tailings; uranium

Principal Investigator(s):

NELSON, JENNIFER E.

Sandia National Laboratories
Albuquerque
87115

Organization Performing the work:

Sandia National Laboratories
Albuquerque 87115 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0022584

USA19980054

Title:
Best practices for radiological control programs

Title in Original Language:

Topic Code(s):

105 -Waste Minimisation

Abstract:

The historical development and implementation of radiological control procedures have never incorporated the criteria of waste minimization within DOE. Radiation protection practices for contamination control have a significant impact on the generation of contaminated material requiring controlled disposal. Now more than ever, DOE needs to reduce the amount of radioactive and mixed wastes produced. The focus of this project is to identify and document industrial best practices for radiological control programs supporting routine operations, upgrades and D&D activities including those practices which resulted in: 1) a substantial reduction in waste generation 2) cost-effective regulatory compliance, and 3) an increase in worker productivity.

WM Descriptor(s): environmental management; minimization; US DOE; waste management (defense)

Principal Investigator(s):

LEVIN, VICTORIA A.

Sandia National Laboratories
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87115

Organization Performing the work:

Sandia National Laboratories
Albuquerque 87115 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0022614

USA19980055

Title:
USE OF DEPLETED URANIUM IN STORING/SHIPPING CASKS

Title in Original Language:

Topic Code(s):

135 -Waste Packaging (Canister Types, Materials, Corrosion Studies); 136 -Waste Storage

Abstract:

The objective of this program is to evaluate viable options for future use and subsequent disposal of depleted uranium (DU) in the storage, shipping, and repository emplacement of vitrified high level waste (VHLW). The program will produce a number of DU-shielding system concepts. These concepts will be evaluated for feasibility, cost, licensability, and operability. Each concept will be compared to existing or potential nonoperability. Each concept also will be evaluated for transportation costs and logistics. Finally, programmatic issues will be discussed including: the use of DU, the source of DU, and licensing.

WM Descriptor(s): casks; depleted uranium; feasibility studies; shielding; technology development; uses; vitrification

Principal Investigator(s):

YOSHIMURA, RICHARD H.

Sandia National Laboratories
Albuquerque
87115

Organization Performing the work:

Sandia National Laboratories
Albuquerque 87115 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0022620

USA19980056

Title:
ADVANCED TECHNOLOGY DEVELOPMENT

Title in Original Language:

Topic Code(s):

101 -General policies; 102 -Programme Strategy, Planning and Management; 115 -Waste Packaging; 118 -Waste Transportation (Methods, Containers, Transportation Means)

Abstract:

The purpose of this task is to provide DOE with the capability to conduct technical investigations of transportation systems, to design and develop packagings for radioactive materials, and to investigate promising new technologies and materials that may result in a more efficient and/or less costly transportation system. This capability results in: the DOE being able to identify transportation needs for site restoration and waste management programs that are not addressed in the existing system, support for package design, development, and testing, support for certification of radioactive materials packagings, support in the development and revision of national and international transportation regulations, and support for technology transfer initiatives to the private industry sector. The Advanced Technology Development Project includes applied technology work in the engineering disciplines of structural and thermal analyses, testing, shielding and criticality, chemical

compatibility, materials investigations, component investigations, new packaging concepts, and certification support. This work is integrated with overall EM mission programs to ensure that the work is focused on true need and that the results of the work will be beneficial to the programs in terms of cost, schedule, operational and maintenance efficiencies, and safety. Results of this work also positions the DOE in a leadership role regard to the development and revisions of international studies.

WM Descriptor(s): environmental management; packaging; remedial action; technology development; transportation management; transportation systems; US DOE

Principal Investigator(s):

SORENSON, KEN B.

Sandia National Laboratories
Albuquerque
87115

Organization Performing the work:

Sandia National Laboratories
Albuquerque 87115 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0022621

USA19980057

Title:

Risk-Based Standards

Title in Original Language:

Topic Code(s):

60 -LEGAL, REGULATORY AND GOVERNMENTAL ISSUES

Abstract:

Define the baseline activities that must be conducted prior to DOE's decision regarding development, application, and implementation of standards and criteria to the Environmental Restoration, Waste Management and decommissioning activities

WM Descriptor(s): decommissioning; environmental management; environmental restoration; standards; waste management

Principal Investigator(s):

Grasher, Barbara A

Pacific Northwest Laboratory
Richland
99352

Organization Performing the work:

Pacific Northwest Laboratory
Richland 99352 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: 1989-10-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0025298

USA19980058

Title:
Assessment and Development of an Industrial Wet Oxidation System for Burning Waste and Low-Grade Fuels: Phase IIIB

Title in Original Language:

Topic Code(s):
162 -Liquid Waste Treatment; 163 -Solid Waste Treatment; 169 -Removal/Recycling of Organics

Abstract:
The objective of Phase III-B is to evaluate the viability of the Model Development Corp. (MODEC) supercritical water oxidation (SCWO) technology, and SCWO technology in general, for oxidizing the organic components of mixed nuclear wastes. Prior work under this Phase included tests of surrogate wastes in MODEC's 30-gal/day bench-scale unit. Following successful completion of those tests, MODEC will design a 500-gal/day pilot plant for destruction of DOE wastes. This activity will be followed by construction of and testing on the pilot plant.

WM Descriptor(s): chemical sciences; energy research; feasibility studies; organic wastes; oxidation; pilot plants; radioactive wastes; waste processing; waste processing plants

Principal Investigator(s):
Chappell, R.N.

Modell Development Corporation
39 Loring Drive
Framingham
01701

Organization Performing the work:
Modell Development Corporation
39 Loring Drive Framingham 01701 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:
Private industry

Program Duration: From: 1989-10-18 To: 1995-2-28

State of Advancement: Research in progress

Sponsoring Organization(s):
U.S. DOE Financial Management and Controller; USDOE Energy Efficiency & Renewable Energy; USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0027409

USA19980059

Title:
Innovative Fossil-Fuel-Fired Vitrification Technology for Soil Remediation

Title in Original Language:

Topic Code(s):
416 -Other Methods and Techniques

Abstract:
The project objective is to develop an innovative fossil-fuel-fired vitrification technology for the remediation of soils containing hazardous and/or radioactive constituents.

WM Descriptor(s): energy policy/planning; environmental management; facilities/equipment; fossil fuels; land; radiation/radioactive; soils; technology development; vitrification

Principal Investigator(s):

Nelkin, G.

Vortec Corporation
3770 Ridge Pike
Collegeville
19426

Organization Performing the work:

Vortec Corporation
3770 Ridge Pike Collegeville 19426 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Private industry

Program Duration: From: 1992-9-28 To: 1996-1-31

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management; USDOE Fossil Energy

Associated Organization(s):

none

Recent publication info:

US0027766

USA19980060

Title:

Intelligent Mobile Sensor System For Autonomous Monitoring and Inspection

Title in Original Language:

Topic Code(s):

241 -Monitoring Programmes; 242 -Monitoring Techniques

Abstract:

The project objective is to develop a robotic device for routine inspection of stored waste drums, radiological surveys of controlled areas, and initial entry surveys of facilities for decommissioning.

WM Descriptor(s): decommissioning; environmental management; facilities/equipment; monitoring; radioactive waste storage; robots; technology development

Principal Investigator(s):

Nelkin, G.

Martin Marietta Corporation
P.O. Box 179
Denver
80201

Organization Performing the work:

Martin Marietta Corporation
P.O. Box 179 Denver 80201 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Private industry

Program Duration: From: 1992-9-30 To: 1996-6-30

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management; USDOE Fossil Energy

Associated Organization(s):

none

Recent publication info:

US0027773

USA19980061

Title:

Waste Inspection Tomography (WIT): A Field-Operable Scanner for Noninvasive Characterization of Nuclear Waste Container

Title in Original Language:

Topic Code(s):

115 -Waste Packaging; 135 -Waste Packaging (Canister Types, Materials, Corrosion Studies)

Abstract:

The project objective is to construct a transportable inspection system to characterize containers of radioactive waste by nondestructive evaluation and assay.

WM Descriptor(s): containers; environmental management; facilities/equipment; non-destructive analysis; radioactive waste storage; technology development; transport/handling/storage

Principal Investigator(s):

Nakaishi, C.

Bio-Imaging Research, Inc.
425 Barclay Boulevard
Lincolnshire
60069

Organization Performing the work:

Bio-Imaging Research, Inc.
425 Barclay Boulevard Lincolnshire 60069 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Private industry

Program Duration: From: 1993-6-22 To: 1996-8-22

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management; USDOE Fossil Energy

Associated Organization(s):

none

Recent publication info:

US0027871

USA19980062

Title:

Remote Operated Vehicle Dry Ice Pellet Decontamination System

Title in Original Language:

Topic Code(s):

411 -Mechanical Decontamination Methods

Abstract:

The project objective is to develop and deploy a remote-operated vehicle dry ice pellet blasting system for the removal of radioactive and hazardous organic contaminants from concrete surfaces at DOE's nuclear waste sites.

WM Descriptor(s): decontamination; environmental management; hazardous materials; radioactive waste disposal; robots; technology development

Principal Investigator(s):

Nelkin, G.

Oceaneering Technologies
501 Prince George Boulevard
Upper Marlboro
20772

Organization Performing the work:

Oceaneering Technologies
501 Prince George Boulevard Upper Marlboro 20772 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:
Private industry

Program Duration: From: 1993-9-24 To: 1996-4-24

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0027952

USA19980063

Title:
The Nuclear Waste Documentary Project

Title in Original Language:

Topic Code(s):
701 -Public Information Programmes, Public Participation; 703 -Education and Training

Abstract:

This is an educational multimedia project concerning nuclear waste issues. The objective is to create and produce a documentary film intended for public television, a museum exhibition, a companion book, and CD-ROM.

WM Descriptor(s): public information; public opinion; radioactive waste management; technology development

Principal Investigator(s):

Wengle, J.L.

Nuclear Waste Documentary Project
P.O. Box 490
Strawberry Plaines
37871

Organization Performing the work:
Nuclear Waste Documentary Project
P.O. Box 490 Strawberry Plaines 37871 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:
Other

Program Duration: From: 1994-5-13 To: 1995-11-12

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0028162

USA19980064

Title:
Environmental Management Technology Demonstration and Commercialization

Title in Original Language:

Topic Code(s):
241 -Monitoring Programmes; 501 -Project Planning and Management

Abstract:

The objective of the project is to develop, demonstrate, and commercialize technologies that address

environmental management needs of contaminated sites. These needs are: characterization, sensors and monitoring; low-level mixed-waste processing; materials disposition technology; improved waste forms; in situ containment and remediation; and efficient separation technologies.

WM Descriptor(s): environmental aspects; environmental management; hazardous materials; low-level radioactive wastes; monitoring; remedial action; separation processes; technology development; waste processing

Principal Investigator(s):

Venkataraman, V.

University of North Dakota Energy and Environmental Research Center
15 North 23rd Street
Grand Forks
58203

Organization Performing the work:

University of North Dakota Energy and Environmental Research Center
15 North 23rd Street Grand Forks 58203 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Institution of higher education

Program Duration: From: 1994-9-30 To: 1999-9-29

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0028636

USA19980065

Title:

South Carolina Nuclear Waste and Spent Fuel Program

Title in Original Language:

Topic Code(s):

136 -Waste Storage; 137 -Waste Disposal (including Spent Fuel); 138 -Waste Transportation (Methods, Containers, etc.); 143 -Spent Fuel Storage; 148 -Spent Fuel Transportation (Methods, Casks, etc.)

Abstract:

The project objective is to develop an independent evaluation of how best to reflect the interests of the State of South Carolina in managing (processing, packaging, storing, and transporting) the current and potential additional quantities of spent fuel and high level wastes at DOE's Savannah River Site.

WM Descriptor(s): environmental management; radioactive waste processing; radioactive waste storage; radioactive wastes; savannah river plant; spent fuels; waste management (defense)

Principal Investigator(s):

Giusti, J.

Medical University of South Carolina South Carolina Nuclear Waste Program
171 Ashley Avenue
Charleston
29425

Organization Performing the work:

Medical University of South Carolina South Carolina Nuclear Waste Program
171 Ashley Avenue Charleston 29425 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Institution of higher education

Program Duration: From: 1995-1-30 To: 1996-2-24

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0028750

USA19980066

Title:
Nevada Risk Assessment/Management Program

Title in Original Language:

Topic Code(s):
701 -Public Information Programmes, Public Participation; 702 -Information Centres

Abstract:

The Harry Raid Center for Environmental Studies (HRC) proposes to establish a national program for risk assessment, risk management, and risk communication and public outreach as these objectives relate to the ecological and human health effects of radioactive and hazardous waste remediation activities in Nevada. This program would provide a national resource which could (1) serve as an 'information clearinghouse' in working with the States to increase public awareness of the risks associated with environmental remediation activities in Nevada and other states and (2) provide information, data, and human resources which could be applied to analyze human health and ecological risks in an objective and credible and publicly acceptable manner.

WM Descriptor(s): environmental management; information centres; information dissemination; public information; public opinion; remedial action; risk assessment; technology development

Principal Investigator(s):
Wengle, J.

Organization Performing the work:
Harry Raid Center for Environment
UNITED STATES OF AMERICA

Other Investigators:

Organization Type:
Other

Program Duration: From: 1995-3-15 To: 1996-9-14

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0028759

USA19980067

Title:
In-Tank Sludge Interface Detection/Time

Title in Original Language:

Topic Code(s):
136 -Waste Storage; 137 -Waste Disposal (including Spent Fuel)

Abstract:

The objective of this development project was to provide a liquid level measurement and moisture monitoring tool for use in high-level waste tanks. This technique may be deployed in a liquid observation well, or directly in tank waste. It may be able to be modified from its present configuration to be deployable via the cone

penetrometer.

WM Descriptor(s): environmental management; high-level radioactive wastes; moisture; monitoring; tanks; technology development

Principal Investigator(s):

Tilley, Hilton

Savannah River Technology Center
Aiken
29801

Organization Performing the work:

Savannah River Technology Center
Aiken 29801 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0030710

USA19980068

Title:

Spectrometer Systems For Online Monitoring

Title in Original Language:

Topic Code(s):

102 -Programme Strategy, Planning and Management

Abstract:

Large quantities of hazardous waste have been generated and stored at DOE sites and at industrial facilities throughout the United States and the world. A number of processes are under consideration to reduce waste volume and transform the waste to stable forms for long term storage and disposal. For some waste, incineration is a cost effective means of volume reduction. Other waste materials require some pretreatment to separate specific components before destruction and disposal. Many of these waste treatment steps can be performed more safely, efficiently, and effectively if real time monitoring of the chemicals in the process can be performed. Fiber optic spectrometer systems previously developed on this project can be adapted and improved to provide real time monitoring of waste at both the Savannah River and the Hanford Sites. Real time monitoring systems will allow processing of more types of waste more efficiently than is currently possible. This task works to transfer appropriate technology to Hanford for use in waste process monitoring and Hanford Waste Vitrification monitoring. Chemical components were detected by combinations of ultra-violet, visible, and infrared absorption spectroscopy, fluorescence spectroscopy, and emission spectroscopy. Heavy metal content of samples were detected by spark emission spectroscopy (SES) or laser induced breakdown spectroscopy (LIBS). SES and LIBS technologies have been developed at other laboratories, notably Los Alamos and Sandi Livermore. Another task of this project involved previously developed NIR spectroscopy system which was adapted for UV-VIS and mid-IR capability. Rugged fiber optic process flow cells for cross-stack and in-line applications were developed for aromatic organics and nitrites and mercury. A final task involved SES, LIBS, fluorescence and RAMAN fiber-optic sensing which were tested for applicability to in-stack, online and in-cell needs. Prioritized and comparative analysis of benefits of each of these techniques was provided.

WM Descriptor(s): environmental management; hazardous materials; minimization; monitoring; real time systems; technology development; volume; waste processing

Principal Investigator(s):

O'Rourke, P. E.

Savannah River Technology Center
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29801

Organization Performing the work:

Savannah River Technology Center
Aiken 29801 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0030713

USA19980069

Title:

Vitrification Process Limits Testing

Title in Original Language:

Topic Code(s):

164 -Waste Immobilization

Abstract:

The focus of this project is to conduct surrogate and hot bench-scale studies (at Savannah River Site and Russia) and pilot-scale surrogate vitrification studies (at Clemson) and pilot-scale radioactive tests (in Russia) on high organic content and high mercury containing mixed waste in an effort to extend the processing window of vitrification technology. It is anticipated that the data from these studies will be used to perform hot pilot-scale treatability studies and eventual field-scale treatment of these target waste streams in the compact vitrification unit.

WM Descriptor(s): environmental management; pilot plants; technology development; vitrification

Principal Investigator(s):

Bickford, D. F.

Savannah River Technology Center
Aiken
29801

Organization Performing the work:

Savannah River Technology Center
Aiken 29801 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0030714

USA19980070

Title:

Electrochemical Destruction of Nitrates

Title in Original Language:

Topic Code(s):

162 -Liquid Waste Treatment

Abstract:

Electrochemical treatment processes were developed for the destruction of organic compounds and nitrates/nitrites and the removal of other hazardous species from liquid waste stored throughout the DOE complex. The development program consisted of five major tasks: (1) evaluation of different electrochemical reactors for the destruction and removal of hazardous waste components, (2) development and validation of engineering process models, (3) radioactive laboratory-scale tests, (4) demonstration of the technology in an engineering-scale size reactor, and (5) analysis and evaluation of testing data. The development program team was comprised of individuals from federal, academic, and private industry. Work was carried out in DOE, academic, and private industrial laboratories. Possible benefits of this technology include: (1) improved radionuclide separation as a result of the removal of organic complexants, (2) reduction in the concentrations of hazardous and radioactive species in the waste (e.g., removal of nitrate, nitrite, mercury, chromium, cadmium, technetium-99, and ruthenium-106), (3) reduction in the size of the off-gas handling equipment for the vitrification of low-level wastes by reducing the source of NOx emissions, (4) recovery of chemicals of value (e.g., sodium hydroxide), and (5) reduction in the volume of waste requiring disposal.

WM Descriptor(s): electrochemistry; environmental management; liquid wastes; nitrates; nitrogen oxides; ruthenium 106; technetium 99; technology development; waste processing

Principal Investigator(s):

Hobbs, D. T.

Savannah River Technology Center
Aiken
29801

Organization Performing the work:

Savannah River Technology Center
Aiken 29801 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0030715

USA19980071

Title:

Advanced Chemical Separations At SRS

Title in Original Language:

Topic Code(s):

112 -Liquid Waste Treatment

Abstract:

The task consisted of testing of Extended Sludge Processing (ESP) developed separations materials for application to SRS tank and other radioactive wastes, testing of an ESP developed material for separation and concentration of radioisotopes from sea water for subsequent analysis, program management support, and closeout of work on cobalt dicarbollide and derivatives. Testing of ESP developed materials included: Set up and test small-scale Cs, Sr or other radioisotope adsorption/ion exchange equipment. Used -cold+ simulants to test equipment operation and procedures prior to set up in an existing hot cell or glove box for tests with actual SRS wastes. Limited tests to small volumes to minimize the amount of waste required. Analysis of solutions from demonstration of ESP developed membrane materials to remove Cs, Tc, and Pu from sea water. Results of the task were reported.

WM Descriptor(s): adsorption; environmental management; gloveboxes; membranes; radioactive waste processing; sludges; tanks; technology development

Principal Investigator(s):

Thompson, Major

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Organization Performing the work:

Savannah River Technology Center
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0030716

USA19980072

Title:

In-Situ Characterization of Hazardous Soil

Title in Original Language:

Topic Code(s):

241 -Monitoring Programmes

Abstract:

Prompt Gamma Neutron Activation Analysis (PGNAA) for safe, real-time, in-situ characterization of soil constituents at SRS has been investigated. A field study focused on use and validation of this technology for in-situ characterization of potentially contaminated soil near the Magnetic Separation (MAG-Sep) demonstration site. A field survey vehicle (FSV), developed by Westinghouse Scientific Ecology Group (SEG), traveled a path near a coal pile or ash basin at SRS and produce measurements from the soil surface to map subsurface concentrations of soil constituents to soil depths up to 2 feet. Westinghouse Science and Technology Center (WSTC) advanced PGNAA technology through improved areas of pulsed neutron activation, high count-rate-throughput electronics, and time-sequenced gamma-ray analysis to detect trace concentrations of radioactive and hazardous elements. The improved WSTC technology was developed to detect explosives in airport baggage, and the technology was adapted for field survey use by WSTC and SEG. The process gives immediate results, no detectable residual activity from the process, detects small amounts of hazardous and radioactive contaminants, and penetrates throughout most samples. PGNAA is expected to detect hazardous and radioactive contaminants at concentrations of 1-10 ppm up to a depth of 2 feet in soil. Westinghouse Savannah River Company (WSRC) and Westinghouse Hanford Company (WHC) representatives judge that PGNAA can be a strong benefit to Waste Management and Environmental Restoration programs in the area of in-situ characterization of soil. As a non-invasive technique, PGNAA can be used for characterization for hazardous metals and radionuclides in soils of suspected waste sites without having to disturb the surface. PGNAA will analyze the soil in a continuous mode, eliminating -blind spots+ produced in discreet sample point analysis techniques. State regulatory and regional EPA representatives will be invited to participate in the study. Regulatory buy-in will be sought before initiating field measurements.

WM Descriptor(s): environmental management; field tests; monitoring; neutron activation analysis; sensitivity; soils; trace amounts; validation

Principal Investigator(s):
Sigg, R. A.

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Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0030724

USA19980073

Title:
Savannah River Site Tritium Analysis Systems

Title in Original Language:

Topic Code(s):
241 -Monitoring Programmes; 242 -Monitoring Techniques

Abstract:

The Environmental Restoration Department (ERD) of the Solid Waste Management and Environmental Restoration Division (SW & ER) is responsible for contaminated granter remediation at the Savannah River Site (SRS). As a part of that effort, analysis of surface groundwaters are required for waste site assessment, monitoring activities, and for risk assessment for the protection of human health and the environment. Tritium is one of the most widespread and most mobile radioactive contaminants encountered in SRS groundwaters. Monitoring of tritium is now limited to routing samples taken from established wells or from samples collected from surface streams and seeps, Development of a tritium analytical tool would be most beneficial to SRS+ efforts to monitor this highly mobile radionuclide. This project involved the development of a tritium analysis system (TAS) to provide both rapid field screening of special or routine samples, as well as the low level counting ability to quantitatively determine tritium levels as the limit of detection. Such a system will provide a better, faster means for monitoring known existing plumes, as well as subsequently discovered -hot spots+ in the SRS surface or groundwaters.

WM Descriptor(s): analytical methods; environmental management; ground water; monitoring; remedial action; savannah river plant; technology development; tritium oxides

Principal Investigator(s):
Hofstetter, K. J.

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Organization Performing the work:
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Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:

US0030730

USA19980074

Title:
High Temperature Demonstrations

Title in Original Language:

Topic Code(s):

163 -Solid Waste Treatment; 164 -Waste Immobilization

Abstract:

This task provided laboratory and demonstration high-temperature vitrification units which could be utilized to demonstrate the effectiveness of remote, high temperature vitrification on existing low-level mixed, hazardous commercial and Department of Energy (DOE) Department of Defense (DOD) waste streams. The evaluations and demonstrations included purchase of high-temperature equipment, waste treatment, product characterization, off-gas analysis, and final waste form disposal. The vitrification units used to demonstrate radioactive contamination control methods and the necessary design features for operation with low level mixed waste (LLMW) and transuranic materials. A long-term goal of this task is to develop a transportable high temperature system capable of vitrifying the solid LLMW in 55 gallon steel drums.

WM Descriptor(s): contamination; environmental management; feasibility studies; hazardous materials; off-gas systems; solid wastes; technology development; vitrification

Principal Investigator(s):

Schumacher, R. F.

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0030734

USA19980075

Title:
Noble Metal Reclamation

Title in Original Language:

Topic Code(s):

164 -Waste Immobilization

Abstract:

This task investigated the reclamation of noble and commercial metals from commercial and government electronic components using advanced process chemistry and available melter technology while immobilizing (via vitrification) hazardous materials such as barium, lead, cadmium, and arsenic to minimize liability and disposal costs. This task was a cooperative plan with Clemson University, Georgia Institute of Technology, Dunkirk International, The Castle Group Ltd, and Conversion Technologies Inc.

WM Descriptor(s): electronic equipment; environmental management; hazardous materials; metals;

technology development; vitrification; waste product utilization

Principal Investigator(s):
Imrich, K. J.

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Organization Performing the work:
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Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0030735

USA19980076

Title:
Vitrification Process Demonstration

Title in Original Language:

Topic Code(s):
153 -Solid Waste Treatment

Abstract:

Significant concentrations of transuranic elements are stored within the DOE Complex. Many actinide isotopes are highly radioactive and have long half-lives. Vitrification of transuranic bearing waste streams would encapsulate these species within a highly durable glass matrix. Total waste volume would be significantly decreased and waste sample handling and storage improved. Also, in the event that particular actinide species needed to be recovered, existing process chemistry could be applied to dissolve the glasses and extract desired elements. This task determined the solubility of transuranics in glass and demonstrate vitrification of an existing Savannah River Site (SRS) waste stream. The primary transuranics to be evaluated were U, Th, Pu, Am, and Cm. The maximum solubility of these transuranics in a durable glass composition a glass which can be successfully processed by existing SRS melter systems was determined. An existing SRS actinide waste was vitrified to demonstrate this process. Samples of waste were characterized to determine chemical composition. From waste composition, i.e., glass composition which maximizes durability and waste loading was selected. Glass samples were vitrified to determine the acceptable processing region, i.e., that portion of the glass-forming region which maximizes waste loading or (minimizes final waste form volume), while also maximizing each of processing, and waste form durability. The Savannah River Technology Center Vitrification has been declared the BDAT (Best Demonstrated Available Technology) for high level waste. (SRTC) has considerable expertise in the areas of glass composition formulation, glass processing, durability evaluation, and performance demonstration project modeling. Much of this expertise will be applied directly to this project.

WM Descriptor(s): environmental management; glass; minimization; solubility; technology development; transuranium elements; vitrification; volume; waste characterization

Principal Investigator(s):
Ramsey, W. G.

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Organization Performing the work:
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Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0030736

USA19980077

Title:
Vitrification Demonstration (Field Scale)

Title in Original Language:

Topic Code(s):
163 -Solid Waste Treatment

Abstract:

The primary objective of this task was demonstrate a stabilization treatment on an actual mixed hazardous and radioactive waste stream. The selected technology of choice was vitrification using processes developed at the Savannah River Technology Center (SRTC) which have been shown to greatly enhance the solubility and retention of hazardous, mixed, and heavy metal species in the glass. This objective was accomplished by a parallel program of pilot scale laboratory demonstrations on actual waste and larger scale vitrification using a mobile facility (this task). The laboratory, pilot scale demonstrations was completed prior to the field application of the mobile facility. This the pilot scale studies provided necessary data to allow scale up of the process for application to an actual waste stream. The delivery of the mobile vitrification system was expedited in order to achieve the vitrification of a waste stream during FY95. Previous, pilot scale units have been fabricated at equipment manufacturers+ sites, but have not been demonstrated on DOE waste. The mobile facility proposed for this task was capable of remediating small waste streams and of demonstrating waste form quality and operating economics for larger waste streams. By combining Savannah River expertise in waste glass formulation, process control, and off-gas treatment with the environmental permitting and broad technical expertise of Clemson University, the pretreatment expertise of RUST Federal, and using commercial melter designs, it was possible to adapt available commercial melter equipment to DOE+s needs in the minimum amount of time, and assure RCRA LDR compliance as early as FY95. Early emphasis was placed on self contained melters capable of being located at the waste site, using existing plant utilities. The unit, consisting of a melter, melter feed preparation, off-gas treatment, and a simplified process control laboratory, was operational in FY95. The melter was capable of operating at about 300 lbs per hour if fed dry materials. Lower rates were achieved if the feed was slurried.

WM Descriptor(s): environmental management; hazardous materials; radioactive wastes; solid wastes; technology development; vitrification

Principal Investigator(s):
Jantzen, Carol M.

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Organization Performing the work:
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Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:

US0030737

USA19980078

Title:
High Level Waste Process Filter Testing

Title in Original Language:

Topic Code(s):
112 -Liquid Waste Treatment; 122 -Liquid Waste Treatment

Abstract:

The task determined the filtration needs for specific processes that are proposed for the pretreatment of underground storage tank wastes. The task ranked the various filtration needs that are suitable to cross flow filtration technology. The task then initiated cross flow filter tests for the most important solid/liquid separation. The commercially available filters at an engineering scale were tested with cold simulants. These tests determined the engineering conditions and operation parameters that were needed for successful separation. Task Description Activity 1: Evaluation Ranking Filtration Needs for Pretreatment This activity evaluated the filtration needs of the proposed pretreatment processes for the underground storage tank wastes. This activity then determined and ranked the filtration needs that were suitable to cross flow filtration technology. The ranking required extensive consultations with principal investigators of waste pretreatment projects. Activity 2: One Specific Cross flow Filter Application This activity initiated one nonradioactive engineering investigation of a specific cross flow filter application which was selected based on the results of Activity 1. This activity used cold simulants and commercially available filters from Mott, Dupont, Vacco, etc. to resolve engineering problems. This initial investigation of a specific cross flow filter application as well as other demonstration tests will be completed in FY1996.

WM Descriptor(s): environmental management; filters; filtration; tanks; technology development; underground storage

Principal Investigator(s):
McCrabe, D. J.

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Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:

US0030738

USA19980079

Title:
Removal And Destruction of Asbestos Waste

Title in Original Language:

Topic Code(s):
167 -Waste Disposal

Abstract:

During the next three decades, the Department of Energy will spend a significant portion of its budget

decontamination and decommissioning facilities within the weapons complex. These D&D activities will generate significant amounts of asbestos containing waste (ACM) and radiologically contaminated asbestos containing waste. There are currently no land disposal restrictions on asbestos material. Vitrification is a technology that may permit continued land disposal of treated asbestos material. Technical evaluation of two vitrification technologies, Joule heated ceramic melter and plasma arc, were evaluated for their destruction capabilities of asbestos containing waste and compare the glass quality of each technology. It also compared the costs of each technology to determine the technology that was most cost effective for the treatment of asbestos containing waste. This project allows SRS to remain ahead of evolving asbestos land disposal requirements. The volume of asbestos bearing material (Transite, floor tile, thermal insulation, spray on insulation, or mastic) will increase significantly due to D&D activities. The land disposal requirements for the disposal of asbestos bearing material are expected to change and a new treatment technology is required to meet these evolving regulations.

WM Descriptor(s): asbestos; environmental management; technology development; vitrification; waste disposal; waste management (defense)

Principal Investigator(s):

Brennan, M. E.

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0030739

USA19980080

Title:

Radioactive Polychlorinated Biphenyl Waste

Title in Original Language:

Topic Code(s):

169 -Removal/Recycling of Organics

Abstract:

The objective of this task was to identify and demonstrate an innovative technology for the destruction of polychlorinated biphenyl (PCB) in radioactively contaminated solid waste. The program included developing techniques and protocol for safe handling and characterization of multicomponent solid waste contaminated with PCB. The task was specifically aimed at demonstrating and evaluating the Dechlor/KGME process for destroying PCB+s in solid, solid, soil-like, waste. This process has been used to treat liquid PCB wastes. However, it has not been demonstrated for treatment of porous, fine grained solids contaminated with PCB+s. This task takes advantage of both a process and a facility which are already permitted for radioactive waste and for PCB waste treatability studies.

WM Descriptor(s): environmental management; polychlorinated biphenyls; radioactive wastes; solid wastes; technology development; waste processing

Principal Investigator(s):

Langton, C. A.

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0030740

USA19980081

Title:

Hot Cells Selective Leaching

Title in Original Language:

Topic Code(s):

132 -Liquid Waste Treatment

Abstract:

Studies using the ACT*DE*CON process with sludge simulants and Hanford Tank Sludge have found the process is effective in removing radioactive elements from the sludge. The ACT*DE*CON process uses oxidative carbonate chemistry and a chelating agent to dissolve and hold the radioactive contaminants in solution. The goal of the process development effort is to minimize the fraction of the sludge that requires vitrification as high level waste and maximize the fraction that can be disposed as low level waste. The wash solutions containing the high level waste fraction could be vitrified directly or further processed to concentrate the radionuclides prior to vitrification. The low level waste fraction is to meet Class C waste acceptance criteria. The proposed program was composed of five major tasks: (1) bench scale process optimization, (2) design and procurement of a pilot-scale apparatus, (3) fabrication of the pilot-scale apparatus, (4) operation of the pilot-scale unit, and (5) analysis and evaluation of the test data. In FY95, a scoping test with Savannah River Site (SRS) sludge was completed to determine if major differences exist with the ACT*DE*CON process using SRS sludge versus the Hanford sludge testing completed previously. Initial results with the ACT*DE*CON process were positive; however, optimization of the process is required to reach the stated goals. The process variables that were optimized in the proposed task included: wash solution volumes, contact time between the wash solution and the sludge, temperature, and reagent concentrations. Savannah River Site High Level Waste sludge was used in the optimization of the ACT*DE*CON process at the Savannah River Technology Center (SRTC) Shielded Cells. In these studies, approximately 0.5l of actual radioactive sludge was used. Knowledge acquired during the optimization with SRS sludge will simplify the future application of the process to other sludges in the DOE complex and the commercial nuclear industry. After the process had been optimized through bench scale testing, a pilot-scale process was designed, fabricated, and tested. The unit was scaled to fit within the SRTC Shielded Cells and was operated with nominally 50l of radioactive sludge.

WM Descriptor(s): bench-scale experiments; environmental management; fractionation; pilot plants; sludges; tanks; technology development; waste processing

Principal Investigator(s):

Hay, M. S.

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0030741

USA19980082

Title:

Compact Melter Vitrification Demonstration

Title in Original Language:

Topic Code(s):

164 -Waste Immobilization

Abstract:

This task was the Mixed Waste Integrated Program funding portion of the vitrification expedited demonstration with three major thrusts: (1) completing the 1,000 Kg hot treatability studies of ORR mixed wastes in support of the field scale mobile vitrification demonstration; (2) performing activities in support of the construction and mobilization of the mobile vitrification unit; and (3) performing activities to carry out the field-scale mobile vitrification demonstration.

WM Descriptor(s): environmental management; field tests; hazardous materials; technology development; vitrification

Principal Investigator(s):

Jantzen, C. M.

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0030742

USA19980083

Title:

Chemical technology for high level radioactive waste tanks

Title in Original Language:

Topic Code(s):

104 -Database & Information Systems, including Technology Transfer Systems. Technical Assistance and Costs; 136 -Waste Storage

Abstract:

Provided studies of the chemistry of high level radioactive waste (HLW) to ensure that corrosion data, corrosion mechanisms, and waste chemistry data bases were maintained current for continued safe storage of HLW.

WM Descriptor(s): chemistry; corrosion; environmental management; high-level radioactive wastes; radioactive waste storage; waste management (defense)

Principal Investigator(s):

Knight, J.R.

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0030768

USA19980084

Title:

Analytical Method Development for the Defense Waste Processing Facility

Title in Original Language:

Topic Code(s):

181 -Methodologies, Analytical Methods, Measurements Instrumentation

Abstract:

This activity provided for the development of analytical methods needed for operation of the Defense Waste Processing Facility (DWPF) at the Savannah River Site and for analysis of R&D and special radioactive samples from the DWPF operations. Specific activities included: Developed improved methods for faster phenylboric acid analysis. Developed and implemented new methods and procedures in DWPF laboratory, including solid phase extraction for organics, slurry sampling and dissolution techniques, and method for analyzing mercury in organics. Identified and developed analysis methods for organics in recycle streams to radioactive waste tanks. Completed development of cesium removal methods and assisted with implementation procedures for use in DWPF laboratory hot cells. Supported DWPF in-cell benzene analyzer. Developed calibration method for beta-ray/gamma-ray effluent monitor. Completed development and startup of the benzene/nitrate analyzer for the Late Wash Project. Developed a fiber optic ICP-CID to remote ICP torch from instrumentation for hot cell installation; investigated glow discharge for direct solids analysis. Developed wet grinding technique for direct injection of glass samples in a ICP. Developed advanced radionuclide analyses using inductively coupled mass spectrometer. Developed procedures for and analyzed radioactive samples from DWPF process demonstrations in SRTC shielded cells. Analyzed radioactive samples from SRTC R&D work in support of DWPF. Analyzed radioactive samples of a special nature for which the DWPF laboratory has no capability.

WM Descriptor(s): analytical methods; environmental management; waste characterization; waste management (defense)

Principal Investigator(s):

Blancett, A.L.

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0030771

USA19980085

Title:

Defense Waste Processing Facility Analytical Cells Upgrade

Title in Original Language:

Topic Code(s):

101 -General policies; 133 -Solid Waste Treatment

Abstract:

The Chemistry Analytical Cells in the Defense Waste Processing Facility (DWPF) are being upgraded for remote operation. These cells are used by the DWPF Analytical Group to analyze samples taken at each step in the vitrification process. Standard chemistry laboratory equipment and instruments are not generally usable with master slave manipulators. This equipment was modified for use with manipulators. Modifications were needed to improve operation, increase remotability, and prevent future maintenance problems prior to radiological start-up. After radiological start-up, there will be no personnel access to perform modifications.

WM Descriptor(s): chemical analysis; manipulators; technology development; vitrification; waste management (defense); waste processing; waste processing plants

Principal Investigator(s):

Kyle, M. A.

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0030782

USA19980086

Title:
Defense Waste Processing Facility Gas Chromatographies

Title in Original Language:

Topic Code(s):
126 -Waste Storage

Abstract:
Safety analysis of Defense Waste Processing Facility (DWPF) operation requires that the vapor space of the SME and SRAT tanks be monitored for explosivity. Of primary concern was hydrogen evolution from the catalytic decomposition of formic acid by noble metals. Typical explosivitiy monitors (LEL sensors manufactured by several vendors) would not function reliably in the SME and SRAT off-gas matrix. Therefore, an alternate method using gas chromatographies was developed. The explosivitiy is determined from the gas chromatography analysis of the off-gas for hydrogen, oxygen, nitrogen, benzene, carbon dioxide, and nitrous oxide. The off-gas sampling system and gas chromatographies were installed in a glovebox to prevent possible spread of radioactive contamination and facilitate maintenance. Software was developed to monitor the sampling system, the gas chromatographies, and transmit data to the DWPF computers monitoring the process.

WM Descriptor(s): explosions; gas analysis; gas chromatography; gloveboxes; monitoring; off-gas systems; tanks; technology development

Principal Investigator(s):
Kyle, M. A.

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Organization Performing the work:
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Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0030783

USA19980087

Title:
Reactor Support Technologies

Title in Original Language:

Topic Code(s):
146 -Spent Fuel Storage

Abstract:
This project consists of materials R&D activities in support of ongoing Reactor functions such as management of spent fuel in wet storage basins, management of moderator stockpile in stainless steel drums, and development of materials technologies in support decontamination and decommissioning activities. A primary focus of this project is development of appropriate materials and corrosion technology to operate the wet storage basins safely. The project includes laboratory studies on the various mechanisms that cause degradation of aluminum clad spent fuels and targets. Electrochemical techniques such as linear polarization, electro impedance spectroscopy, etc., were utilized to identify and understand the factors that effect the corrosion of aluminum alloys. The role of water chemistry, namely conductivity, pH, chloride content etc., on the corrosion of aluminum alloys were also studied. Results of these studies were utilized to refine basin management practices and water chemistry controls for the reactor basins. This project developed materials technologies in support of reactor decommissioning and deactivation activities. Electrochemical decontamination techniques

were developed and techniques for the packaging and disposition of cadmium rods were also developed.

WM Descriptor(s): materials testing; spent fuels; storage facilities; waste storage

Principal Investigator(s):

Capeletti, T. L.

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0030797

USA19980088

Title:

Materials Technology for Spent Fuels

Title in Original Language:

Topic Code(s):

135 -Waste Packaging (Canister Types, Materials, Corrosion Studies); 137 -Waste Disposal (including Spent Fuel)

Abstract:

This project consists of materials R&D activities on aluminum clad foreign research reactor fuels in support of the National Spent Fuels Management Program. The focus of the project was development of storage technologies for interim dry and long term storage of foreign research reactor spent fuels. The project evaluated the performance of spent fuels in various storage environment and developed the envelope of storage temperature, humidity, inert gas conditions for safe storage of aluminum clad spent fuel for a 50 year period. Corrosion tests, both in an autoclave and specially designed capsules were conducted to define the storage envelope. Further corrosion models were developed and validated to allow spent fuel corrosion performance prediction for a 50 year period. Validation tests using full scale Mark 31 targets were also initiated to evaluate the extremes conditions of the dry storage environment envelope. Finally, requirements for critically safe storage of high enriched spent fuels in geologic repository was also initiated.

WM Descriptor(s): corrosion resistance; dry storage; environmental management; spent fuel storage; validation; waste management (defense)

Principal Investigator(s):

Capeletti, T. L.

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Organization Performing the work:

Savannah River Technology Center
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

Associated Organization(s):

USDOE Environmental Restoration and Waste Management none

Recent publication info:

US0030799

USA19980089

Title:

Materials Technology for Waste Tanks

Title in Original Language:

Topic Code(s):

135 -Waste Packaging (Canister Types, Materials, Corrosion Studies)

Abstract:

This project developed the materials technology necessary for safe and effective operations of the H Area tank farm. Corrosion monitoring technologies including online monitoring techniques were developed. Linear polarization, electrical resistance and electrochemical noise corrosion monitoring techniques were evaluated in the laboratory using high level waste simulants. Their suitability for application in the waste tank farm was assessed. Further, a corrosion coupon rig was developed and implemented in Tank 50. The degradation mechanisms resulting in cooling coil failures was also evaluated. Based on this evaluation, waste tank management procedures were developed and implemented to mitigate onset of corrosion induced cooling coil failures. Finally alternatives to the currently used chromate based cooling coil inhibitor were also evaluated. Three candidate cooling coil inhibitors were identified and their performance validated for use in waste tanks.

WM Descriptor(s): corrosion resistance; environmental management; materials testing; monitoring; tanks; validation; waste management (defense)

Principal Investigator(s):

Capeletti, T. L.

Savannah River Technology Center
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29801

Organization Performing the work:

Savannah River Technology Center
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0030802

USA19980090

Title:

Materials Technology for Waste Tanks

Title in Original Language:

Topic Code(s):

135 -Waste Packaging (Canister Types, Materials, Corrosion Studies)

Abstract:

This project developed the materials technology necessary for safe and effective operations of the F Area tank farm. Corrosion monitoring technologies including online monitoring techniques were developed. Linear polarization, electrical resistance and electrochemical noise corrosion monitoring techniques were evaluated in

the laboratory using high level waste simulants. Their suitability for application in the waste tank farm was assessed. Alternative inhibitors for waste tanks were investigated. The synergistic effect of nitrites and hyroxides were explored to reduce the amount nitrite inhibitors in waste tanks. The causes for steam line failures in the tank farm was also investigated. Steps to mitigate steam line failure were identified for implementation in the tank farm.

WM Descriptor(s): corrosion resistance; environmental management; materials testing; monitoring; tanks; validation; waste management (defense)

Principal Investigator(s):

Capeletti, T. L.

Savannah River Technology Center
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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0030803

USA19980091

Title:
Corrosion Inhibition for In Tank Precipitation

Title in Original Language:

Topic Code(s):

132 -Liquid Waste Treatment; 135 -Waste Packaging (Canister Types, Materials, Corrosion Studies)

Abstract:

This project developed the materials technology necessary for the in-tank precipitation (ITP) and extended sludge processing (ESP) processes. It developed the corrosion inhibitors requirements for these processes for a broad range of temperature and waste tank chemistries. A combination of electrochemical tests, e.g. linear polarization and corrosion coupon tests, were used to develop the inhibitor requirements. These requirements were incorporated into the operations technical standards. The kinetics and probability of pitting corrosion of carbon steel in high level waste environments was also studied. A statistically designed experiment consisting of large carbon steel coupons in simulated high level waste was instituted. The pitting growth rate was determined from these studies and was used as the technical basis to determine waste tank corrosion performance under off-normal conditions.

WM Descriptor(s): corrosion; corrosion protection; environmental management; materials testing; precipitation; sludges; tanks; waste management (defense)

Principal Investigator(s):

Capeletti, T. L.

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0030804

USA19980092

Title:
Materials Technology for the Defense Waste Processing Facility

Title in Original Language:

Topic Code(s):
134 -Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies); 135 - Waste Packaging (Canister Types, Materials, Corrosion Studies); 137 -Waste Disposal (including Spent Fuel)

Abstract:
This project consists of the materials R&D activities necessary to support the Defense Waste Processing Facility (DWPF). This project includes tasks to study the erosion and corrosion performance of materials in vitrification systems and components. The erosion/corrosion performance of agitator blades in DWPF frit slurry environment in SRAT, SME etc., was studied using a specially designed laboratory apparatus. Agitator blades of candidate materials namely stellite, ultimet, stainless steel, and inconel were evaluated and ranked on the basis of erosion/corrosion performance. The performance of these materials was also verified using ASTM erosion tests. Results of these studies were integrated into the DWPF materials of construction database. The current materials of construction and candidate alternate materials were also evaluated in DWPF prototypic environments including the melter, SME, etc., using the IDMS. Corrosion coupons were strategically located in all the systems and components, and their performance evaluated periodically. The materials performance was related to the high temperature environments and recommendations made for alternate materials. Finally, the potential degradation mechanisms in DWPF systems and components were also assessed and integrated into the DWPF structural integrity analyses.

WM Descriptor(s): corrosion; environmental management; erosion; materials testing; slurries; vitrification; waste management (defense); waste processing; waste processing plants

Principal Investigator(s):
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Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0030806

USA19980093

Title:
Solid phase scintillation counting. Waste minimization alternatives

Title in Original Language:

Topic Code(s):
122 -Liquid Waste Treatment; 162 -Liquid Waste Treatment

Abstract:
EML is investigated whether milligram amounts of 2 commercially available Beaded Synthetic Materials (BSMs) can be used to significantly reduce the mixed-organic liquid waste generated from routine Liquid Scintillation (LS) counting of aqueous environmental samples containing either #alpha# #beta# or #gamma# emitting nuclides. Conventional LS counting requires 10-20 mL water miscible organic-based LS cocktail per sample producing a non-reusable mixed-waste end product. It has been demonstrated that one of the 2 BSMs (a divinyl-benzene polymer with 100-500 um diameter) produces a photon signal that is detected by our LS counter with 80% efficiency when 0.5-0.1 gm of the material is slurred with "4"0KCl salt and water. We will determine whether #beta# emitters other then "4"0K (with a 1.32 MeV beta maximum) produce such a high photon yield. The 2 BSMs will also be tested using selected #alpha# and #gamma# emitters of known energy supported in either an aqueous or solid phase. In both cases we will investigate whether these 2 BSMs can be washed and re-used for repeat LS measurement.

WM Descriptor(s): aqueous solutions; liquid scintillation detectors; liquid scintillators; liquid wastes; organic wastes; polymers; potassium 40; radioactive materials; solidification; waste processing

Principal Investigator(s):
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ENVIRONMENTAL MEASUREMENTS LAB. U.S. DEPT OF ENERGY
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UNITED STATES OF AMERICA

Other Investigators:

Organization Type:
Other

Program Duration: From: 1995-11-1 To: 1996-11-1

State of Advancement: Research in progress

Sponsoring Organization(s):
Environmental Measurements Lab.; 376 Hudson St. New York NY 10014

Recent publication info:
1136

USA19980094

Title:
Rapid determination of radium by solvent extraction and PERALS"T"M

Title in Original Language:

Topic Code(s):
109 -Waste Characterisation (Radionuclide Inventory Determination), including Computer Codes and Measuring Methods and Techniques; 152 -Liquid Waste Treatment

Abstract:
Data are presented for the extraction efficiencies (EE's) of "2"2"6Ra and its progeny 2 1"0Pb/Po using a commercially available toulene based extractant under various chemical conditions. Six potentially interfering #alpha# emitting actinides ("2"3"2U 2 3"0Th 2 4"4Cm 2 4"2Pu 2 4"3am and "2"3"7Np) were also tested.

Radium can be directly extracted from a 1 liter aqueous sample with a 1-2 mL aliquot of RADAEX"R and measured in a very low background PERALS"T"M #alpha# counting system that electronically rejects unwanted #gamma#/#beta# signals. The extractant can also be mixed into either a toluene based or water miscible Liquid Scintillation (LS) cocktail and measured by conventional LS counting for rapid screening purposes. The EE of 2 2"6Ra into RADAEX was 98-100% from a 0.3M NaNO_3 solution adjusted to pH> 10 whereas that of "2"1"0Pb/Po was 2-3%. The EE's for "2"2"6Ra 2 1"0Pb/Po and the 6 actinides were also measured over a pH range of 1 to 12. Of the 6 actinides only Cm and Am co-extracted at pH> 10 with EE's of 100% and 63% respectively. These 2 actinides if present in a sample cannot be back-extracted from the Ra bearing organic phase by simply changing the pH or acid concentration without loss of Ra. Isotopes of Am or Cm if present would interfere with the determinations of either #alpha# emitting 2 2"3Ra(5.6 MeV) 2 2"4Ra(5.7 MeV) or #beta# emitting "2"2"8Ra (via 2 2"8Th progeny; 5.3 MeV #alpha#) but not that of "2"2"6Ra (4.8 MeV #alpha#) because of the 0.250 MeV energy resolution of the PERALS"T"M Spectrometer Gamma emitting "1"3"3Ba which may be used as a yield determinant is not detected by PERALS"T"M.

WM Descriptor(s): actinides; alpha decay; alpha-bearing wastes; americium 243; curium 244; lead 210; neptunium 237; plutonium 242; polonium 210; radium 226; solvent extraction; thorium 230; toluene; uranium 232

Principal Investigator(s):

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Krikorian N.

Organization Type:

Other

Program Duration: From: 1995-8-1 To: 1997-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Environmental Measurements Lab.; 376 Hudson St. New York NY 10014

Recent publication info:

1137

USA19980095

Title:

Extraction efficiencies of Ra U Th Pu Am Cm and Np in 3 commercially available extractive scintillators

Title in Original Language:

Topic Code(s):

109 -Waste Characterisation (Radionuclide Inventory Determination), including Computer Codes and Measuring Methods and Techniques; 152 -Liquid Waste Treatment

Abstract:

Detailed data are presented for the extraction efficiencies (EE's) of 2 1"0Pb 2 2"6Ra 2 3"2U 2 3"0Th 2 4"4Cm 2 4"2Pu 2 4"3Am and 2 3"7Np into 3 commercially available liquid extractive scintillators under various chemical conditions. The extractive scintillations were either aliphatic amine sulfates (URAEX"R and THOREX) or a phosphoric acid/nitrate derivative (ALPHAEX"R). One to two milliter aliquots of these toluene based extractive scintillators intended for measurement in a PERALS"T"M alpha counting system can be mixed into a Liquid Scintillation (LS) cocktail and measured by conventional LS counting. The PERALS system rejects unwanted #beta# or #gamma# signals. Using "2"3"2U as a tracer sulfuric nitric and hydrochloric acids were tested over a range of normalities to determine their effect on the EE. The optimum EE's for URAEX and

THOREX were from dilute sulfuric acid whereas that of ALPHAEX was from nitric acid. The effect of aqueous phase pH on the EE's for each nuclide was also tested at the optimum salt (SO_4 or NO_4) and acid conditions of each extractant. Each extractive scintillator has the capability of extracting either one or several actinide elements depending on the pH acid normality or salt concentration of the aqueous phase. If an aqueous sample contains several alpha emitting actinides then additional separation chemistry steps may not be required before final measurement depending on (1) the choice of extractant (2) chemical conditions during extraction and (3) the alpha energy difference between co-extracting interferants and the nuclide of interest. The final choice of a yield tracer for a specific radioanalytical application would also be determined by the energy resolution of the PERALS"T'M Spectrometer typically 0.250 MeV.

WM Descriptor(s): americium 243; curium 244; efficiency; extraction; lead 210; liquid scintillators; neptunium 237; plutonium 242; radium 226; solvent extraction; thorium 230; uranium 232

Principal Investigator(s):

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State of Advancement: Research in progress

Sponsoring Organization(s):

Environmental Measurements Lab.; 376 Hudson St. New York NY 10014

Recent publication info:

1138

USA19980096

Title:

Development of a user's guide to assist with decommissioning cutting operations

Title in Original Language:

Topic Code(s):

421 -Dismantling Techniques

Abstract:

When nuclear facilities are decommissioned potentially radioactive aerosols are produced during cutting operations. We are developing a 'User's Guide' which can assist a contractor both in performing a risk assessment and in configuring an appropriate aerosol containment and collection systems. The development of this User's Guide is supported by both laboratory research and field tests. The laboratory research involves the use of plasma torch oxyacetylene and laser cutting tools. The field tests currently involve only plasma and oxylacetylene torches. Stainless steel carbon steel and aluminium were studied.

WM Descriptor(s): aluminium; carbon steels; cutting; cutting tools; decommissioning; manuals; nuclear facilities; radiation protection; radioactive aerosols; reactor dismantling; stainless steels

Principal Investigator(s):

NOVICK, V.J.

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Young K.; Dean J.; Chou L.; Willard B.

Organization Type:

Other

Program Duration: From: 1994-1-1 To: 1996-9-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Argonne National Laboratory Technology Development Division; 9700 South Cass Avenue Argonne Illinois 60439 USA

Recent publication info:

1139

USA19980097

Title:

Structure-function studies resorcinol-formaldehyde (R-F) resin for application in cesium removal from alkaline wastes

Title in Original Language:

Topic Code(s):

132 -Liquid Waste Treatment

Abstract:

Structure-function studies of R-F resin which has high capacity and selectivity for cesium have centered around the issue of the resin's chemical stability. Compared to phenol-formaldehyde resin (P-F) R-F resin does possess higher capacity but is chemically less stabile. R-F resin oxidation is easily monitored using solid-state NMR techniques; these results are correlated with resin performance through measurement of distribution coefficients. During the course of preparation of fluorinated R-F and P-F polymer derivatives it has been observed that the phenolic precursors of P-F resins undergo extensive etherification of the fixed ionic groups (hydroxyl) during resin preparation (determined using solid-state 13C NMR) thus theoretical capacity which is half that of R-F resins is further reduced. R-F resin undergoes facile oxidation of the aromatic ring to give p-quinone structures with loss of ion-exchange sites and performance. The amount of fluorine present in the derivatives has an effect on the amount of cross-linking that the resin precursors undergo and can be monitored using solid-state 19F NMR. Preparation of new derivatives of R-F resin which enhance the chemical/oxidative stability of these phenolic resins is currently in progress.

WM Descriptor(s): alkaline earth metal complexes; cesium; comparative evaluations; formaldehyde; oxidation; radioactive waste processing; removal; resins; resorcinol

Principal Investigator(s):

HUBLER, T.

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Other Investigators:

Franz J.A.; Hallen R.T.; Brown G.N.; Linehan J.C.; Shaw W.J.; Bray L.A.

Organization Type:

Other

Program Duration: From: 1994-6-1 To: 1996-9-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Pacific Northwest National Laborarory; Battelle Boulevard Richland WA 99352

Associated Organization(s):

N/A

Recent publication info:

1140

USA19980098

Title:

In-situ stabilization and containment of buried hazardous waste

Title in Original Language:

Topic Code(s):

167 -Waste Disposal; 316 -Barrier Studies/Tests/Impacts

Abstract:

Research has been conducted on advanced cementitious grouting materials for in-situ stabilization and containment of buried hazardous waste. The grouts were designed to be compatible with in-situ remediation techniques such as jet grouting soil mixing. The main areas of focus were in-situ stabilization of chromium contaminated soil and subsurface containment barriers. Additives including superplasticizers cement replacements and fibres have been used to significantly improve the performance of cementitious subsurface barriers. The developed grouts are also applicable to geotechnical applications. Grouts containing ground granulated blast furnace slag were used to stabilize soil contaminated with trivalent and hexavalent chromium. Contaminated soil stabilized with slag-modified grout was subjected to a variety of leaching durability and mechanical property tests. Treatment of contaminated soil with slag-modified grout resulted in a strong low permeability leach resistant product. Increasing the slag content improved leach resistance and other properties such as durability in sulphate environments. The redox properties of slag permit reduction of hexavalent chromium to the trivalent state without the necessity or a separate pre-treatment stage. This simplifies and reduces the time and costs associated with in-situ remediation of chromium contaminated soil.

WM Descriptor(s): cements; decontamination; ground disposal; grouting; radioactive wastes; soils; stability; waste disposal

Principal Investigator(s):

ALLAN, M.L.

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Other Investigators:

Kukacka L.E.

Organization Type:

Other

Program Duration: From: 1992-1-1 To: 1994-10-1

State of Advancement: Unknown

Sponsoring Organization(s):

Brookhaven National Laboratory; Building 526 Upton New York 11973 USA

Recent publication info:

1141

USA19980099

Title:

Latex modified grouts for in-situ stabilization of TRU/Mixed waste

Title in Original Language:

Topic Code(s):

164 -Waste Immobilization; 316 -Barrier Studies/Tests/Impacts

Abstract:

Latex-modified cementitious grouts are undergoing evaluation for in-situ stabilization of buried transuranic and mixed waste. The primary objective is to formulate materials suitable for jet grouting buried waste into a solid cohesive from which can be retrieved at a later date. Grouting the waste reduces the risk of exposure to airborne contaminants. Addition of latex to cementitious grout has the potential to improve certain properties of thr stabilized waste. These include durability impermeability and adhesion to waste material. Latex-modification offers enhancements to conventional cementitious grouts and is significantly less expensive than some polymer-based grouts. Research conducted to date has focused on development of low viscosity grouts compatible with jet grouting. The physical and mechanical properties of grout-stabilized soil are being measured. Comparison with conventional cementitious grouts will be made. Field tests on simulated buried waste are planned.

WM Descriptor(s): cements; ground disposal; grouting; latex; radioactive wastes; soils; stability; transuranium elements; waste disposal

Principal Investigator(s):

ALLAN, M.L.

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Kukacka L.E.

Organization Type:

Other

Program Duration: From: 1995-12-1 To: 1996-10-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Brookhaven National Laboratory; Building 526 Upton New York 11973 USA

Recent publication info:

1142

USA19980100

Title:

Partitioning behavior of "9"9Tc and "1"2"9I from simulated Hanford tank wastes using polyethylene glycol-based aqueous biphasic systems

Title in Original Language:

Topic Code(s):

112 -Liquid Waste Treatment

Abstract:

Three simulated Hanford tank wastes SY-101 NCAW and SST were prepared and contacted with aqueous solutions of 20-60% (w/w) polyethylene glycol (PEG)-2000. The combined salting out action of OH"-CO_3"2"- SO_4"2"- PO_4"3"- and possibility other minor constituents in the waste simulants results in the formation of aqueous biphasic systems (ABS). Investigation of the partitioning behavior of "9"9Tc (as "9"9TcO_4"-) and 1 2"9I(as "1"2"9i"-) from the waste simulant phase to the upper PEG-rich phase at 25 and 50 deg C revealed distribution ratios as high as 190 for 9 9TcO_4"- and 7.5 for "1"2"9I"-. The partitioning of several of the other major species in these solutions (Na"+ PO_4"3"- CO_3"2"- SO_4"2"- PEG) as well as the general physical characteristics of the ABS were also investigated. In general the observed distribution ratios

are affected (increased if they prefer the PEG-rich phase decreased if they prefer the salt-rich phase) by increasing the concentration of PEG-2000 used to from the ABS which increases the difference in actual PEG concentration in each phase. Stripping of the "9"9TcO_4"- from the loaded PEG-rich phase has been accomplished by reduction of pertechnetate and contact with a fresh salt ((NH_4)_3 citrate)) solution. Other possible stripping or disposal options are also discussed.

WM Descriptor(s): iodine 129; isotope separation; liquid wastes; polyethylene glycols; radioactive waste processing; solvent extraction; technetium 99

Principal Investigator(s):

ROGERS, R.

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Other Investigators:

Bond A.; Bauer C.; Zhang J.; Rein S.; Chomko R.; Roden D.

Organization Type:

Other

Program Duration: From: 1994-5-1 To: 1997-5-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Northern Illinois University Department of Chemistry; DeKalb IL 60115-2862 USA

Recent publication info:

1143

USA19980101

Title:

RISKIND-A computer program for calculating radiological consequences and health risks from transportation of spent nuclear fuel

Title in Original Language:

Topic Code(s):

148 -Spent Fuel Transportation (Methods, Casks, etc.); 232 -Environmental Risk Assessment

Abstract:

This report presents the technical details of RISKIND a computer code designed to estimate potential radiological consequences and health risks to individuals and the collective population from exposures associated with the transportation of spent nuclear fuel RISKIND is a user-friendly interactive program that can be run on an IBM or equivalent personal computer under the Windows"T"M environment. Several models are included in RISKIND that have been tailored to calculate the exposure to individuals under various incident-free and accident conditions The incident-free models assess exposures form both gamma and neutron radiation and can account for different cask designs. The accident models include accidental release atmospheric transport and the environmental pathways of radionuclides form spent fuels; these models also assess health risks to individuals and the collective population. The models are supported by databases that are specific to spent nuclear fuels and include a radionuclide inventory and dose conversion factors. In addition the Flexibility of the models allows them to be used for assessing any accidental release involving radioactive materials.

WM Descriptor(s): biological radiation effects; computerized simulation; health hazards; radiation doses; radioactive waste management; risk assessment; s codes; spent fuels; waste transportation

Principal Investigator(s):

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Organization Type:

Other

Program Duration: From: 1988-1-1 To: 1995-11-1

State of Advancement: Unknown

Sponsoring Organization(s):

Argonne National Laboratory; 9700 South Cass Avenue
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Recent publication info:

1144

USA19980102

Title:

Evaluation of radioactive scrap metal recycling

Title in Original Language:

Topic Code(s):

232 -Environmental Risk Assessment; 430 - MANAGEMENT OF DECOMMISSIONING WASTE

Abstract:

This report evaluates the human health risks and environmental and sociopolitical impacts of options for recycling radioactive scrap metal (RSM) or disposing of and replacing it. Argonne National Laboratory (ANL) is assisting the U.S. Department of Energy (DOE) Office of Environmental Restoration and Waste Management Oak Ridge Programs Division in assessing the implications of RSM management alternatives. This study is intended to support the DOE contribution to a study of metal recycling being conducted by the Task Group on Recycling and Reuse of the Organization for Economic Cooperation and Development. The focus is on evaluating the justification for the practice of recycling RSM and the case of iron and steel scrap is used as an example in assessing the impacts. To conduct the evaluation a considerable set of data was compiled and developed. Much of this information is included in this document to provide a source book of information.

WM Descriptor(s): environmental impacts; health hazards; iron; materials recovery; radioactive waste management; recycling; risk assessment; scrap metals; steels; waste disposal

Principal Investigator(s):

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Organization Type:

Other

Program Duration: From: 1993-1-1 To: 1996-2-1

State of Advancement: Unknown

Sponsoring Organization(s):

Argonne National Laboratory; 9700 South Cass Avenue
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Recent publication info:

1145

USA19980103

Title:

Integrated Data Base report-1994: U.S. spent nuclear fuel and radioactive waste inventories projections and characteristics

Title in Original Language:

Topic Code(s):

104 -Database & Information Systems, including Technology Transfer Systems. Technical Assistance and Costs; 109 -Waste Characterisation (Radionuclide Inventory Determination), including Computer Codes and Measuring Methods and Techniques

Abstract:

In its current annual report the Integrated Data Base (IDB) Program has compiled and documented historic data on the inventories and characteristics of both commercial and U.S. Department of Energy (DOE)spent nuclear fuel (SNF) and commercial and U.s. government-owned radioactive wastes. Except for transuranic wastes inventories of these materials are reported as of December 31 1994. Transuranic waste inventories are reported as of December 31 1993. All SNF and radioactive waste data reported are based on the reliable information available form government sources the open literature technical reports and direct contacts. The information and data forecasted are consistent with the latest DOE Energy Information Administration projections of U.S. commercial nuclear power growth and expected DOE-related and private industrial and institutional activities. The radioactive materials considered in this report on a chapter-by-chapter basis are SNF high-level waste transuranic waste low-level waste commercial uranium mill tailings DOE Environmental Restoration Program contaminated environmental media (soils and debris) commercial reactor and fuel cycle facility decommissioning wastes and mixed (hazardous and radioactive) low-level waste. For most of these categories current and projected inventories are given through the calendar-year 2030 and the radioactivity and thermal power are calculated based on reported or estimated isotopic compositions.

WM Descriptor(s): contamination; data compilation; information systems; inventories; nonradioactive wastes; radioactive materials; radioactive wastes; spent fuels; waste forms

Principal Investigator(s):

THARP, M.L.

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Klein J.; Storch S.N.; Ashline R.C.; Loghry S.L.; Drez P.E.; Icenhour A.S.; Salmon R.; Chung T.; Tol

Organization Type:

Other

Program Duration: From: 1980-8-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

Integrated Data Base Program; 105 Mitchell Road MS-6495
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Recent publication info:

1146

USA19980104

Title:
Real-time monitoring of waste-processing streams using transient infrared spectroscopy

Title in Original Language:

Topic Code(s):

113 -Solid Waste Treatment; 181 -Methodologies, Analytical Methods, Measurements Instrumentation

Abstract:

The project is developing Transient Infrared Spectroscopy (TIRS) as a real-time on-line monitor for the composition of processed-waste streams. TIRS is a single-ended noncontact method for chemically analyzing almost any moving stream of nonmetallic solid or viscous-liquid material. TIRS can operate with stream velocities from 3 to 1000 m/min. TIRS performs the analysis by acquiring the infrared spectrum of the stream. TIRS uses a jet of air aimed onto the process stream to create a thin cooled or heated layer at the surface of the stream. It can then acquire the infrared spectrum of this layer because the layer emits and absorbs infrared radiation differently form the rest of the process stream. The project has developed the application of TIRS to the polymer encapsulation of low-level radioactive waste and is exploring its application to other waste-processing procedures such as vitrification.

WM Descriptor(s): chemical composition; encapsulation; infrared spectrometers; low-level radioactive wastes; monitoring; process control; radioactive waste processing; real time systems; vitrification

Principal Investigator(s):

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Organization Type:

Other

Program Duration: From: 1999-12-1 To: 1996-9-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Ames Laboratory Iowa State University; Ames IA 50011-3020 USA

Associated Organization(s):

Rocky Flats Environmental Technology Site

Recent publication info:

1147

USA19980105

Title:
Concrete decontamination by electro-hydraulic scabbling

Title in Original Language:

Topic Code(s):

416 -Other Methods and Techniques

Abstract:

The objective of this project is to develop and demonstrate a cost-efficient rapid controllable concrete electro-hydraulic scabbling (EHS) process to remove surface layers of contaminated concrete while generating minimal secondary waste. The EHS device delivers powerful shock waves to the concrete surface originated by a pulsed

high-voltage electric discharge between two electrodes. The hydraulic shock wave propagates through water between two electrodes. The hydraulic shock wave propagates through water between the discharge channel and the concrete causing the concrete to crack and peel. Phases I and II of the development program have been completed. In Phase I the concept feasibility was demonstrated in the laboratory. In Phase II a prototype was developed and tested. A demonstration of the Electro-Hydraulic Scabbler on uranium contaminated concrete floors in Plant 6 at the Fernald Environment Management Project (FEMP) was completed in September 1995. Six discrete locations were scabbled ranging in size from about 3.6 ft"2 to 11 ft"2. Included in the demonstration location were cracks construction joints and scarred sections of the floor. The system performed well with no breakdown of any key component. Scabbling depth varied between 1/4" and 1/2". The level of contamination was reduced an average of ten times form a few thousand to a few hundred ppm uranium (or #beta#/#gamma#cpm). The Phase II plan involves an extensive operational of a higher capacity unit at a DOE site.

WM Descriptor(s): concretes; decontamination; electric discharges; hydraulic fracturing; impact shock; removal; surface contamination

Principal Investigator(s):

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Other Investigators:

Organization Type:

Other

Program Duration: From: 1994-10-1 To: 1997-10-1

State of Advancement: Unknown

Sponsoring Organization(s):

Textron Systems Division; 201 Lowell St. Wilmington MA 01887 (USA)

Associated Organization(s):

Dept. of Energy/METC

Recent publication info:

1148

USA19980106

Title:
Multispectral neutron logging

Title in Original Language:

Topic Code(s):

302 -Site Survey and Characterization

Abstract:

Geophysical borehole-logging techniques are used for in situ determination of subsurface physical chemical geological and hydrological parameters. This Multispectral Neutron Project addressed the adaptation of one measurements technique neutron-induced spectral gamma ray logging to map environmental contaminants along boreholes. A goal of the project was to determine the detection thresholds for various contaminants for a state-of-the-art instrument. Experiments were completed by collecting data using an experimental prototype borehole sonde within a specially built model containing contaminated material. The sonde contained an electronic neutron generator and a cryogenically-cooled high-solution gamma-ray detector. The neutron generator produced about 10"8 neutrons per second at a rate of 3000 bursts per second each lasting 33 microseconds. The detector was 22.5% efficient. The borehole model was made to allow changing the contamination zone. Six interchangeable zones were constructed: chlorine (high concentration) chlorine(low concentration) mercury cadmium gadolinium and samarium. The contamination zones were disks 2 ft. 6 in. diameter and 6 in. high thus representing a thin zone of contamination around a borehole. Form the experiments detection thresholds were

determined for the five elements tested. The results were: mercury 33 parts per million by weight (ppm); cadmium 1.4 ppm; chlorine 86 ppm; gadolinium 0.9 ppm; and samarium 1.2 ppm. These detection thresholds are based on data acquired during 1000 seconds of counting time. It is believed that these detection threshold can be improved by nearly an order of magnitude using a sonde containing existing state-of-the-art technology.

WM Descriptor(s): boreholes; concentration ratio; contamination; gamma detection; geophysical surveys; multi-element analysis; neutron logging; neutron probes; site characterization

Principal Investigator(s):

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Other Investigators:

Wilson R.D.

Organization Type:

Other

Program Duration: From: 1990-1-1 To: 1994-9-1

State of Advancement: Unknown

Sponsoring Organization(s):

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Recent publication info:

1149

USA19980107

Title:

Site characterization and object location using a tensor magnetic gradiometer

Title in Original Language:

Topic Code(s):

302 -Site Survey and Characterization

Abstract:

The tensor magnetic gradiometer system (TMGS) nonintrusively measures the vector magnetic field and the magnetic gradient tensor at a waste site for use in site characterization. The system consists of a four-element array of high-sensitivity triaxial ringcore fluxgate magnetometers and supporting software. The TMGS measures five independent components of magnetic gradient and three components of the magnetic field. The advantage of surveying with this type of instrument is that interpretations yielding the location and characteristics of the source of a local magnetic disturbance (anomaly) require far fewer data samples than equivalent interpretations using conventional magnetic data. TMG technology has appeal for site investigations for its ability to rapidly survey waste sites and provide locations and characteristics of buried magnetic sources presumably associated with buried waste without requiring direct physical access to the entire site. In FY1993 the USGS and the DOE-GJPO collaborated with the USGS providing their prototype TMGS sensor for demonstration at a test site located at the Idaho National Engineering Laboratory (INLE) in Idaho. DOE-GJPO developed acquisition reduction and interpretation software and design and implementation of hardware and software required in order to operate the TMGS on a mobile platform. During August 1995 the mobile TMGS system was tested at the Cold Test Pit located just outside the confines of the INEL Radioactive Waste Management Complex (RWMC).

WM Descriptor(s): geophysical surveys; magnetic fields; magnetic probes; magnetometers; measuring methods; performance testing; site characterization; spatial distribution; underground disposal; waste disposal

Principal Investigator(s):

SNYDER, D.D.

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Other Investigators:

Organization Type:

Other

Program Duration: From: 1992-1-1 To: 1999-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

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Associated Organization(s):

U.S. Geological Survey Branch of geophysics

Recent publication info:

1150

USA19980108

Title:

Rabbit Valley Geophysics Performance Evaluation Range

Title in Original Language:

Topic Code(s):

302 -Site Survey and Characterization; 303 -Earth Science Models and Studies

Abstract:

The Rabbit Valley Geophysics Performance Evaluation Range (GPER) is a facility provided by the U.S. Department of Energy (DOE) Office of Technology Development for evaluating the performance of geophysical methods and instruments under carefully characterized conditions. The GPER was constructed during the 1993/94 period under sponsorship of the DOE Office of Technology Development TTP AL932003. The site is an 80-acre tract of public land administered by the Bureau of Land Management (BLM) and is authorized for use as a geophysical test site under an Interagency Agreement between BLM and the DOE-Grand Junction Projects Office (GJPO). The Rabbit Valley GPER is located in an area free from cultural noise and interference caused by above ground structures (e.g. power lines fences buildings). Geophysical targets have been emplaced below the ground surface providing an area with no physical obstructions. The GPER is used to evaluate the performance of instrumentation systems used in a variety of geophysical measurement methods including surface magnetics induction electromagnetics time-domain electromagnetics induced polarization/resistivity methods very low frequency electromagnetics ground-penetrating radar (GPR) and Seismic methods. The GPER supports objective and quantitative evaluation of the relationships among measured geophysical data computer-modeled responses and well-defined target and environmental parameters for individual test cells.

WM Descriptor(s): geologic models; geophysical surveys; land use; magnetic surveys; measuring methods; performance testing; radioactive waste facilities; site characterization; site selection

Principal Investigator(s):

ABRAHAM, J.A.

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Other Investigators:

Organization Type:

Other

Program Duration: From: 1988-1-1 To: 1996-9-1

State of Advancement: Research in progress

Sponsoring Organization(s):

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Recent publication info:

1151

USA19980109

Title:

Three dimensional site characterization using broadband electromagnetics

Title in Original Language:

Topic Code(s):

302 -Site Survey and Characterization

Abstract:

The induction electromagnetic (EM) method is an effective tool for mapping the subsurface soil conductivity distribution. Recent progress in the investigation and evaluation of the method includes demonstrations of the most current commercial time-domain and frequency-domain broadband electromagnetic (BBEM) systems evaluation of optimal BBEM system configurations for waste site configurations for waste site characterization and evaluation of advanced analysis systems in development at academic institutions and government laboratories. The capabilities of the most recently introduced commercial BBEM systems have been demonstrated by means of physical model studies at DOE facilities and through field trails sponsored by the related VETEM project The work also demonstrated the most efficient antennae configurations for the identification and mapping of small buried objects and larger waste pits. In addition to commercial software for interpretation support three developmental analysis methods were evaluated. These were: (1) Nonlinear three-dimensional Inversion by Dr. K.H. Lee Lawrence Berkeley Laboratory; 2 the method of Migration or Reverse Time continuation by Dr. M. Zhdanov University of Utah and (3) the method of Continuation by Dr.H.T. Andersen consultant. The three methods evaluated derive sections and plans for multiple traverses and depths. True three dimensional inversion routines are still in development. A TDEM system along with qualified operators and analysts is available at the GJPO for use throughout the DOE complex. Suitable time-domain and frequency-domain BBEM systems are available from commercial sources.

WM Descriptor(s): analytical solution; electric conductivity; electromagnetic surveys; geophysical surveys; mapping; measuring methods; site characterization; soils

Principal Investigator(s):

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Other

Program Duration: From: 1992-1-1 To: 1999-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

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Recent publication info:

1152

USA19980110

Title:

Three-dimensional/three component (3D/3C) seismic for site characterization

Title in Original Language:

Topic Code(s):

302 -Site Survey and Characterization

Abstract:

The three-dimensional three-component (3D/3C) seismic technology was used to characterize hydrogeologic framework over a subsurface volume in a minimally instructive manner thus providing an understanding of preferential pathways for contaminant transport and fate. Surveys with 3D seismic methods allow investigation of a volume when surface access may be restricted because of high contamination levels. With the 3D/3C seismic method data acquired along separate source and receiver lines outside a restricted volume provide information that can be interpreted for zones within the restricted volume. 3D seismic data can be processed so that selected profiles within a volume may be viewed from any angle and specific time or depth horizons may also be displayed and interpreted. Higher resolution and additional subsurface information is possible with combined one-component compressional=wave velocity of most subsurface materials is less than the compressional-wave velocity and because the dominant recovered frequencies are similar for both wave types in many areas shear-waves are able to map much thinner features. In addition 3C data allow determination of anisotropy which may indicate features such as preferred grain orientation periodic layering and depositional or erosional lineation and may be correlatable to preferential contaminant transport pathways. Other applications include determining soil or waste heterogeneity and integrity and defining and delineating trench and pit boundaries. A planned FY96 full-scale demonstration will enable the 3D/3C seismic technology to be developed to a point where it can be transferred to private industry and applied at numerous suitable sites.

WM Descriptor(s): contamination; environmental transport; geologic structures; ground water; hydraulic conductivity; seismic surveys; site characterization; three-dimensional calculations

Principal Investigator(s):

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Organization Type:

Other

Program Duration: From: 1993-10-1 To: 1999-9-1

State of Advancement: Research in progress

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Associated Organization(s):

U.S.Geological Survey Colorado School of Mines

Recent publication info:

1153

USA19980111

Title:

Field studies at the Apache Leap Research Site

Title in Original Language:

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 322 - Site Survey and Characterization

Abstract:

The Apache Leap Research Site studies provide field experimental data to test theories and conceptual models related to characterization and performance assessment of a high-level radioactive waste repository in unsaturated fractured rock. Field methods and analyses for estimating hydraulic pneumatic and transport properties are evaluated over a range of measurement and field observation scales. Measurement scales range from less then one meter to over several tens of meters for single and cross-hole pneumatic and hydraulic testing and to over one hundred meters for the testing of perched-water conditions and properties and fracture-dominated flow and transport. Field studies also examine the role of fractures and fracture zones for focusing infiltration and recharge. A large-scale tracer test is being conducted for estimating ground-water travel times from an intermittent stream channel through a fault-induced fracture network to collection locations in the underlying mining tunnel. Environmental stable and radioactive isotopes samples are analyzed to determine the rate and pathway for water and solute flux through the matrix and fracture components. Conceptual flow and transport models being tested are the stochastic continuum dual continue and discrete fracture network models. Infiltration through fractures is studied on a small watershed using measurements of precipitation evapotranspiration and runoff.

WM Descriptor(s): environmental exposure pathway; environmental transport; field tests; geologic fractures; ground water; high-level radioactive wastes; hydraulic conductivity; performance testing; site characterization; underground disposal

Principal Investigator(s):

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Neuman S.; Wierenga P.J.

Organization Type:

Other

Program Duration: From: 1995-5-1 To: 1997-3-1

State of Advancement: Research in progress

Sponsoring Organization(s):

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Recent publication info:

1154

USA19980112

Title:

Testing and evaluation of ground-water flow and transport models

Title in Original Language:

Topic Code(s):

137 -Waste Disposal (including Spent Fuel); 322 - Site Survey and Characterization

Abstract:

Theoretical and modeling studies test and evaluate conceptual flow and transport models relevant to site characterization and performance assessment of high-level radioactive waste repositories sited in unsaturated fractured rock. The modeling assessment studies use experimental data generated at the Apache Leap Research Site (ALRS) to validate the applicability of the stochastic continuum and fractal scaling concepts as may be indicated by the ALRS field experimental results. Using ALRS field experimental data as well as independent considerations the studies examine theoretically and computationally the possibility to define and determine effective parameters for multiphase flow and transport in fractured tuff by smoothing and numerical inversion techniques. Stochastically-based deterministic computational methods will be developed to simulate flow and transport in unsaturated fractured tuff and to evaluate the associated uncertainties. Using the ALRS field data the investigator will examine the extent to which it is possible to define the roles of individual fractures and fracture zones in facilitating preferential flow and transport in unsaturated fractured tuff.

WM Descriptor(s): environmental transport; field tests; flow models; geologic fractures; ground water; high-level radioactive wastes; hydraulic conductivity; performance testing; rock-fluid interactions; site characterization; underground disposal

Principal Investigator(s):

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Other Investigators:

Organization Type:

Other

Program Duration: From: 1995-5-1 To: 1997-3-1

State of Advancement: Research in progress

Sponsoring Organization(s):

University of Arizona Department of Hydrology and Water Resources; Tucson Arizona 85721 USA

Recent publication info:

1155

USA19980113

Title:

Unsaturated zone monitoring and field studies

Title in Original Language:

Topic Code(s):

242 -Monitoring Techniques; 303 -Earth Science Models and Studies

Abstract:

Field studies at the University of Arizona's Maricopa Agricultural Center assess capabilities limitations and usefulness of unsaturated zone monitoring strategies methods and instrumentation relevant to moisture and gaseous movement and contaminant transport. The testing of monitoring strategies and instrumentation is over a range of scales and conditions using water and tracer applications. The studies will provide datasets and information needed to provide the technical bases for identifying and evaluating proposed monitoring programs at low-level radioactive waste (LLW) and site decommissioning (SD) sites. Field testing involves evaluations of the design installation use and decommissioning of unsaturated zone monitoring systems under anticipated conditions. The testing also will examine whether and how the monitoring systems and instrumentation may compromise the performance of natural and engineered barriers at LLW and SD facilities and how to eliminate or mitigate such compromises. Following review of the state-of-the-art in unsaturated zone monitoring strategies instrumentation and methods a field plan was developed and peer-reviewed by soil scientists. The field testing program involves two water application experiments using different irrigation rates and water qualities to robustly test monitoring strategies and instrumentation. The overall integration of the techniques into a coherent monitoring criteria that can installed at future LLW and SD sites will be tested and evaluated.

WM Descriptor(s): decommissioning; environmental transport; field tests; fluid flow; geologic fractures; geologic surveys; hydraulic conductivity; low-level radioactive wastes; monitoring; rock-fluid interactions; site characterization

Principal Investigator(s):

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Warrick A.W. Scanlon B.R.

Organization Type:

Other

Program Duration: From: 1995-4-1 To: 1998-5-1

State of Advancement: Research in progress

Sponsoring Organization(s):

University of Arizona Department of Soil Water and Environmental Sciences; Tucson Arizona 85721 USA

Associated Organization(s):

Texas Bureau of Economic Geology
University of Texas at Austin

Recent publication info:

1156

USA19980114

Title:
Ground-water flow and transport analyses

Title in Original Language:

Topic Code(s):

303 -Earth Science Models and Studies; 404 -Non-Reactor Facility Decommissioning

Abstract:

Ground-water flow and transport studies are evaluating uncertainties in the present hydrologic assessment methods associated with performance assessment models used at site decommissioning sites. The study is designed to determine the potential reduction in uncertainties using alternative analytical methods. Pacific Northwest Laboratory (PNL) investigators are utilizing and adapting analytical methods from their previously developed 'Hydrologic Evaluation Methodology (HEM)' and available unsaturated zone monitoring studies to support decommissioning plan reviews. PNL will perform calculations using the incorporated HEM methods and datasets to determine the level of conservatism inherent in the present review models and possible uncertainty reductions realized in using the HEM methods. The study involves demonstrations and documentation of the recommended HEM subsurface water flow and transport analyses for estimating infiltration and subsurface water fluxes for a range of site conditions and scales. The uncertainty assessments will carry the infiltration estimates for the various HEM methods through the review model (e.g. MEPAS Code) to final dose calculations for comparisons. The final report will provide technical bases for NRC staff guidance on reviews of site decommissioning plans involving infiltration and related transport.

WM Descriptor(s): decommissioning; environmental transport; flow models; fluid flow; ground water; hydraulic conductivity; hydrology; nuclear facilities; water influx

Principal Investigator(s):

GEE, G.W.

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Other Investigators:

Meyer P. Rockhold M.

Organization Type:

Other

Program Duration: From: 1995-9-1 To: 1997-9-1

State of Advancement: Research in progress

Sponsoring Organization(s):

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Recent publication info:

1157

USA19980115

Title:
Implementation of low-level waste performance assessment methodology and extension of the methodology to decommissioning

Title in Original Language:

Topic Code(s):

404 -Non-Reactor Facility Decommissioning; 430 -MANAGEMENT OF DECOMMISSIONING WASTE

Abstract:

The objective of this work is to modify the existing U.S.Nuclear Regulatory Commission Low-level Waste (LLW) Performance Assessment (PA) Methodology to a methodology that is appropriate for site decommissioning and to continue development of the Sandia Environmental Decision Support System to automate and test both the LLW PA and decommissioning methodologies. Tasks within this work will: 1 identify and compile available data to support NRC site decommissioning needs; 2 evaluate differences between LLW and decommissioning sites; 3 assess the applicability of the LLW Performance Assessment Methodology (PAM) to decommissioning analyses; 4 recommend and test a methodology appropriate for decommissioning analyses; 5 implement a decommissioning methodology within the Sandia Environmental Decision Support System.

WM Descriptor(s): data compilation; decommissioning; evaluation; low-level radioactive wastes; nuclear facilities; performance testing

Principal Investigator(s):

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Other Investigators:

Organization Type:

Other

Program Duration: From: 1995-7-1 To: 1997-10-1

State of Advancement: Research in progress

Sponsoring Organization(s):

NRC Performance Assessment Department MS 1345 Sandia National Laboratories; P.O.Box 5800 Albuquerque NM 87185-1345 USA

Recent publication info:

1158

USA19980116

Title:

Modeling of gaseous transport and geochemical interactions in a low-level waste disposal facility

Title in Original Language:

Topic Code(s):

202 -Dispersion and Migration Models; 223 - Effects of Gaseous Releases

Abstract:

The objective of this project is the development of a comprehensive computer model to estimate the rate of release of contaminants from low-level radioactive waste facilities. Prior work resulted in a Breach Leach and Transport (BLT) code to estimate contaminant release from near-surface low-level waste disposal facilities resulting from container degradation (Breach) waste-form leaching and transport in the water phase. Present work is directed in three separate but related research areas to broaden the coverage of contaminant release pathways and to enhance the simulation of release by explicitly modeling additional chemical mechanisms: predicting gaseous release from low-level waste disposal facilities; modifying the code to simultaneously simulate multi-species release; extending the code to simulate chemical speciation and chemical reaction. Reports documenting this work: 1 describe the physical and chemical processes that control the release and migration of radionuclides from shallow land low-level waste disposal facilities; 2 formulate mathematical models of these processes; 3 outline the implementation of these models in the computer code; 4 demonstrate

the application of the code on a set of example problems; and 5 provide a user's manual for the code.

WM Descriptor(s): computerized simulation; environmental exposure pathway; environmental transport; flow models; gaseous wastes; geochemistry; ground disposal; ground release; low-level radioactive wastes

Principal Investigator(s):

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Organization Type:

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Program Duration: From: 1993-12-1 To: 1996-3-1

State of Advancement: Unknown

Sponsoring Organization(s):

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Recent publication info:

1159

USA19980117

Title:

Field lysimeter program low-level waste data base

Title in Original Language:

Topic Code(s):

114 -Waste Immobilization (Bituminization, Cementation, Including Tests of Properties, Leaching Studies); 181 -Methodologies, Analytical Methods, Measurements Instrumentation

Abstract:

The Field Lysimeter Investigations; Low-Level Waste Data Base Development Program is (a) studying the degradation effects of organic ion-exchange resins caused by radiation (b) examining the adequacy of test procedures recommended in the Branch Technical Position on Waste Form to meet the requirements of 10 CFR 61 using solidified resins (c) obtaining performance information on solidified ion-exchange resins in a disposal environment and (d) providing data and information on radionuclide transport in the environment for use in performance assessments. Compressive test results of 11-year-old cement and vinyl ester-styrene solidified waste forms are presented which show effects of aging and self-irradiation. Results of the ninth year of data acquisition from the field testing are presented and discussed. During the continuing field testing both Portland type I-II cement and Dow vinyl ester-styrene waste forms are being tested in lysimeter arrays located at Argonne National Laboratory-East in Illinois and at Oak Ridge National Laboratory. The study is designed to provide continuous data on radionuclide release and movement as well as environmental conditions over a 20-year period. The results are being used to evaluate the capability of performance assessment models.

WM Descriptor(s): cements; data compilation; materials testing; performance testing; radioactive waste disposal; radiolysis; radionuclide migration; resins; solidification; waste forms

Principal Investigator(s):

MCCONNEL JR., J.

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Other Investigators:

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Organization Type:

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Program Duration: From: 1986-9-1 To: 1997-9-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Idaho National Engineering Laboratory; Idaho Falls Idaho 83415-3509 USA

Recent publication info:

1160

USA19980118

Title:

Microbial degradation of low-level radioactive waste

Title in Original Language:

Topic Code(s):

117 -Waste Disposal; 161 - Biodegradation/Biotreatment

Abstract:

The Nuclear Regulatory Commission stipulates in 10 CFR 61 that disposed low-level radioactive waste (LLW) be stabilized. To provide guidance to disposal vendors and nuclear station waste generators for implementing those requirements the NRC developed the Technical Position on Waste Form Revision 1. That document details a specified set of recommended testing procedures and criteria including several tests for determining the biodegradation properties of waste forms. The purpose of this research program is to develop modified microbial degradation test procedures that will be more appropriate than the existing procedures for evaluating the effects of microbiologically influenced chemical attack on cement-solidified LLW. Groups of microorganisms indigenous to LLW disposal sites are being employed that can metabolically convert organic and inorganic substrates into organic and mineral acids. Such acids aggressively react with cement and can ultimately lead to structural failure. The application of mechanisms inherent in microbially influenced degradation of cement-based material are the focus of this study. Data-validated evidence of the potential for microbially influenced deterioration of cement-solidified LLW and subsequent release of radionuclides has been developed during this study.

WM Descriptor(s): biodegradation; cements; low-level radioactive wastes; microorganisms; radioactive waste disposal; solidification; waste forms

Principal Investigator(s):

ROGERS, R.D.

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McConnel Jr. J.

Organization Type:

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Program Duration: From: 1992-9-1 To: 1996-9-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Idaho National Engineering Laboratory; Idaho Falls Idaho
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Recent publication info:

1161

USA19980119

Title:

Characteristics of low-level decontamination waste

Title in Original Language:

Topic Code(s):

182 -Waste from form characterization; 412 - Chemical Decontamination Methods

Abstract:

Studies are being performed to evaluate structural stability and leachability of radionuclides stable metals and chelating agents from cement-solidified decontamination ion-exchange resin wastes collected from seven commercial boiling water reactors and one pressurized water reactor. Samples of untreated resin waste and solidified waste forms are subjected to immersion and compressive strength testing. Some waste-form samples are leach-tested using simulated ground waters and simulated seawater for comparison with the deionized water tests that are normally performed to assess waste-form leachability. This study shows the results of these tests and assesses the effects of the various decontamination methods waste form formulations leachant chemical compositions and pH of the leachant on the structural stability and leachability of the waste forms. This study will also characterize ion-exchange resins and perform leaching studies from samples collected from full reactor decontaminations.

WM Descriptor(s): decontamination; ion exchange materials; leaching; low-level radioactive wastes; materials testing; resins; solidification; stability; waste forms

Principal Investigator(s):

AKERS, D.W.

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Other Investigators:

Mandler J.

Organization Type:

Other

Program Duration: From: 1986-9-1 To: 1996-5-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Idaho National Engineering Laboratory; Idaho Falls Idaho
83415-3509 USA

Recent publication info:

1162

USA19980120

Title:

Characterization of low-level waste; activated metals and ion-exchange resins

Title in Original Language:

Topic Code(s):

117 -Waste Disposal; 182 -Waste from form characterization

Abstract:

This research program is addressing key issues in characterizing and disposing of all long-lived radionuclides of potential concern in activated metal waste and other waste streams from operating power stations. The objectives of this research are 1 to identify additional long-lived radionuclides of potential concern not listed in 10 CFR Part 61 that may be present in significant amounts in various types of low-level radioactive wastes and activated metals 2 to enhance the NRC's understanding of the distribution and projected quantities of additional long-lived radionuclides within activated metals and low-level waste streams from commercial nuclear power stations 3 to determine appropriate preliminary scaling factors for the difficult-to-measure radionuclides to use when waste is not analyzed or when sample results are near or below the lower-limit-of-detection (LLD) and 4 to provide radiological characterizations of activated metal specimens to use in experiments for determining leach rates of radionuclides from activated metals.

WM Descriptor(s): ion exchange materials; leaching; low-level radioactive wastes; radioactive materials; radioactive waste disposal; resins; scrap metals; waste forms

Principal Investigator(s):

ROBERTSON, D.E.

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Organization Performing the work:

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Other Investigators:

Mandler J.

Organization Type:

Other

Program Duration: From: 1992-9-1 To: 1996-5-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Pacific Northwest National Laboratory; Battelle Boulevard
P.O.Box 999 Richland WA 99352 USA

Recent publication info:

1163

USA19980121

Title:

Characterization of radionuclide-chelating agent complexes released from low-level radioactive waste

Title in Original Language:

Topic Code(s):

182 -Waste from form characterization; 412 - Chemical Decontamination Methods

Abstract:

Research studies are obtaining data to: (1) experimentally determine radionuclide-chelating complexes in leachates obtained from leaching studies of decontamination LLW solidified in cement from nuclear power stations (2) perform thermodynamic calculations to identify important radionuclide-chelating complexes and validate experimental test results (3) experimentally determine thermodynamic data for important radionuclide-chelating complexes for which data are not available (4) determine sorption behavior of radionuclide-chelating complexes on soils (5) modify existing geochemical models to include thermodynamic and kinetic data for radionuclide-chelating complexes and predict radionuclide-chelating complexes in leaching from LLW and in soils and (6) experimentally validate geochemical calculations using actual soils data.

WM Descriptor(s): cements; chelates; chelating agents; decontamination; leaching; low-level radioactive wastes; radioactive waste management; solidification; thermodynamics; waste forms

Principal Investigator(s):

SERNE, R. JEFF

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Other Investigators:

Cantrell K.

Organization Type:

Other

Program Duration: From: 1993-9-1 To: 1997-5-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Pacific Northwest National Laboratory; Battelle Boulevard
P.O.Box 999 Richland WA 99352 USA

Recent publication info:

1164

USA19980122

Title:

Radionuclide solubilities for LLW and SDMP performance assessments

Title in Original Language:

Topic Code(s):

182 -Waste from form characterization; 412 -
Chemical Decontamination Methods

Abstract:

This research program is designed (1) to characterize actual waste slags for radionuclide and chemical content (2) to experimentally determine the solubilities of radionuclides present in decommissioning wastes under varying hydrochemical and physical conditions expected at SDMP disposal sites (3) to determine dissolution rates for wastes slags (4) to determine release rates for important radionuclides present in decommissioning wastes (5) to determine the time to reach solubility limits for the important radionuclides present in decommissioning waste (6) to provide an understanding of the effects of varying hydrochemical and physical conditions on the solubilities of radionuclides and dissolution rates for decommissioning and (7) to provide limited experimental radionuclide solubility data time to reach solubility limits and release rate data from LLW and SDMP dissolution rates under varying hydrochemical and physical conditions.

WM Descriptor(s): chemical composition; decommissioning; dissolution; evaluation; low-level radioactive wastes; slags; solubility; waste disposal; waste forms

Principal Investigator(s):

FELMY, A.

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Organization Performing the work:

PACIFIC NORTHWEST NATIONAL LABORATORY
RICHLAND WA 99352 UNITED STATES OF
AMERICA

Other Investigators:

Rai D.

Organization Type:

Other

Program Duration: From: 1995-9-1 To: 1997-5-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Pacific Northwest National Laboratory; Battelle Boulevard
P.O.Box 999 Richland WA 99352 USA

Recent publication info:

1165

USA19980123

Title:

Characterization of retardation mechanisms in soils

Title in Original Language:

Topic Code(s):

202 -Dispersion and Migration Models

Abstract:

The research involves laboratory analyses and molecular modeling of the mechanisms controlling radionuclide retardation in soil. To date it has dealt with simple silicate minerals and is now being extended to clay minerals and Fe oxides/hydroxides. This project is providing basic information to be used in determination of mechanisms affecting radionuclide migration in soils. It will be factored into geochemical models for prediction of radionuclide transport in ground water. This is an important aspect of performance assessment.

WM Descriptor(s): buildup; clays; flow models; geochemistry; ground water; iron hydroxides; iron oxides; radionuclide migration; soils

Principal Investigator(s):

WESTRICH, H.

SANDIA NATIONAL LABORATORY
ALBUQUERQUE
NM 87185-0750

Organization Performing the work:

SANDIA NATIONAL LABORATORY MS 1330 ALBUQUERQUE NM 87185-1330 UNITED STATES OF AMERICA

Other Investigators:

Cygan R. Brady P. Nagy K.

Organization Type:

Other

Program Duration: From: 1991-9-1 To: 1997-9-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Sandia National Laboratory; Albuquerque New Mexico 87185-0750 USA

Recent publication info:

1166

USA19980124

Title:

Predicting the kinetics of disequilibrium silicate weathering

Title in Original Language:

Topic Code(s):

202 -Dispersion and Migration Models

Abstract:

The research involved laboratory analyses and computer modeling of the mechanisms affecting dissolution rates in common silicate minerals. It looked at iodine sorption on soil minerals which exhibit anion exchange properties (imogolite and allophane). This project provided basic information to be used in determination of mechanisms affecting radionuclide migration in soils. It will be factored into geochemical models for prediction

of radionuclide transport in ground water. This is an important aspect of performance assessment.

WM Descriptor(s): chemical reaction kinetics; dissolution; inorganic ion exchangers; iodine; radionuclide migration; silicates; soils; sorption; weathering

Principal Investigator(s):

CASEY, W.

UNIVERSITY OF CALIFORNIA
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Organization Performing the work:

UNIVERSITY OF CALIFORNIA
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Other Investigators:

Organization Type:

Other

Program Duration: From: 1992-6-1 To: 1995-9-1

State of Advancement: Unknown

Sponsoring Organization(s):

University of California; Davis California 95616-8627 USA

Recent publication info:

1167

USA19980125

Title:

Application of surface complexation modeling to natural mineral assemblages. Issues for low level nuclear waste disposal

Title in Original Language:

Topic Code(s):

202 -Dispersion and Migration Models; 323 -Earth Science Studies and Models

Abstract:

The Kongarra uranium ore body in Northern Australia is currently the focus of an international cooperative research project 'Analogue Studies in the Alligator Rivers Region' (ASARR). As a part of ASARR this project has begun surface complexation modeling of U(VI) adsorption onto the complex natural substrates found in the ore body and contiguous soils based on work with reference mineral phases completed under the previous 'International Alligator Rivers Analogue Project'. The studies in this project are focused on (1) extending the range of reference minerals and natural substrates considered in batch studies (2) assessing field partitioning information in light of the results of laboratory sorption studies and (3) undertaking column studies of U(VI) transport using single reference minerals and more complex substrates. Emphasis will be placed on the adsorption of uranium onto (1) iron oxides (2) kaolinite and smectite (3) ferrihydrite sorbed to quartz and smecite particles and (4) natural substrates. Results obtained will be modeled using the surface complexation approach and experiments will be conducted that will test their applicability to transport of uranium through adsorbing porous media. A one dimensional transport model coupled with aqueous speciation will be tested against the observed decrease in U(VI) concentrations with distance from the ore body.

WM Descriptor(s): adsorption; complexes; coordinated research programs; environmental transport; low-level radioactive wastes; minerals; natural analogue; radioactive waste disposal; uranium; uranium ores

Principal Investigator(s):

DAVIS, J.

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Organization Performing the work:

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Other Investigators:

Waite T.; Payne T.; Kohler M.; Curtis G.; McBeath M.; Barger J.

Organization Type:

Other

Program Duration: From: 1993-6-1 To: 1997-3-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Water Resources Division; U.S. Geological Survey MS-465 Menlo Park CA 94025 USA

Associated Organization(s):

Australian Nuclear Science and Technology Organization Private Mail Bag 1 Menal NSW 2234 Australia; Department of Water Engineering University of New South Wales P.O.Box 1 Kensington NSW 2033 Australia

Recent publication info:

1168

USA19980126

Title:

The role of organic complexation and microparticulates in the enhancement of radionuclide migration

Title in Original Language:

Topic Code(s):

202 -Dispersion and Migration Models

Abstract:

Research at the Maxey Flats LLW disposal facility (NUREG/CR4670) the Hanford site (NUREG/CR 3712 and 4030) and Chalk River Nuclear Laboratory (NUREG/CR 4879 vol. 1 and 2) showed radionuclides transport through soils at rates faster than predicted by current transport models. This includes radionuclides (e.g. Fe-55 Co-60 Ni-63 Pu and Am) generally considered unlikely candidates for mobilization based on their presently understood geochemical behavior. Preliminary evidence suggests that naturally produced organic complexes and microparticulates played a significant role in enhancing migration. This project is examining plumes from sites where radionuclides have migrated in ground water to determine the role of organic complexants and microparticulates in enhancing transport. Sampling was conducted at Chalk River Nuclear Laboratory to determine the mobile species of long-lived radionuclides such as I-129 and Tc-99. Chemical characterization of the samples is underway with emphasis on organo-radionuclides. Field investigation is being conducted on carbon-14 uptake by vegetation to determine carbon-14 transfer and uptake coefficients in vegetation for the soil-to-plant and air-to-leaves pathways.

WM Descriptor(s): americium; carbon 14; complexes; environmental exposure pathway; ground water; iron 55; nickel 63; organic compounds; particulates; plutonium; radionuclide migration; soils

Principal Investigator(s):

ROBERTSON, D.E.

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Organization Performing the work:

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Other Investigators:

Schilk A.; Abel K.; Cooper E.; Killey R.; Hatwig P.; Thomas C.

Organization Type:

Other

Program Duration: From: 1994-5-1 To: 1996-9-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Battelle Pacific Northwest Laboratory; Box 999 Richlan WA 99352 USA Tel:(509)376-5664 Fax:(509)376-3868

Associated Organization(s):

Atomic Energy of Canada Ltd.

Recent publication info:

1169

USA19980127

Title:

Control of water infiltration into near surface LLW disposal units

Title in Original Language:

Topic Code(s):

316 -Barrier Studies/Tests/Impacts

Abstract:

This is a field demonstration project of the long-term performance of a series of covers at a humid region site located in Beltsville Maryland. This project is providing long-term data on the performance of a series of covers. Two are proving to be promising. One called bioengineering is particularly effective at sites susceptible to subsidence. It is also capable of drawing down the water table below the cover. It is being tested in pilot studies by NYSERDA at West Valley New York and by the U.S. Navy in Hawaii.

WM Descriptor(s): closures; demonstration programs; ground disposal; low-level radioactive wastes; performance testing; radioactive waste disposal; site characterization; water influx

Principal Investigator(s):

SCHULTZ, R.

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CA 94720

Organization Performing the work:

UNIVERSITY OF CALIFORNIA
BERKELEY CA 94720 UNITED STATES OF AMERICA

Other Investigators:

Ridky R.; O'Donnell E.

Organization Type:

Other

Program Duration: From: 1985-3-1 To: 1996-9-1

State of Advancement: Research in progress

Sponsoring Organization(s):

108 Hoagland Hall University of California Berkeley; Berkeley California 94720 USA

Associated Organization(s):

University of Maryland

Recent publication info:

1170

USA19980128

Title:
Mixed analyte performance evaluation program

Title in Original Language:

Topic Code(s):

109 -Waste Characterisation (Radionuclide Inventory Determination), including Computer Codes and Measuring Methods and Techniques; 181 -Methodologies, Analytical Methods, Measurements Instrumentation

Abstract:

There does not exist a primary performance evaluation program that includes in one sample the analytes necessary for the quantification of both radioactive and nonradioactive analytes. The Radiological and Environmental Sciences Laboratory prepares performance standards consisting of similar matrix materials designed to evaluate the ability and quality of analytical measurements reported by the participating agencies. The samples contain environmentally important and U.S. compliance required constituent analytes of hazardous and radioactive (mixed) character. This program known as the Mixed Analyte Performance Evaluation Program (MAPEP) is conducted semiannually with distribution dates of January 1 and July 1. Three months will be allowed for the analysis of constituents not otherwise regulated by holding times. The samples will be extensively characterized before distribution to assure homogeneity and concentration values. A report will be generated at the conclusion of each round. The participants will not be ranked or scored but each participant will be apprised of their performance in relation to the characterization criteria established for that round. A handbook has been drafted which outlines the philosophy of the MAPEP and defines the numerical and statistical procedures used to develop the performance criteria as well as the quality assurance procedured used to prepare the samples.

WM Descriptor(s): chemical analysis; interlaboratory comparisons; matrix materials; nonradioactive wastes; performance testing; radioactive wastes; sample preparation; sampling; waste forms

Principal Investigator(s):

MARLETTE, GIM

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ID 83401-1563

Organization Performing the work:

RADIOLOGICAL & ENVIRONMENTAL SCIENCE LABORATORY U.S. DEPARTMENT OF ENERGY (DOE)
850 ENERGY DRIVE MS-4149 IDAHO FALLS ID 83401-1563 UNITED STATES OF AMERICA

Other Investigators:

Morton J.; Dahlgren J.; Verwolf M.

Organization Type:

Other

Program Duration: From: 1995-1-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

Radiological and Environmental Sciences Laboratory; 850 Energy Drive MS-4149 Idaho Falls ID 83401-1563

Recent publication info:

1171

USA19980129

Title:

DOE methods for environmental and waste management samples

Title in Original Language:

Topic Code(s):

181 -Methodologies, Analytical Methods, Measurements Instrumentation; 512 -Unknown

Abstract:

A compilation of sampling and analytical methods developed and used by the United States Department of Energy is made available through the Methods Compendium Program. The document supporting the program is DOE Methods for Evaluating Environmental and Waste Management Samples (DOE Methods) and contains sampling organic inorganic and radioanalytical methods for site characterization environmental restoration and waste management operations. Verified methods have been peer reviewed and contain applicable quality control data. The document uses a performanced-based approach which allows the user to make decisions of applicability and useability of the methods employed. The DOE Methods is available by hardcopy or Internet (http://www.inel.gov/resl/). The DOE Methods is a dynamic document designed to meet the changing needs of the analytical metrology community.

WM Descriptor(s): chemical analysis; data compilation; environmental materials; evaluation; sampling; site characterization; waste forms; waste management

Principal Investigator(s):

MORTON, J.S.

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Other Investigators:

Woolf S.; Carter M.; Newberry W.

Organization Type:

Other

Program Duration: From: 1994-10-1 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

Radiological and Environmental Sciences Laboratory; 850 Energy Drive MS-4149 Idaho Falls ID 83401-1563

Recent publication info:

1172

USA19980130

Title:

Technical and Programmatic Support to the DOE offices of Nuclear Energy and Environmental Managemen

Title in Original Language:

Topic Code(s):

102 -Programme Strategy, Planning and Management

Abstract:

This project includes two tasks to provide technical and programmatic support to the DOE offices of Nuclear Energy and Environmental Management. TASK 1: COOPERATIVE LABORATORY AGREEMENTS. This task continues support to the International Programs Division, Office of the Assistant Secretary for Nuclear Energy (NE-14). Nuclear development programs and U.S. interests in international safety and nonproliferation are being reshaped to meet new missions--from removal of actinides in waste to undertaking studies and new reactor R&D to establishing the most feasible techniques and processes for weapons plutonium disposition. DOE requires support for its nuclear programs that relate to these international nuclear activities, as well as for

U.S. programs regarding foreign reactor safety. These include activities involving development of R&D programs with potential international cooperative support, agreements, and cooperation with international agencies, as well as those activities with international proliferation implications. The Special Projects Office of Argonne National Laboratory provides assistance to NE-14 for U.S. nuclear development programs that can support international efforts to dispose of excess weapons plutonium, to enhance high level waste management, and to further the peaceful use of nuclear power. The LMR and associated fuel cycle programs, the HTGR, the ALWR, and other nuclear programs are included. In addition, continuing effort is provided to support U.S. initiatives to address safety of Soviet designed reactors in the Newly Independent State (NIS) and Central and Eastern European Countries. Efforts also are provided in program planning, review, and implementation; in preparation of reports and studies; and in supporting and participating in international and domestic meetings and conferences. TASK 2: EM PROGRAM VIDEO. Produce an informational thirty minute video program to document the overall activities of Environmental Management operations (EM-33). Production activities will include scripting, location taping to document activities animation, and editing.

WM Descriptor(s): analysis, education & risk management; environmental management; management; policy & management; public information

Principal Investigator(s):

Helt, J.E.

Argonne National Laboratory
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60439

Organization Performing the work:

Argonne National Laboratory
Lemont 60439 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013665

USA19980131

Title:

Technical Support for Waste Operations Oversight

Title in Original Language:

Topic Code(s):

102 -Programme Strategy, Planning and Management; 106 -Quality Assurance Aspects

Abstract:

This project modifies support to the Office of Spent Fuel Management begun in FY 1990. The technical content requires knowledge of: (1) spent nuclear fuel, radioactive, hazardous, and mixed waste characteristics and environmental effects; (2) environmental regulatory compliance; and (3) compliance with procedures of the National Environmental Policy Act of 1969 (NEPA). Argonne National Laboratory's (ANL) Special Projects Office (SPO) will provide technical and associated administrative support in, but not limited to, the following areas: (1) assuring waste management operations' compliance with NEPA procedures and relevant DOE directives; (2) assuring waste operations' compliance with Federal, State, and local governments; environmental regulatory requirements and relevant DOE directives; (3) conducting technical reviews of selected phases of waste operations; (4) developing databases for recording, tracking, and evaluating regulatory activities, safety functions, and waste and spent nuclear fuel operations, and management functions; and (5) developing program planning documents as may be necessary.

WM Descriptor(s): compliance; data base management; environmental management; spent fuel storage; waste management (defense)

Principal Investigator(s):

Helt, J.E.

Argonne National Laboratory
Lemont
60439

Organization Performing the work:

Argonne National Laboratory
Lemont 60439 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013671

USA19980132

Title:

High-Level Waste Technology

Title in Original Language:

Topic Code(s):

134 -Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies)

Abstract:

The activity consists of tasks to develop information on the behavior of high-level waste glasses. Based on a thorough review of the literature as identified in the document "High-Level Waste Borosilicate Glass: A Compendium of Corrosion Characteristics," inadequacies in the knowledge base related to glass performance were noted. The ongoing tasks were developed to address these inadequacies within a time frame to support the startup of vitrification facilities at Savannah River, West Valley, and Hanford [Tank Waste Remediation System (TWRS)]. Argonne National Laboratory (ANL) will continue to develop information to support the qualification of waste forms within the Vitrification Branch of DOE. The continued activity would take advantage of the facilities and expertise developed to date in the Program and would provide independent credibility to the performance of vitrified waste. The planned approach is to continue and conclude ongoing tasks as scheduled. No new experimental tasks are planned. Long-term tests using fully radioactive, actinide-doped, and simulated waste glasses, including the EA glass, will continue. Radioactive glasses include those based on actual tank sludge compositions from the Defense Waste Processing Facility and West Valley Demonstration Project. Information and test methods developed in the Program will be used to provide insight to the development of glass compositions for TWRS waste. All work will be done at Quality Level I.

WM Descriptor(s): borosilicate glass; environmental management; mechanical properties; vitrification; waste management (defense)

Principal Investigator(s):

Helt, J.

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60439

Organization Performing the work:

Argonne National Laboratory
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Other Investigators:

Organization Type:

Other

Program Duration: From: 2/1/1989 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0013706

USA19980133

Title:
Minimum Additive Waste Stabilization Compositional Envelope

Title in Original Language:

Topic Code(s):
164 -Waste Immobilization

Abstract:
Most DOE sites have a large variety of predominantly inorganic waste streams (e.g. sludges, ashes, contaminated soils/water, and transite/asbestos) to which the MAWS concept can be applied and has potential for significant cost savings resulting from remediation and treatment activities. Vitrification is a viable process where organic components are destroyed and toxic metals and radionuclides are incorporated into the glass matrix. The leachability of the resulting waste glass is dependent upon the waste matrix. Therefore it is important to understand the range of waste materials that can be treated to produce a leach resistant glass. In addition, it is also important to know how quality glass can be produced with high waste loading to render vitrification a cost effective alternative for the vast amount of low level mixed waste. This can be accomplished by minimizing additives while substituting wastes with similar molecular constituents for the glass formers and fluxes. This is known as the Minimum Additive Waste Stabilization (MAWS) approach. The objective of this project is to provide a database of waste glass properties (both processing and leach performance) and models to guide, focus, and expedite continuing development studies required for new LLW/LLMW streams. This will help to reduce overall development costs, and reduce cycle time from waste characterization to technology implementation. This glass compositional envelope information should permit more rapid identification of optimal formulations and provide an evaluation of the applicability and potential benefits of the MAWS technology for relevant remediation problems. Also, this effort should be coordinated with efforts in developing the glassy slag (ceramic) waste forms compositional envelope so that where possible similar data are obtained to fill the database and similar models can be applied for predicting performance. This will require considerable communication and coordination concerning sharing of techniques so that data are consistent and data base/model structures filled so that a single product can be obtained.

WM Descriptor(s): environmental management; leaching; minimization; organic wastes; technology development; vitrification; waste management

Principal Investigator(s):
Helt, J.E.

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Organization Performing the work:
Argonne National Laboratory
Lemont 60439 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0013751

USA19980134

Title:
TRUEX Model Validation

Title in Original Language:

Topic Code(s):
102 -Programme Strategy, Planning and Management

Abstract:

In this program, the Center for TRUEX Technology Development at Argonne National Laboratory (ANL) will perform tasks to broaden the applicability of TRUEX processing of high-level waste (HLW) and transuranic-containing (TRU) waste streams. Treatment of stored wastes by the TRUEX process will lower the costs of final disposal significantly, treatment of waste streams as they are generated will allow recycle of streams and avoidance of future waste treatment and disposal costs. Specific tasks center on writing a report on the status of TRUEX process development. Special emphasis will be paid to where and on what streams use of the TRUEX process is anticipated and the timing of these activities.

WM Descriptor(s): alpha-bearing wastes; environmental management; high-level radioactive wastes; radioactive waste processing; technology development; transuranium elements; validation

Principal Investigator(s):

Helt, J.E.

Argonne National Laboratory
Lemont
60439

Organization Performing the work:
Argonne National Laboratory
Lemont 60439 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0013753

USA19980135

Title:
Biphasic Systems for Radioactive Waste Pretreatment

Title in Original Language:

Topic Code(s):
162 -Liquid Waste Treatment

Abstract:

The objective of this task is to determine the feasibility of using Aqueous Biphasic Separation (ABS) systems based on polyethylene glycols (PEGs) for the selective extraction and recovery of I, Se, and Tc from caustic solutions containing high concentrations of nitrate, nitrite, and carbonate. Partitioning of the targeted anions will be measured by batch extractions and correlated with aqueous feed composition, PEG molecular weight, and PEG concentration. Phase diagrams will be constructed for aqueous biphase systems using supernatant compositions from a simulated single-shell tank. The biphase system will be optimized with respect to selective extraction of I, Se, and Tc. The partitioning behavior of the major ions present in the supernatant feeds will also be determined. Ion stripping from loaded PEG phases will be investigated using electrodialysis. Other stripping techniques using water-soluble complexants will also be examined. Preliminary flowsheet evaluation will involve a countercurrent extraction test using a simulated tank waste feed. This test will permit a realistic assessment of decontamination factors and processing costs. This task will be carried out jointly with

researchers at Northern Illinois University. A final technical assessment report will be provided 36 months after the start of the program.

WM Descriptor(s): environmental management; hazardous materials; iodine; polyethylene glycols; selenium; separation processes; technetium; technology development; waste processing

Principal Investigator(s):

Helt, J.E.

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Organization Performing the work:

Argonne National Laboratory
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0013756

USA19980136

Title:

Clean-out Retention Tanks

Title in Original Language:

Topic Code(s):

169 -Removal/Recycling of Organics

Abstract:

ANL has identified PCB contamination in the sludge of the Laboratory side of the waste water treatment plant. To determine the source of the PCBs, retention tank sludge was analyzed for a number of constituents, including PCBs. Twelve retention tanks in six different buildings were found to have levels of PCBs greater than 50 ppm. Two of these tanks have already been cleaned using FY95 funds. In addition, five tanks in Building 212 are contaminated with lead above RCRA limits. This funding is to prepare a work plan and to have Waste Management Operations (WMO) remove the contaminated sludge from these retention tanks and package the material for disposal. Because of the planned upgrading of the wastewater treatment plant, it is critical that these tanks be cleaned immediately so as not to contaminate the new systems. With the expected FY 96 funds, between three and four tanks will be cleaned. Fifty-nine other retention tanks and one sump on site also contain sludge which should be removed because it is contaminated with radioactive materials. These tanks would be cleaned out over several years. They are lower in priority then the tanks contaminated with PCBs and lead because administrative controls are in place to ensure radioactive liquids are not discharged to the Laboratory sewer system.

WM Descriptor(s): decontamination; environment, safety & health support; hazardous materials; polychlorinated biphenyls; sludges

Principal Investigator(s):

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Organization Performing the work:

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Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Energy Research

Associated Organization(s):
none

Recent publication info:
US0013981

USA19980137

Title:
Stabilization of Heavy-Metal Wastes and Recovery of Value-Added Products

Title in Original Language:

Topic Code(s):
162 -Liquid Waste Treatment; 163 -Solid Waste Treatment

Abstract:

Heavy-metal-containing chemical hazardous wastes require proper disposal to protect the environment. Rostoker, Inc., has developed a method and apparatus to convert these hazardous wastes into slags to form benign waste forms. This process not only minimizes the hazardous wastes, but also allows recovery of some of the valuable metals and produces value-added products. To implement the Rostoker technology, however, further work is needed in understanding the kinetics of the process involved in the Rostoker technology and in optimizing the characteristics of the final waste forms of different waste streams. This requires considerable work from not only the environmental standpoint, but also from the materials standpoint. The kinetics of the process must be well understood. The physical, structural, and mechanical properties of the final waste forms should be optimized. At the same time, nonleachable characteristics need to be improved so that U.S. Environmental Protection Agency compliance criteria can be met and the long-term durability of the final waste forms can be ensured. Argonne National Laboratory (ANL) will carry out the necessary tests for this purpose and advise Rostoker on improvement of the final waste form so that their fabrication technology will be standardized, benign final waste forms will be produced, and value-added by-products will be recovered.

WM Descriptor(s): energy research; hazardous materials; metals; minimization; separation processes

Principal Investigator(s):

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Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Energy Research

Associated Organization(s):
none

Recent publication info:
US0014180

USA19980138

Title:

Magnetohydrodynamic Property Transfer Assessment

Title in Original Language:

Topic Code(s):

501 -Project Planning and Management

Abstract:

Argonne National Laboratory (ANL) will conduct property transfer assessments at U.S Department of Energy (DOE) magnetohydrodynamic (MHD) research and development facilities. The purpose of these assessments is to (1) identify on-site and potential off-site liabilities associated with past or current practices involving the use, storage, treatment, or disposal of hazardous materials or substances and (2) assess regulatory compliance and permit status of site operations as they relate to shutdown or property transfer. In addition, the property assessment may include an identification of factors that could influence the selection of decontamination and decommissioning alternatives, factors could include potential future use, long-range site plans, facility condition, and potential health, safety and environmental hazards. The assessments will cover legal and regulatory issues associated with property transfers, including pertinent federal and state statutes and any DOE requirements or guidance. The project will involve pre-assessment planning, on-site assessments and post-assessmentactivities that will be summarized in a report on potential and actual environmental concerns related to on-site and off-site conditions and regulatory issues associated with the property transfer.

WM Descriptor(s): environmental aspects; environmental exposure; environmental restoration; fossil energy environmental restoration; human populations; land use

Principal Investigator(s):

Chambers, Harold

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Organization Performing the work:

Pittsburgh Energy Technology Center
UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: 2/21/1994 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Fossil Energy

Associated Organization(s):

none

Recent publication info:

US0022108

USA19980139

Title:

Research in Actinide Chemistry

Title in Original Language:

Topic Code(s):

150 -ALPHA BEARING/TRU WASTE

Abstract:

This research emphasizes the basic studies of the behavior in solution of the actinide elements and of the chemically related lanthanide elements. The systems are chosen for investigation because the data can provide increased understanding of the principles governing the chemical behavior of the f-elements with a variety of complexing ligands, both organic and inorganic. The data may also be of direct value for modeling calculations of the behavior of actinides in environmental and waste repository systems or in improved separation schemes of these elements. Emphasis continues on the thermodynamic, kinetic, and spectroscopic (absorption and luminescence) studies of the complexation and redox reaction of the actinides. A major environmental ligand studied is humic acid. Binding of actinides in the III through VI oxidation states to humic acid is very rapid. Upon binding, most of the An is ``weakly'' bound and two days were found to be required to reach equilibrium between ``strong'' and ``weak'' binding. Binding studies of NpO{sub 2+} in humic acid solutions gave stability

constants that had no dependence on pH in contrast to the behavior of the complexation of An(III), (IV), and (VI). Other systems presently under study involve actinide interaction with silicate ligands. The fluorescent half-life method has provided information on the residual hydration of the trivalent metals in a variety of complexes and in a number of systems used in solvent extraction separations of actinides. Studies on hydrolysis, carbonate, and phosphate complexation are also under way.

WM Descriptor(s): actinides; alpha decay radioisotopes; alpha-bearing wastes; chemical properties; chemical reactions; chemical sciences; energy research

Principal Investigator(s):

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Other Investigators:

Organization Type:

Institution of higher education

Program Duration: From: 3/1/1987 To: 2/29/1996

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Energy Research

Associated Organization(s):

none

Recent publication info:

US0027190

USA19980140

Title:

Physical--Chemical Studies of Transuranium Elements

Title in Original Language:

Topic Code(s):

150 -ALPHA BEARING/TRU WASTE

Abstract:

This project provides training for pre- and postdoctoral students in chemical research with the transuranium 5f (actinide) and related 4f (lanthanide) elements. The goals of this project are to interpret and correlate the results of continuing investigations of the basic chemical and physical properties of these elements as related to general theories. Current research emphasis is on (1) characterization of f-element compounds by luminescence spectroscopy (extending experience and data base of optical probes of crystal structure); (2) study of energy upconversion processes in f-element-doped glass ceramics; (3) use of luminescence lifetimes to characterize f-element materials (and to determine the influences of various experimental parameters on them); (4) synthesis and characterization of mixed actinide-lanthanide titanates (for possible use to immobilize nuclear waste); (5) use of high pressure to alter the electronic structure about an f-element ion, to cause a phase transition in the material, to induce amphorization, or to determine the relationship with pressure of the several phases of an f-element material; (6) determination of the enthalpy of formation of selected lanthanide and actinide oxychlorides and the evaluation and applicability of predictive methods for estimating the thermodynamic properties of lanthanide and actinide materials; and (7) investigation of various techniques for preconcentration of technetium (Tc) in very dilute biological samples (e.g., human urine) in preparation for radiometric determination of Tc and optimization of equipment and procedures for the radiometric determination of Tc.

WM Descriptor(s): actinides; alpha decay radioisotopes; alpha-bearing wastes; chemical properties; chemical reactions; chemical sciences; energy research; technetium

Principal Investigator(s):

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Other Investigators:

Organization Type:

Institution of higher education

Program Duration: From: 4/1/1988 To: 6/30/1996

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Energy Research

Associated Organization(s):

none

Recent publication info:

US0027273

USA19980141

Title:

Development of Novel Reverse-Osmosis Membrane with High Rejections for Organic Compounds

Title in Original Language:

Topic Code(s):

162 -Liquid Waste Treatment

Abstract:

Chemical process industry (CPI) separations consume as much as 4.4 quads of energy annually in the United States. Many of these separations involve removing organic compounds from aqueous process streams. Conventional technologies are energy intensive or have environmental drawbacks that make their use less than optimal. Additionally, some processes also destroy the organic compounds, precluding the possibility of recovering or recycling them. Reverse-osmosis (RO) membrane processes offer the potential to significantly improve and simplify treatment of these industrial process streams, but their use has been limited by their inability to remove many industrially important organics. The goal of this program is to develop a new class of RO membranes that can reject high percentages of organic compounds while maintaining high water fluxes. These improved organic-rejecting RO membranes could be used alone or in combination with other technologies in hybrid wastewater-treatment systems that would otherwise be impractical, given the performance of current RO membranes. In Phase I researchers demonstrated the feasibility of the approach by developing membranes with a rejection of 98% for a target organic (phenol) and a water flux of 25 L/m{sup 2}h. A technical and economic analysis indicates that this performance will result in wastewater-treatment systems with capital and operating costs that are only 60% of the costs for systems based on conventional technologies. Additionally, systems based on the organic-rejecting RO membranes will use only 20% of the energy required by conventional processes. The objectives of Phase II are (1) to continue the development of these organic rejecting RO membranes, focusing on developing membranes for removal of polar organics, aromatics, and chlorinated hydrocarbons; (2) to incorporate these organic rejecting membranes into solvent-resistant hollow-fiber modules; (3) to scale up modules to a size that will allow for meaningful field tests; and (4) to field-test the technology extensively. This work will pave the way for immediate commercialization of the technology with the Phase III partner.

WM Descriptor(s): energy research; hazardous materials; industry; membranes; organic compounds; osmosis; small business innovation research

Principal Investigator(s):

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Other Investigators:

Organization Type:

Private industry

Program Duration: From: 7/29/1992 To: 5/25/1996

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Energy Research

Associated Organization(s):

none

Recent publication info:

US0027703

USA19980142

Title:

Geophysical Data Fusion for Subsurface Imaging

Title in Original Language:

Topic Code(s):

104 -Database & Information Systems, including Technology Transfer Systems. Technical Assistance and Costs

Abstract:

The project objective is to develop a software package that will be used in a workstation. This software will integrate geophysical data derived from multiple sensor technologies. It will be used for characterization of hazardous waste sites by delineation of contaminant plumes and by identification of thin clay layers and geological discontinuities up to a depth of 300 ft.

WM Descriptor(s): clays; computer codes; computerised simulation; environmental management; instrumentation; land; technology development

Principal Investigator(s):

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Other Investigators:

Organization Type:

Private industry

Program Duration: From: 9/29/1992 To: 12/31/1995

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management;
USDOE Fossil Energy

Associated Organization(s):

none

Recent publication info:

US0027764

USA19980143

Title:
Mobile Worksystem for Decontamination and Decommissioning

Title in Original Language:

Topic Code(s):
404 -Non-Reactor Facility Decommissioning; 423 -Robotics, Remote Operations

Abstract:
The project objective is to develop a high-performance remotely operated mobile worksystem capable of performing a wide range of decontamination and decommissioning (D & D) tasks in nuclear environments.

WM Descriptor(s): decommissioning; environmental management; facilities/equipment; robots; technology development

Principal Investigator(s):
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Other Investigators:

Organization Type:
Institution of higher education

Program Duration: From: 9/29/1992 To: 9/30/1996

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management; USDOE Fossil Energy; EW

Associated Organization(s):
none

Recent publication info:
US0027767

USA19980144

Title:
Intelligent Mobile Sensor System For Autonomous Monitoring and Inspection

Title in Original Language:

Topic Code(s):
241 -Monitoring Programmes; 423 -Robotics, Remote Operations

Abstract:
The project objective is to develop a robotic device for routine inspection of stored waste drums, radiological surveys of controlled areas, and initial entry surveys of facilities for decommissioning.

WM Descriptor(s): environmental management; facilities/equipment; monitoring; robots; technology development; waste storage

Principal Investigator(s):
Nelkin, G.

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Other Investigators:

Organization Type:
Private industry

Program Duration: From: 9/30/1992 To: 12/6/1996

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management; USDOE Fossil Energy; EW

Associated Organization(s):
none

Recent publication info:
US0027773

USA19980145

Title:
Development of a Long-Term, Post-Closure Radiation Monitor

Title in Original Language:

Topic Code(s):
242 -Monitoring Techniques

Abstract:
Babcock and Wilcox Company will develop a low-cost multipoint radiation monitoring system for the long-term continuous monitoring of radiation levels in the vadose zone of hazardous waste sites. The system will be based on gamma spectroscopy and will be capable of monitoring to depths of more than 50 m below ground level without necessitating the drilling of wells.

WM Descriptor(s): environmental management; gamma spectroscopy; instrumentation; land; radiation monitoring; radiation/radioactive; technology development; underground disposal

Principal Investigator(s):
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Other Investigators:

Organization Type:
Private industry

Program Duration: From: 9/30/1992 To: 1/31/1998

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management; USDOE Fossil Energy; EW

Associated Organization(s):
none

Recent publication info:
US0027779

USA19980146

Title:
Three-Dimensional Subsurface Imaging Synthetic Aperture Radar (3-D--SISAR)

Title in Original Language:

Topic Code(s):
242 -Monitoring Techniques

Abstract:

The objective of this project is to demonstrate the feasibility of an advanced ground-penetrating radar (GPR) technology to effectively characterize subsurface environments at DOE storage sites by providing 3-D maps of buried objects such as storage containers and waste materials. The intended use of this technology will be for pre-remediation characterization and post-remediation monitoring.

WM Descriptor(s): environmental management; instrumentation; radar; radiation monitoring; site characterization; technology development; underground disposal

Principal Investigator(s):

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Other Investigators:

Organization Type:

Private industry

Program Duration: From: 9/22/1993 To: 12/31/1995

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management; USDOE Fossil Energy

Associated Organization(s):

none

Recent publication info:

US0027953

USA19980147

Title:

DOCUMENT IMAGING, INDEXING, AND RETRIEVAL SYSTEM FOR IAEA SPECIAL INSTRUCTIONS

Title in Original Language:

Topic Code(s):

104 -Database & Information Systems, including Technology Transfer Systems. Technical Assistance and Costs

Abstract:

A computer-automated data storage and retrieval system to serve as the central repository and analytical forum for the International Atomic Energy Agency (IAEA) Special Inspection will be physically and functionally defined. Such an automated information management system is critical to the assimilation of the voluminous nuclear information (text, maps, diagrams, space sensor data, photographs, and so forth) to support special inspection implementation. The technology, hardware, and software for this kind of system is largely available. The project at hand is that of tailoring a system to the customer requirement, which is one that is inexpensive yet robust and scalable for application to a text base as small as a few thousand pages up to a million or more. The system will allow for the storage and indexing of existing paper files, the continued day-to-day entry of new documents into the database, and the ability to acquire data remotely. Special emphasis is placed on low-cost, document-scanning, optical character recognition, and image storage and retrieval. The Phase I project consists of eight tasks: (1) Requirements Definition, (2) System Architecture, (3) High-Volume Imaging, (4) Desktop (day-to-day) Imaging, (5) Field Imaging, (6) Optical Character Recognition (OCT) Software, (7) Compact Disk-Read Only Memory (CD-ROM) System, and (8) Indexing and Retrieval. A complete system design, operations procedures, training requirements, cost-performance-size data and scaling factors for sizing the system, and estimated system-performance data will be delivered.

WM Descriptor(s): data compilation; data processing; documentation; energy research; information/communications; small business innovation research

Principal Investigator(s):

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Other Investigators:

Organization Type:

Private industry

Program Duration: From: 12/21/1993 To: 1/17/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Energy Research

Associated Organization(s):

none

Recent publication info:

US0028009

USA19980148

Title:

Electromagnetic Mixed-Waste Processing System for Asbestos Decontamination

Title in Original Language:

Topic Code(s):

169 -Removal/Recycling of Organics

Abstract:

The overall objective of this project is to develop and demonstrate a cost-effective technology that decomposes asbestos, removes hazardous organic constituents from the decomposed asbestos, and removes radioactive and heavy metals from the decomposed asbestos or stabilizes them within the asbestos.

WM Descriptor(s): asbestos; decontamination; environmental management; separation processes; technology development

Principal Investigator(s):

Bossart, S.

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Other Investigators:

Organization Type:

Private industry

Program Duration: From: 6/9/1994 To: 1/1/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management; USDOE Fossil Energy; EW

Associated Organization(s):

none

Recent publication info:

US0028198

USA19980149

Title:

Automated Baseline Change Detection Using a SAW/GC System

Title in Original Language:

Topic Code(s):

167 -Waste Disposal

Abstract:

Develop a reliable and accurate automated change-detection system which applies recent advances on optical sensor positioning technology to automatically detect and isolate mixed waste barrel changes which may indicate potential containment failures.

WM Descriptor(s): environmental management; hazardous materials; land; monitoring; optical systems; technology development

Principal Investigator(s):

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Other Investigators:

Organization Type:

Private industry

Program Duration: From: 9/21/1994 To: 3/5/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management; EW

Associated Organization(s):

none

Recent publication info:

US0028631

USA19980150

Title:

National Geoscience Data Repository System, Phase 2

Title in Original Language:

Topic Code(s):

104 -Database & Information Systems, including Technology Transfer Systems. Technical Assistance and Costs

Abstract:

The American Geological Institute (AGI) recently completed the first phase of a multiphase program to study and implement a National Geoscience Data Repositorv System (NGDRS) capture and preserve valuable geoscientific data. The study was initiated in response to the fact that tens of billions of dollars worth of domestic geological and geophysical data are in jeopardy of being irrevocably lost or destroyed as a consequence of the ongoing downsizing of the U.S. energy and minerals industry. The first phase of the project was designed to assess the feasibility of establishing the NGDRS. It focused on two major issues. First, it documented the types and quantity of data available fur contribution to the NGDRS. Second, it documented the data needs and priorities of potential users of the system. There would be no point in proceeding with the project without large contributions of data that would be of great interest to the potential user community. The second phase of the NGDRS project is being proposed in response to the positive findings of the Phase I study. The Phase II study would address specific organizational and operational requirements for establishing and implementing the NGDRS. The joint industry, academic, government agency Steering Committee established in the Phase I feasibility study would provide oversight and guidance for the Phase II study. The proposed Phase II study has four major components(1) Planning and Specification, (2) Directory of Geoscience Data Centers, (3)Pilot Project, and (4) Steering Committee Operations.

WM Descriptor(s): data compilation; exploration and production supporting research; fossil energy; geologic surveys; geology

Principal Investigator(s):

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Other Investigators:

Organization Type:

Other

Program Duration: From: 1/30/1995 To: 1/28/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Fossil Energy

Associated Organization(s):

none

Recent publication info:

US0028728

USA19980151

Title:

Ion-Selective Ceramic Membranes for Separation of Radioactive Wastes

Title in Original Language:

Topic Code(s):

171 -Technologies and Methodologies

Abstract:

The principal objective of the project is to demonstrate the use of electrochemical cells for the separation of radioactive waste and salt splitting using highly ion-selective ceramic membranes. A plan of work is proposed to fabricate sodium ion conducting ceramic membranes in the form of thin films over porous supports, as well as discs. A protective coating will be deposited on these materials to suppress or eliminate potential corrosion in acidic media. The membranes will be examined by scanning electron microscopy and X-ray detection. Electrochemical cells will be designed, constructed and used to test the ceramic membranes at 700 degrees C. Aqueous salt solutions containing nitrates of Na, Cs, Rb, and Sr will be electrolyzed through these ceramic membranes in order to demonstrate the ion-selectivity of the membranes. The catholyte and anolyte solutions will be chemically analyzed. It is anticipated that these membranes will exhibit excellent ion selectivity.

WM Descriptor(s): ceramics; electrochemistry; energy research; membranes; radioactive wastes; separation equipment; small business innovation research

Principal Investigator(s):

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Other Investigators:

Organization Type:

Private industry

Program Duration: From: 9/1/1995 To: 3/23/1996

State of Advancement: Research in progress

Sponsoring Organization(s):

Associated Organization(s):

USDOE Energy Research none

Recent publication info:

US0028941

USA19980152

Title:

ENERGETICS OF SILICATE MELTS FROM THERMAL DIFFUSION STUDIES

Title in Original Language:

Topic Code(s):

302 -Site Survey and Characterization

Abstract:

This project will constrain the thermodynamic and transport properties of a variety of geological melts by a novel experimental approach, thermal diffusion studies. The diffusion, solution, and element partition coefficients arising from this study of silicate, sulfide, carbonate, and aqueous sulfate fluids will form a database for understanding magmatic crystallization behavior and evaluation of geothermal, ore deposit, and nuclear waste isolation potential.

WM Descriptor(s): energy research; engineering and geosciences; reserves/geology/exploration; site characterization; site selection; site studies; thermodynamic properties

Principal Investigator(s):

Kolstad, G.A.

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Other Investigators:

Organization Type:

Institution of higher education

Program Duration: From: 8/31/1984 To: 1/31/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Energy Research

Associated Organization(s):

none

Recent publication info:

US0032225

USA19980153

Title:

Decladding of Selected DOE-Owned Spent Fuel

Title in Original Language:

Topic Code(s):

146 -Spent Fuel Storage

Abstract:

The project objective is to conduct special head-end processing on spent fuel rods and assemblies that do not lend themselves to direct reprocessing methods. Activities are: (1) disassemble fuel bundles and remove the cladding from the fuel rods, (2) remove any thermal bonding material (e.g., sodium) from the fuel, (3) consolidate and recan the fuel in aluminum, (4) ship the fuel to a DOE reprocessing plant, and (5) ship the residual radioactive waste to an approved burial site.

WM Descriptor(s): environmental management; environmental restoration; fuel assemblies; fuel rods;

spent fuel elements

Principal Investigator(s):

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Other Investigators:

Organization Type:

Private industry

Program Duration: From: 12/1/1985 To: 1/31/1996

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Defense Programs; USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0032259

USA19980154

Title:

Implementation of a Three-Dimensional Mapping/Inspection System for Inside-Tank or Containment Areas

Title in Original Language:

Topic Code(s):

241 -Monitoring Programmes

Abstract:

The Department of Energy (DOE) and commercial manufacturing firms have entered into numerous agreements with the Environmental Protection Agency and State natural resources departments to meet or exceed current environmental standards for storage of nuclear wastes. Virtually all current legislation mandates frequent visual inspection of waste storage facilities and tankage, which augments routine leakage detection/monitoring, to assure that hazardous materials are not being released into the environment. Most new tankage for nuclear wastes provides for double containment. However, the inner containment barriers must receive routine 100% visual inspection to verify that no leaks or corrosion problems are developing. At present, no commercial sensors or systems provide the means to perform these inspections. The system to be developed and tested in this project will solve several near term inspection needs. Phase I demonstrated a technology which improves the current process for inspection of tank and containment areas. It makes possible the acquisition of three dimensional and color imagery from a sensor which is easily radiation hardened, can be configured to fit through a small diameter opening (4 inches in diameter or larger in the initial version), and includes an integral robotic positioning subsystem so that the sensor can achieve the full area coverage currently required. In Phase II, a radiation hardened version of the Phase I prototype and its robotic positioner will be developed. Telerobotic control of the sensor/positioning system will be implemented. The controller and sensor/positioner will be tested by using it to perform inspections of tankage at Oak Ridge National Laboratory and at other DOE facilities. Various automated defect and corrosion algorithms will be investigated. Anticipated Results/Potential Commercial Applications as described by the awardee: Cleanup and inspection must be done inside nuclear containment chambers and within large chemical, petroleum, and waste disposal/holding tanks. This operational environment precludes safe human presence, demanding autonomous means for sensing, mapping, and navigating of robotics mechanisms for cleanup and inspection. Current environmental protection agreements require periodically performed 100% inspection of all containment chambers and tankage, to assure that no leakage into the ground water system is occurring. Analysis indicates that a reusable tank inspection and characterization system will easily pay for itself in 3 to 6 months, if routine inspection requirements are put into full force. Routine inspection of these hazardous sites will improve the environment.

WM Descriptor(s): energy research; instrumentation; leaks; monitoring; tanks; waste storage

Principal Investigator(s):

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Other Investigators:

Organization Type:

Private industry

Program Duration: From: 7/27/1992 To: 11/24/1995

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Energy Research

Associated Organization(s):

none

Recent publication info:

US0032879

USA19980155

Title:

CONVERSION OF SOX CONTROL RESIDUE AND WASTE OILY EMULSION TOCEMENT PLANT FEED STOCK

Title in Original Language:

Topic Code(s):

113 -Solid Waste Treatment

Abstract:

In Phase I, it was shown that the residual lime contained in the residues from atmospheric fludized bed combustion systems can be used in the treatment of oil/water emulsions, creating a waste water that can be discharged into a sanitary sewer, and a non-hazardous oily residue that can be used as a fuel for a cement kiln. Phase II will optimize this process in order to produce an aqueous discharge which is better than could be obtained with lime and also a higher quality fuel for cement kiln application. The optimized process will be demonstrated on pilot plant scale using two ashes: a high reactivity AFBC bed ash and a low reactivity AFBC bed ash. The oily residue by-product from these separations will be used in test burns in a cement kiln, to study its effectiveness as a fuel and its influence on the environmental emissions from the plant. The quality of the clinker will be measured after each of the test burns. Information related to adapting the process to other systems will be developed, and other water treatment applications will also be investigated. Anticipated Results/Potential Commercial Applications as described by the awardee: The benefits from the use of this technology include reduced volumes of solid waste (from both ash and oily residues), cost savings associated with the reduced solid waste disposal, and energy savings for cement manufacture (the waste can be used to fuel a cement kiln). The process should be suitable for application to appropriate non-hazardous waste treatment, and for application, without significant capital investment, to treatment operations currently using lime.

WM Descriptor(s): ashes; energy research; fluidized-bed combustion; industry; minimization; non-radioactive; small business innovation research; solid wastes

Principal Investigator(s):

none,

Oak Ridge Operations Office
1919 Halethorpe Farms Road
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21227

Organization Performing the work:

Oak Ridge Operations Office
1919 Halethorpe Farms Road Baltimore 21227 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:
Private industry

Program Duration: From: 7/27/1992 To: 12/31/1996

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Energy Research

Associated Organization(s):
none

Recent publication info:
US0032898

USA19980156

Title:
Studies of and Recomendations on Radionuclide Contamination, Radioactive, Mixed Waste, and Basic Radiation Protection Criteria

Title in Original Language:

Topic Code(s):
101 -General policies

Abstract:
Part 1 of this project will (1) examine sources of contamination, removal methods, and decision levels to be employed in decontamination efforts; (2) examine feasibility and potential risks of the release of radioactive materials to the environment; and (3) consider de minimis and below regulatory concern (BRC). Committees of technical experts are being formed and a consensus of experts from around the world will be sought. These efforts should result in a sound scientific basis for remediation efforts and the protection of the population from the effects of radiation exposure. Part 2 will examine the problems of disposal of mixed waste that also contain radioactive waste. The National Council on Radiation Protection (NCRP) will study the sequence from waste generation, through treatment, storage, packaging, and transportation, to disposal. Classification of wastes and current disposal practices will be examined. Consideration will be given to a risk-based approach. The importance of communicating technical issues to the public will be addressed. The methods are the same as in Part 1. The resulting report is expected to serve the nation's needs in this troublesome area by providing guidance of specific usefulness to those with responsibility for waste management and control. Fundamental to the control of radiation exposure is the promulgation and definition of basic radiation protection criteria. This will be addressed in Part 3. The same methods are used as in Part 1. These efforts serve the public interest in the broadest sense in that any utilization or management of sources that involve irradiation requires defined criteria for exposure control.

WM Descriptor(s): contamination; environmental management; environmental restoration; hazardous materials; radiation protection; recommendations; technology development

Principal Investigator(s):
Barainca, M.J.

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Other Investigators:

Organization Type:
Other

Program Duration: From: 8/20/1992 To: 12/31/1995

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:

US0032942

USA19980157

Title:
Effect of Biosurfactants on Biodegradation, Sorption, and Transport of Mixed Wastes in the Subsurface

Title in Original Language:

Topic Code(s):

161 -Biodegradation/Biotreatment

Abstract:

In situ treatment with biosurfactants has the potential to be an effective, economical, and nontoxic remediation technology. Biosurfactants may be used to increase the biodegradation rate of organic compounds, thus enhancing in situ bioremediation. Biosurfactants may also be used to enhance the desorption and transport of highly sorptive contaminants (e.g., recalcitrant organics and metals) and, thus, to facilitate the flushing of contaminated subsurface environments by pumping. However, little is known about the effects of biosurfactants on (1) biodegradation enhancement, (2) adsorption--desorption behavior of organic and inorganic compounds, or (3) transport of organic and inorganic compounds. The research includes the following specific objectives: (1) to evaluate the use of biosurfactants to enhance biodegradation rates of slightly water soluble compounds alone and in waste mixtures and (2) to determine the influence of biosurfactants on contaminant sorption--desorption and the resultant impact on biodegradation and transport of mixed wastes. The results of the research will help elucidate the effect of bioavailability on the biodegradation and transport of organic chemicals. Conditions wherein either water solubility or mass transfer limitations control the rate of biodegradation will be delineated. In addition, the results will provide information on the capability of biosurfactants to enhance the desorption and transport of organic and inorganic contaminants. These sets of information will be useful for developing techniques for enhancing remediation of mixed wastes via in situ biodegradation and facilitated flushing.

WM Descriptor(s): biodegradation; biological and environmental research; energy research; land; remedial action; site studies; surfactants

Principal Investigator(s):

Aaron, J.

Oakland Operations Office
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Tucson
85720

Organization Performing the work:

Oakland Operations Office
Department of Soil and Water Sci Tucson 85720 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Institution of higher education

Program Duration: From: 12/1/1992 To: 8/29/1996

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Energy Research

Associated Organization(s):

none

Recent publication info:

US0032967

USA19980158

Title:
Houdini: Reconfigurable In-Tank Robot

Title in Original Language:

Topic Code(s):

423 -Robotics, Remote Operations

Abstract:

Develop a system (named Houdini) which will perform waste retrieval, waste mobilization, waste reduction and other decommissioning tasks. Houdini would be a tethered, hydraulically-powered, t rack-driven worksystem with an expandable frame chassis. When fully deployed, Houdini will measure 4 ft. x 5 ft., but the system can be collapsed to fit through confined entries as small as 24 inches in diameter.

WM Descriptor(s): decommissioning; environmental management; robots; technology development; waste retrieval

Principal Investigator(s):

Kothari, Vijenda P.

Morgantown Energy Technology Center

Organization Performing the work:

Morgantown Energy Technology Center
UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0033627

USA19980159

Title:

DOE Office of Science & Technology Program

Title in Original Language:

Topic Code(s):

102 -Programme Strategy, Planning and Management

Abstract:

Conduct of the Office of Science and Technology (OST) mission at the Savannah River Site (SRS) is based on identification, development and deployment of new technologies in support of environmental restoration and waste management needs and includes research, development, demonstration, testing, evaluation, and application of technologies. Demonstration and deployment are a major focus at SRS. This is done to accomplish the national and international objectives of (1) providing technological solutions that do not currently exist; (2) developing practical alternatives or enhancements to potentially unacceptable baseline technologies; (3) reducing risks to the environment and the public by improving waste management and expediting environmental restoration efforts; (4) reducing costs associated with environmental remediation and waste management; and (5) establishing partnerships that promote technology transfer. Overall program goals emphasize dual use and deployment strategies.To leverage resources and avoid duplication of efforts for problems which many DOE sites, as well as SRS, have in common, OST has established four focus areas and designated lead sites to coordinate and manage complex-wide Focus Area Programs. SRTC has established the Focus Area Programs Department to coordinate and manage SRS's technology development activities along with the related Focus Area Programs' activities. The focus areas are: Subsurface Contaminants; Mixed Waste Characterization, Treatment, and Disposal; High-Level Waste Tank Remediation; and Facility Transitioning, Decommissioning, and Final Disposition. Each is managed at a specific operations office, along with several crosscutting and integration programs managed by DOE-HQ. SRS is the lead site for the Subsurface Contaminants Focus Area, but it is expected that SRS will carry out Technical Task Plans (TTPs) in all Focus Areas

WM Descriptor(s): environmental management; program management; technology development; US DOE

Principal Investigator(s):

Steele, John

Savannah RIver Technology Center
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29808-001

Organization Performing the work:

Savannah River Technology Center
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0033822

USA19980160

Title:

Defense Waste Processing Facility Chemical Flowsheet and Improvements

Title in Original Language:

Topic Code(s):

102 -Programme Strategy, Planning and Management

Abstract:

SRTC provides the vitrification technology for high level wastes, waste acceptance technology, and process operational and safety boundaries. The objectives are to support safe startup and operation of the Defense Waste Processing Facility (DWPF), to demonstrate that the DWPF waste form will meet repository requirements; and to provide performance parameters for DWPF. Direct technical support is provided for chemical and melter cell technical issues, analytical methods development, preparation of radioactive process requirements, late wash filter performance with both irradiated and unirradiated material, and chemical flowsheet and material balance evaluations. The following major DWPF technical needs will be addressed: rheological constraints on sludge-slurry stimulant for SME and MFT, SRAT coil fouling process demonstration, technical options for resolution of the melter feed loop bias (analytical support to that test series), and completion of version 3 of the Product Composition Control System (PCCS). Preparation and revision of the Waste Form Qualification Report (WQR) will address the technical basis for the Glass Product Control Program, chemical compatibility, glass thermal stability, radionuclide inventory projections, and foreign material in the DWPF product. Large Scale Pilot Facilities placed in "cold standby". SRTC will provide startup assistance for late wash on-line analyses and troubleshooting support. SRTC will also provide sample analyses of DWPF glass canisters , PCT leachate analyses for DWPF samples, DWPF cold feeds and for backup samples from the DWPF Lab. Batch Characterization: This program will validate each feed for processing in the DWPF. This includes characterization of the material, establishing consistency with SAR bases and PCCS, processing the material in the Shielded Cells, and characterizing the processing behavior and product characteristics. This program is required by the DWPF NCSASR, and the DWPF Glass Product Control Program.Organic Recycle: Provide technical bases to enable assessing whether nitroaromatics, products of diazonium chemistry, surfactants and other organics produced in or introduced into DWPF present safety or process concerns in DWPF or other HLW systems (e.g. evaporation of DWPF recycle, ITP and Saltstone). Results from laboratory simulations to be bench marked against composition of DWPF recycle after start of Rad Ops.Chemical Process Cell Technical Issues: Test proposed and planned process changes prior to implementation in the DWPF Chemical Process Cell (CPC) to prevent unanticipated technical, operating and /or glass quality concerns. Develop (test with simulants) a new "sludge only " flowsheet to replace current flowsheet that utilizes a copper-dilute formic acid solution in lieu of PHA. Develop an interim flowsheet for transition to full coupled operations that uses a reduced weight fraction of PHA solids in the melter feed. Complete bench-scale studies designed to

quantify peak hydrogen generation rate as a function of credible deviations in actual formic acid additions to SME product for melter feed redox adjustment. Quantify the high impact parameters which stabilize foam produced during the SRAT/SME cycles. Identify and test alternative antifoam agents and strategies to de-stabilize foam. Use the 1/200th-scale unit for tests. Complete studies designed to determine the principal process parameters that impact the kinetics of nitrite reaction. If phenol is a high impact parameter, identify process parameters that will ensure nitrite reaction during the SRAT cycle if phenol was not present in the aqueous product. Identify and test cleaning agents that may be used to clean the CPC vessel vent system of organic high boilers. Test on irradiated organics. Identify disposal methodology for spent cleaning solutions. Determine the melter feed chemical species that significantly impact reduction-oxidation chemistry in the melter feed and the follow-on impacts on melter operations, i. e., foaming and control variables.Salt Processing Cell Technical Issues: Test proposed and planned DWPF process changes on The Salt Processing Cell prior to implementation in DWPF to prevent unanticipated technical operating or glass quality concerns. Test impact of absorbed radiation dose of KTPB feed on precipitate hydrolysis chemistry and hydrolysis product composition. Use facilities to implement process and cost improvements. Develop and evaluate system cleaning techniques. Specify design and/or operating changes to improve transfer pump, sample pump, and agitator operability.

WM Descriptor(s): defense programs; environmental management; program management; waste management (defense); waste processing

Principal Investigator(s):

Budenstein, Sam

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Organization Performing the work:

Savannah River Technology Center
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0033829

USA19980161

Title:

Fissile Materials Disposition - Plutonium Vitrification

Title in Original Language:

Topic Code(s):

134 -Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies)

Abstract:

SRTC provides the technology for vitrification of excess plutonium (Pu) in a glass waste form that meets non-proliferation objectives. Glass formulations have been developed that demonstrate the feasibility of incorporating 10 weight percent plutonium in the glass. Analysis of the plutonium glasses showed that a very durable glass surpassing current high level waste disposal requirements is produced. The AmCm process will serve as a foundation for the remaining development and demonstration of a Pu vitrification process. The following Pu glass processing properties will be determined; solubility limits, liquidus, dissolution kinetics, density, operating parameters (melter operation, feed characteristics, frit optimization, melter residence time, offgas system requirements, system balancing), Time-Temperature-Transformation studies, radiation effects, and product performance via Product Consistency Tests.The feasibility of placing the small plutonium glass bearing canisters in the large DWPF HLW canisters has been successfully demonstrated using simulants. Evaluate the efficacy of a radioactive "hot" demonstration using the large Defense Waste Processing Facility

HLW canisters

WM Descriptor(s): fissile materials disposition; high-level radioactive wastes; plutonium; storage and disposition options; vitrification

Principal Investigator(s):

Budenstein, Sam

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Organization Performing the work:

Savannah River Technology Center
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Fissile Materials Disposition

Associated Organization(s):

none

Recent publication info:

US0033830

USA19980162

Title:

AM/CM Pretreatment R&D Summary

Title in Original Language:

Topic Code(s):

154 -Waste Immobilization

Abstract:

Vitrification will be used to stabilize an americium/curium (Am/Cm) solution presently stored in F-Canyon for eventual transport to the heavy isotope programs at Oak Ridge National Laboratory. Prior to vitrification, an in-tank oxalate precipitation and a series of oxalic/nitric acid washes will be used to separate these elements and lanthanide fission products from the bulk of the uranium and metal impurities present in the solution. Pretreatment development experiments were performed to understand the behavior of the lanthanides and the metal impurities during the oxalate precipitation and properties of the precipitate slurry. The results of these experiments will be used to refine the target glass composition allowing optimization of the primary processing parameters and design of the solution transfer equipment.

WM Descriptor(s): americium; curium; environmental management; oxalic acid; radioactive waste storage; separation processes; vitrification; waste management (defense)

Principal Investigator(s):

Knight, Jim

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Organization Performing the work:

Savannah River Technology Center
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0033841

USA19980163

Title:
Liquid Scintillation Counting Method for High Salt Content Radioactive Waste Samples.

Title in Original Language:

Topic Code(s):
181 -Methodologies, Analytical Methods, Measurements Instrumentation

Abstract:

As a consequence of waste vitrification efforts underway at the Savannah River Site, a need has arisen to obtain gross alpha and gross beta values in samples with high salt contents, and high beta activities. A less time-consuming method than the traditional approaches was desired to analyze large numbers of these samples, as well as other various contaminated samples which routinely flow through our lab. A method has been developed to measure the alpha activity using the standard addition method in conjunction with liquid scintillation counting and pulse shape discrimination.

WM Descriptor(s): alpha spectroscopy; beta detection; environmental management; monitoring; vitrification; waste management (defense)

Principal Investigator(s):
Blancett, Allen

Savannah River Technology Center
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Organization Performing the work:
Savannah River Technology Center
Aiken 29808-001 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:

US0033844

USA19980164

Title:
Separation and Measurement Method of I-129 in Nuclear Waste

Title in Original Language:

Topic Code(s):
181 -Methodologies, Analytical Methods, Measurements Instrumentation

Abstract:

The method to measure I-129 in nuclear wastes separates anion complexes of sulfur, iodine, and phosphorus radioisotopes to enable measurement by radiochemical techniques. This method involves ion chromatographic separation of the anion complexes from other highly emitting radioisotopes such as cesium-137 and strontium-90 which interfere with radiochemical analysis. The anions are collected in the column effluent and the radioisotopes are measured by nuclear counting methods. The method was developed to enable measurement of trace radionuclides in radioactive waste but can also be used for the analysis of environmental samples.

WM Descriptor(s): chemical analysis; environmental management; iodine 129; monitoring; radioactive wastes; separation processes

Principal Investigator(s):

Blancett, Allen

Savannah River Technology Center
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29808-001

Organization Performing the work:

Savannah River Technology Center
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0033845

USA19980165

Title:
Remote Turbidity Meter

Title in Original Language:

Topic Code(s):

181 -Methodologies, Analytical Methods, Measurements Instrumentation

Abstract:

A commercially available turbidity meter was modified to accept fiber optic input. The custom instrument is used to measure turbidity in radioactive waste sludge settling studies performed in a shielded cell. The modification allows the measurement to be made with the bulk of the instrument located outside of the cell.

WM Descriptor(s): fibre optics; monitoring; monitors; radioactive wastes; sludges; turbidity

Principal Investigator(s):

Blancett, Allen

Savannah River Technology Center
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29808-001

Organization Performing the work:

Savannah River Technology Center
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0033847

USA19980166

Title:
Chemical Technology for HLW Tanks

Title in Original Language:

Topic Code(s):

181 -Methodologies, Analytical Methods, Measurements Instrumentation

Abstract:

This project provided experimental assistance and consultation for a criticality issue on the In-Tank precipitation process. It identified the valence of plutonium in the tank supernate.

WM Descriptor(s): high-level radioactive wastes; plutonium; tanks; valence

Principal Investigator(s):

Knight, Jim

Savannah River Technology Center
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29808-001

Organization Performing the work:

Savannah River Technology Center
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0033848

USA19980167

Title:

Radioactive Sample Vial Insert

Title in Original Language:

Topic Code(s):

181 -Methodologies, Analytical Methods, Measurements Instrumentation

Abstract:

A sample vial insert was designed and tested to allow sampling of a radioactive slurry stream with a standard sampler but with reduction of volume such that all of the sample can be analyzed without introducing dilution and washing errors. The insert does not interfere with any analysis and can be handled remotely in a shielded cell. Testing was done to verify sample validity.

WM Descriptor(s): liquid wastes; radioactive wastes; sampling; slurries; waste management (defense)

Principal Investigator(s):

Blancett, Allen

Savannah River Technology Center
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Organization Performing the work:

Savannah River Technology Center
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0033849

USA19980168

Title:
Halide Free Glass Dissolution Method

Title in Original Language:

Topic Code(s):
181 -Methodologies, Analytical Methods, Measurements Instrumentation

Abstract:

The analysis of radioactive glass requires dissolution normally accomplished using halide-containing acids (HCL). These acids are undesirable from the standpoint of equipment deterioration and waste generation. A method was developed using nitric acid only.

WM Descriptor(s): chemical analysis; dissolution; glass; nitric acid

Principal Investigator(s):
Blancett, Allen

Savannah River Technology Center
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Organization Performing the work:
Savannah River Technology Center
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Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:

US0033850

USA19980169

Title:
On-Line Nitrite and Benzene Analyzer System

Title in Original Language:

Topic Code(s):
181 -Methodologies, Analytical Methods, Measurements Instrumentation

Abstract:

A real-time analyzer system was developed to analyze a radioactive liquid process stream for nitrite and benzene concentration. The nitrite is measured in the liquid phase; the benzene is air-purged into the vapor phase and measured. Both are analyzed by absorption spectroscopy in the visible and ultraviolet respectively over fiber optics.

WM Descriptor(s): absorption spectroscopy; chemical analysis; fibre optics; nitrates; organic compounds; real time systems

Principal Investigator(s):

Blancett, Allen

Savannah River Technology Center
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29808-001

Organization Performing the work:

Savannah River Technology Center
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0033851

USA19980170

Title:

Subsurface Barrier and Montan Wax Irradiation Projects

Title in Original Language:

Topic Code(s):

241 -Monitoring Programmes

Abstract:

This work effort may support at a minimum level or concurrently, as appropriate, the Technology Transfer and Science Education missions of the Department of Energy. The proof-of-concept that Perfluorocarbon Tracers (PFT's) could be used as a method for monitoring barrier performance has been demonstrated on a simulated waste pit at Hanford and on an actual waste pit at Brookhaven National Laboratory. Field scale experiments were conducted, the data collected and analyzed. The results support the feasibility of detecting tracers outside of the barrier on the time frame of a few days or weeks for intact barriers. Modeling of transport of PFT tracers in a subsurface system consisting of soil and a soil/neat cement barrier has been conducted The simulations indicate that for the base case, a two order of magnitude difference in the PFT diffusion coefficient in the soil and barrier, small holes (on the order of centimeters) should be easily detectable. Model evaluations indicate the feasibility of locating breaches down to a few centimeters in size. However, experimental verification of this concept is needed. It is recommended that tests be performed on subsurface barriers with pre-formed breaches of known location, size, and geometry. A field demonstration was completed to quantify the potential use of montan wax as a subsurface barrier material for nuclear waste management applications. The main emphasis was to quantify the wax's long-term ability to withstand radiation-induced mechanical, chemical, and microbial degradation. The study included the measurement of mechanical property changes (specifically hardness), chemical changes (molecular weight) and microbial attack as a function of gamma-irradiation doses in air. Based on the data obtained to date the wax is extremely resistant to radiation-induced change.

WM Descriptor(s): containers; detection; environmental management; leaks; radioactive waste storage; tanks; technology development; waste storage

Principal Investigator(s):

Bari, Robert A.

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11973-5000

Organization Performing the work:

Brookhaven National Laboratory
Upton 11973-5000 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0033879

USA19980171

Title:
Waste Management

Title in Original Language:

Topic Code(s):
120 -RADIOACTIVE WASTE FROM NON-NFC SOURCES

Abstract:

Fermilab generates radioactive, regulated chemical and mixed wastes as a consequence of particle accelerator operation and related activities. The associated routine waste management activities include transportation, storage, and disposal. Two associated Main Ring Accelerator PCB projects include: 1) Main Ring contamination cleanup; and 2) Main Ring PCB transformer reduction.

WM Descriptor(s): accelerators; environmental management; waste management; waste management (non-defense)

Principal Investigator(s):
Chrisman, B. L.

Fermi National Accelerator Laboratory
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60510-0500

Organization Performing the work:
Fermi National Accelerator Laboratory
Batavia 60510-0500 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0034033

USA19980172

Title:
Accelerated Facility Characterization

Title in Original Language:

Topic Code(s):
302 -Site Survey and Characterization; 401 -D&D Programme Strategy, Planning and Management

Abstract:

The objective of this project is to develop and implement an accelerated process for characterization of potentially contaminated facilities in conjunction with decontamination and decommissioning (D&D) activities. This new process will be referred to as Accelerated Facility Characterization (AFC). The key components of AFC will be clearly defined data objectives, a clear definition of the end state of the facility, a flexible work

plan, and the introduction of innovative technologies where appropriate.

WM Descriptor(s): decommissioning; decontamination; environmental management; monitoring; nuclear facilities; technology development

Principal Investigator(s):

Helt, J.E.

Argonne National Laboratory
Lemont
60439

Organization Performing the work:

Argonne National Laboratory
Lemont 60439 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: 10/1/1995 To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0034096

USA19980173

Title:

Immobilization of Fission Products in Phosphate Ceramic Waste Forms

Title in Original Language:

Topic Code(s):

134 -Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies)

Abstract:

This project focuses on the development of chemically bonded phosphate ceramics as a solidification and stabilization (S/S) technology for waste streams containing specific fission products such as cesium, strontium, and technetium. This work directly addresses the critical need at various DOE sites for developing an immobilization technology for tank wastes and other decontamination waste streams which contain fission products. High-temperature immobilization technologies are not feasible for these waste streams because they cause volatilization of fission products. Phosphate ceramics are not only extremely durable but can retain contaminants in their matrix by various mechanisms such as elemental substitution, formation of insoluble phosphates of the contaminants, and ion exchange. It is expected that because of the concurrent stabilization mechanisms of chemical fixation and physical encapsulation of the contaminants in an extremely durable phosphate matrix, the final waste form will have the desired properties. In this work, major tasks include (a) demonstrating the phosphate ceramic S/S of waste streams containing technetium-99 (partitioned from high-level wastes using a sorption process), the result being durable phosphate-ceramic-based final waste forms; (b) scaling up of the phosphate-bonding immobilization technology for field applications; and (c) transferring of the phosphate-bonding immobilization technology to the end users at various DOE sites.

WM Descriptor(s): ceramics; fission products; phosphate glass; radioactive waste management; radioactive wastes; technology development

Principal Investigator(s):

Helt, J.E.

Argonne National Laboratory
Lemont
60439

Organization Performing the work:

Argonne National Laboratory
Lemont 60439 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: 2/1/1996 To: 9/30/1998

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0034097

USA19980174

Title:

Ex Situ Waste Treatment & Processing Systems

Title in Original Language:

Topic Code(s):

121 -Gaseous Waste Treatment

Abstract:

The Fernald Environmental Management Project (FEMP) Vitrification Facility will produce an off-gas stream consisting of high concentrations of radon gas. There exists a need to effectively remove the radon from the off-gas prior to discharge to the atmosphere. The purpose of this project is to develop and evaluate the use of a fluid-based apparatus for removal of radon (Rn) from the FEMP Vitrification Facility off-gas stream. The scope of this project will be limited only to basic feasibility issues. If feasibility is successfully established over the range of critical parameters identified by Fernald Environmental Restoration Management Corporation (FERMCO), Argonne National Laboratory (ANL), and Department of Energy (DOE) scientists, further development could be undertaken to explore engineering issues and to optimize the performance, safety, and energy utilization leading to a final system design. Performance parameters related to the removal of radon that will be evaluated are: 1) saturation capacity dependence on radon concentration; 2) temperature dependence of absorption and desorption; 3) the effect of contaminants (water, vapor, sulphurous-oxides, and nitrous-oxides) (H2O, SOx, and NOx); 4) degassing; and 5) transient variation of radon concentration. The approach will be to use controlled sources of radon in ANL analytical laboratories to quantitatively assess the above performance parameters for a single working fluid over a range of radon concentrations prototypic of the expected concentrations during FEMP Vitrification Facility operations.

WM Descriptor(s): environmental management; feasibility studies; gaseous wastes; off-gas systems; radioactive waste processing; radon; technology development; vitrification

Principal Investigator(s):

Helt, J.E.

Argonne National Laboratory
Lemont
60439

Organization Performing the work:

Argonne National Laboratory
Lemont 60439 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0034098

USA19980175

Title:
Phosphate Bonding with Harmonic Compaction

Title in Original Language:

Topic Code(s):
162 -Liquid Waste Treatment

Abstract:
The objective of this project is to evaluate, plan, and possibly demonstrate a combined technology of phosphate bonding chemistry and the harmonic compaction technology developed by Ryan and Murphy Inc. (RMI) to treat mixed wastes. Efforts will evaluate the RMI compaction method of volume reduction of soils and other solid wastes and will identify suitable binders for their stabilization. This effort will result in a system that will transform solid waste streams into waste forms that will pass land disposal requirements while occupying reduced volume.

WM Descriptor(s): environmental management; hazardous materials; minimization; phosphates; technology development; volume

Principal Investigator(s):
Helt, J.E.

Argonne National Laboratory
Lemont
60439

Organization Performing the work:
Argonne National Laboratory
Lemont 60439 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0034099

USA19980176

Title:
Immobilization

Title in Original Language:

Topic Code(s):
132 -Liquid Waste Treatment; 134 -Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies)

Abstract:
One of the technologies being developed by the Tank Focus Area (TFA) is removal of cesium from the soluble fraction of the high-level waste at Hanford and solidification of the separated cesium in a form suitable for disposal. Currently under consideration for cesium removal are a resorcinol-formaldehyde resin, a crystalline silico-titanate, and a hexacyanoferrate sorber. Immobilization of the separated cesium must be demonstrated. Vitrification is the primary immobilization option. This task is part of a program that will demonstrate the vitrification of the separated cesium. The purpose of the task is to provide processes and procedures for preparation of the separation media for vitrification. To achieve this purpose, the subtask will identify processing needs and options for two of the separation media: specifically, an engineered form of the crystalline silico-titanate sorber and resorcinol-formaldehyde resin; perform tests to determine the ability of separation-media processing options to produce reliable feed for vitrification; identify the preferred processes based on process safety, compatibility of the product with vitrification processing, and glass product quality (The development effort will work closely with the Savannah River Technology Center (SRTC) to ensure that proposed processes are appropriately tested for compatibility with vitrification.); and transfer the technology

(processes and procedures) to SRTC for use in vitrification of the separation media from the pretreatment demonstration.

WM Descriptor(s): cesium; environmental management; high-level radioactive wastes; separation processes; technology development; vitrification

Principal Investigator(s):

Helt, J.E.

Argonne National Laboratory
Lemont
60439

Organization Performing the work:

Argonne National Laboratory
Lemont 60439 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0034100

USA19980177

Title:

Geological Repository Support Program

Title in Original Language:

Topic Code(s):

143 -Spent Fuel Storage

Abstract:

Conduct studies on the dissolution and oxidation of spent fuel and cladding degradation related to repository waste package behavior.

WM Descriptor(s): dissolution; oxidation; spent fuel storage; spent fuels

Principal Investigator(s):

Rutherford, Dan M

Pacific Northwest Laboratory
Richland
99352

Organization Performing the work:

Pacific Northwest Laboratory
Richland 99352 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: 7/1/1987 To: 3/31/1995

State of Advancement: Research in progress

Sponsoring Organization(s):

none

Associated Organization(s):

none

Recent publication info:

US0034620

USA19980178

Title:
Corrosion of Low-Carbon Steel in Simulated Waste Isolation Pilot Planned Environments

Title in Original Language:

Topic Code(s):
135 -Waste Packaging (Canister Types, Materials, Corrosion Studies)

Abstract:
Evaluate corrosion behavior of low-carbon steel and alternative metal packaging materials in simulated Waste Isolation Pilot Planned environments

WM Descriptor(s): corrosion; materials testing; packaging; radioactive waste storage; steels

Principal Investigator(s):
Rutherford, Dan M

Pacific Northwest Laboratory
Richland
99352

Organization Performing the work:
Pacific Northwest Laboratory
Richland 99352 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:
Other

Program Duration: From: 11/8/1989 To: 9/30/1995

State of Advancement: Research in progress

Sponsoring Organization(s):
none

Associated Organization(s):
none

Recent publication info:
US0034690

USA19980179

Title:
Chemical Speciation and Solubility

Title in Original Language:

Topic Code(s):
181 -Methodologies, Analytical Methods, Measurements Instrumentation

Abstract:
Develop fundamental data on chemical speciation and solubility for Strontium and Americium in High Level Waste: predictive modeling of phase partitioning during tank processing.

WM Descriptor(s): americium; phase studies; solubility; strontium

Principal Investigator(s):
Rutherford, Dan M

Pacific Northwest Laboratory
Richland
99352

Organization Performing the work:
Pacific Northwest Laboratory
Richland 99352 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:
Other

Program Duration: From: 9/1/1996 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):
none

Associated Organization(s):
none

Recent publication info:

US0035377

USA19980180

Title:

Geologic Disposal Support Program

Title in Original Language:

Topic Code(s):

142 -Spent Fuel Packaging (Canisters, Materials. etc.)

Abstract:

Conduct additional studies on the dissolution and oxidation of spent fuel and cladding degradation related to repository waste package behavior.

WM Descriptor(s): dissolution; oxidation; packaging; spent fuel storage; spent fuels

Principal Investigator(s):

Rutherford, Dan M

Pacific Northwest Laboratory
Richland
99352

Organization Performing the work:

Pacific Northwest Laboratory
Richland 99352 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: 3/1/1996 To: 9/30/1996

State of Advancement: Research in progress

Sponsoring Organization(s):

none

Associated Organization(s):

none

Recent publication info:

US0035445

USA19980181

Title:

DWPF Liquidus Temperature

Title in Original Language:

Topic Code(s):

181 -Methodologies, Analytical Methods, Measurements Instrumentation

Abstract:

Measure the liquidus temperature of simulated nuclear waste glasses received from the client. Perform optical microscopy, scanning electron microscopy, and X-ray analysis to determine the primary crystalline pahse of each sample

WM Descriptor(s): glass; phase studies; temperature measurement

Principal Investigator(s):

Rutherford, Dan M

Pacific Northwest Laboratory
Richland
99352

Organization Performing the work:

Pacific Northwest Laboratory
Richland 99352 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:
Other

Program Duration: From: 9/24/1996 To: 11/24/1996

State of Advancement: Research in progress

Sponsoring Organization(s):
none

Associated Organization(s):
none

Recent publication info:
US0035451

USA19980182

Title:
Multisensor Inspection & Characterization Robot for Small Pipes

Title in Original Language:

Topic Code(s):
423 -Robotics, Remote Operations

Abstract:

This project will develop an operational, commercial system for real-time, multisensor characterization and mapping of small diameter (1 inch) contaminated process pipes for DOE use in decontaminating and decommissioning facilities. Specifically, this effort will produce a semiautonomous device with onboard miniature sensors and a remote operator interface with integrated data display capable of inspecting pipes for radiation, organics (solvents and polychlorinated biphenyls (PCBs)), and metals (mercury, lead, arsenic, etc.) and of mapping unknown piping runs from internal position data. This system will operate in both a survey and a detailed analysis mode. The detailed analysis mode can be initiated when the survey mode indicates high levels of the contaminant(s) of interest.

WM Descriptor(s): decommissioning; decontamination; environmental management; monitoring; pipes; real time systems; robots; technology development

Principal Investigator(s):
Shoemaker, Harold

Morgantown Energy Technology Center

Organization Performing the work:
Morgantown Energy Technology Center
UNITED STATES OF AMERICA

Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0036655

USA19980183

Title:
Infrared Analysis of Wastes

Title in Original Language:

Topic Code(s):
184 -Mixed waste characterization

Abstract:

The polymer encapsulation of low-level mixed waste (LLMW) is a promising method for producing a

certifiable, low-volume immobilized waste, which is being developed in the DOE complex. The present grouting method for immobilization has difficulties meeting RCRA Toxicity Characteristic Leaching Procedure (TCLP) requirements. This subtask is developing and deploying the technology necessary for real-time monitoring of the polymer encapsulation process. The monitor will both improve and document the quality of the waste form produced by encapsulation. The monitor measures on line and in real time the total waste loading in the encapsulated waste stream and the concentrations of selected components of the encapsulated waste. This real-time information can guide the process operators in optimizing the waste loading and in producing the most economical waste immobilized waste, and too low of a loading is uneconomic, producing an unnecessarily large waste volume. Both the waste loading and the compositional information provided by the monitor will document the waste form and contribute to its certification.

WM Descriptor(s): encapsulation; grouting; hazardous materials; infrared spectrometers; low-level radioactive wastes; monitoring; real time systems; technology development

Principal Investigator(s):

Edelson, Martin C.

Ames Laboratory
Ames
50011

Organization Performing the work:

Ames Laboratory
Ames 50011 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0038267

USA19980184

Title:

SITE CHARACTERIZATION, DEMONSTRATION AND EVALUATION

Title in Original Language:

Topic Code(s):

184 -Mixed waste characterization; 187 - Radionuclide characterization in-situ

Abstract:

THIS TASK WILL DEVELOP AND EVALUATE INNOVATIVE TECHNOLOGIES FOR TRANS-URANIUM / MIXED BURIED WASTE SITE ASSESSMENT. THE FOCUS OF THIS EFFORT WILL BE ON NON-INVASIVE GEOPHYSICAL SITE CHARACTERIZATION TECHNOLOGY EVALUATION. THE PURPOSE OF THE TASK IS TO DEVELOP A TIME- AND FREQUENCY-DOMAIN PROTOTYPE INSTRUMENT AT THE USGS IN SUPPORT OF THE VERY EARLY TIME ELECTROMAGNETIC (VETEM) PROJECT.

WM Descriptor(s): alpha-bearing wastes; radioactive wastes; site characterization; technology development; transuranium compounds

Principal Investigator(s):

PETERS, MIKE D.

Idaho National Engineering and Environmental Lab
Idaho Falls
83415

Organization Performing the work:

Idaho National Engineering and Environmental Lab
Idaho Falls 83415 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0039293

USA19980185

Title:
NEW FACILITY PLANNING

Title in Original Language:

Topic Code(s):
136 -Waste Storage

Abstract:

PROVIDES FOR THE PLANNING, DESIGN, CONSTRUCTION, AND STARTUP OF NEW FACILITIES TO TREAT, STORE, AND DISPOSE OF HIGH LEVEL WASTE. THE CURRENT IDENTIFIED PROJECT INCLUDES MODIFICATIONS TO THE NWCF REQUIRED FOR CALCINING SODIUM-BEARING WASTE.

WM Descriptor(s): construction; design; environmental management; high-level radioactive wastes; planning; radioactive waste storage; storage facilities; waste management (defense)

Principal Investigator(s):
VALENTINE, JIM H.

Idaho National Engineering and Environmental Lab
Idaho Falls
83415

Organization Performing the work:
Idaho National Engineering and Environmental Lab
Idaho Falls 83415 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0039314

USA19980186

Title:
RETRIEVAL

Title in Original Language:

Topic Code(s):
166 -Waste Storage

Abstract:

THE PURPOSE OF THIS PROJECT IS TO PROVIDE FACILITIES AND EQUIPMENT TO RETRIEVE APPROXIMATELY 250,000 DRUM EQUIVALENTS OF EXISTING MIXED WASTE LOCATED AT THE RADIOACTIVE WASTE MANAGEMENT COMPLEX (RWMC). THIS MIXED WASTE DOES NOT

COMPLY WITH STORAGE REQUIREMENTS FOR RCRA REGULATED WASTE AND, THEREFORE, NEEDS TO BE RETRIEVED AND RE-STORED TO MEET RCRA STORAGE REQUIREMENTS. THIS PROJECT IS A FY-90 LINE-ITEM CONSTRUCTION PROJECT, PROVIDING FUNDING FOR AN ENCLOSURE WHICH IS BEING ERECTED OVER THE WASTE AND FOR EQUIPMENT NEEDED TO RETRIEVE THE WASTE. THE WASTE TO BE ENCLOSED BY THIS ENCLOSURE IS LOCATED ON PADS 1, R, AND A PORTION OF PAD 2 WHICH ARE LOCATED WITHIN THE TRANSURANIC STORAGE AREA AT THE RWMC. WASTE CONTAINERS HAVE BEEN STACKED TO A HEIGHT OF APPROXIMATELY 16 FEET ON ABOVE GRADE ASPHALT PADS AND THEN COVERED WITH FABRIC AND SOIL. THE ENCLOSURE IS APPROXIMATELY 314,000 SQUARE FEET AND WILL ALLOW FOR THE YEAR-ROUND, SAFE RETRIEVAL OF WASTE CONTAINERS. THE ENCLOSURE WILL ALSO MINIMIZE THE EFFECTS OF FURTHER WEATHER RELATED DEGRADATION OF SOME OF THE CONTAINERS WHICH HAVE BEEN STORED FOR OVER 20 YEARS. BOTH OPERATIONS AND CONSTRUCTION FUNDING ARE INCLUDED IN THIS PROJECT. THE OEPRATIONS FUNDS PROVIDE PROGRAMMATIC SUPPORT FOR PREPARATION AND SUBMITTAL OF THE ENVIRONMENTAL DOCUMENTATION AND PERMITS, TRADEOFF STUDIES, PREPARATION OF THE PROGRAM SAFETY DOCUMENTATION, FACILITY OPERATING AND MAINTENANCE DOCUMENTATION, PROGRAMMATIC REVIEW OF PROJECT DESIGN AND CONSTRUCTION DOCUMENTATION, INTEGRATED SYSTEMS ACCEPTANCE TESTING, AND PROCESS SPECIFIC TRAINING OF OPERATIONS PERSONNEL FOR THE FACILITIES AND THE PROCESS EQUIPMENT. CONSTRUCTION FUNDED ACTIVITIES INCLUDE PROJECT AND CONSTRUCTION MANAGEMENT; TITLE DESIGN; ENGINEERING STUDIES; INSPECTION; CONSTRUCTION OF THE BUILDING TO ENCLOSE THE WASTE STORAGE PADS 1, 2 & R; AND GOVERMENT FURNISHED EQUIPMENT TO SUPPORT CERTAIN BUILDING SUBSYSTEMS; AND FOR RETRIEVAL EQUIPMENT.

WM Descriptor(s): containers; environmental management; hazardous materials; waste management (defense); waste retrieval

Principal Investigator(s):

MAUGHAN, ROBERT Y.

Idaho National Engineering and Environmental Lab
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83415

Organization Performing the work:

Idaho National Engineering and Environmental Lab
Idaho Falls 83415 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0039332

USA19980187

Title:

TRANS-URANIUM WASTE CHARACTERIZATION AND STORAGE FACILITY

Title in Original Language:

Topic Code(s):

156 -Waste Storage; 166 -Waste Storage

Abstract:

THE OBJECTIVE OF THE WASTE CHARACTERIZATION AND STORAGE FACILITY (WCSF) LINE-ITEM CONSTRUCTION PROJECT, ADS DPR4309EG, IS TO PROVIDE FACILITIES FOR THE TEMPORARY STORAGE AND CHARACTERIZATION OF APPROXIMATELY 2.3 MILLION CUBIC

FEET OF MIXED, TRANSURANIC-CONTAMINATED (TRU) WASTES CURRENTLY STORED AT THE IDAHO NATIONAL ENGINEERING LABORATORY (INEL) UNTIL PERMANENT DISPOSITION IS DETERMINED. THIS PROJECT IS PART OF AN INEL STRATEGY TO BRING THE RADIOACTIVE WASTE MANAGEMENT COMPLEX (RWMC) WASTE HANDLING AND STORAGE INTO COMPLIANCE WITH THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) REQUIREMENT AND TO SUPPORT TREATMENT AND DISPOSAL OF THE STORED TRU WASTES.

WM Descriptor(s): alpha-bearing wastes; compliance; containers; environmental management; hazardous materials; transuranium elements; waste management (defense)

Principal Investigator(s):

MAUGHAN, ROBERT Y.

Idaho National Engineering and Environmental Lab
Idaho Falls
83415

Organization Performing the work:

Idaho National Engineering and Environmental Lab
Idaho Falls 83415 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0039333

USA19980188

Title:

PLASMA HEARTH PROCESS PILOT SCALE TESTING

Title in Original Language:

Topic Code(s):

164 -Waste Immobilization

Abstract:

THIS TECHNICAL TASK PLAN DESCRIBES A SUBSET OF WORK EFFORTS UNDER THE PLASMA HEARTH PROCESS (PHP) TECHNOLOGY DEVELOPMENT PROJECT. THE PURPOSE OF THE OVERALL PROJECT IS TO DEVELOP, TEST AND EVALUATE A NEW CONCEPT FOR MIXED WASTE TREATMENT BASED ON VITRIFICATION OF WASTE MATERIALS USING FIXED HEARTH DC TRANSFERRED ARC PLASMA TORCH TECHNOLOGY. FIXED HEARTH ARC PLASMA TECHNOLOGY HAS BEEN USED FOR MANY YEARS IN THE PROCESSING OF SPECIALTY AND OTHER METALS, AND HAS MANY POTENTIAL BENEFITS AS A WASTE TREATMENT PROCESS. BECAUSE OF THE MATURITY OF THE TECHNOLOGY, ITS DEVELOPMENT FOR WASTE TREATMENT SHOULD BE RAPID.

WM Descriptor(s): environmental management; hazardous materials; pilot plants; plasma; technology development; vitrification

Principal Investigator(s):

BATES, STEVEN O.

Idaho National Engineering and Environmental Lab
Idaho Falls
83415

Organization Performing the work:

Idaho National Engineering and Environmental Lab
Idaho Falls 83415 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0039339

USA19980189

Title:
IN SITU STABILIZATION OF TRANSURANIC / MIXED WASTES

Title in Original Language:

Topic Code(s):
154 -Waste Immobilization; 164 -Waste Immobilization

Abstract:
THIS PROJECT WILL INVESTIGATE TECHNOLOGIES FOR IN-SITU STABILIZATION OF BURIED TRANSURANIC (TRU)/MIXED WASTES FOR INTERIM AND FINAL REMEDIATION. END USERS AT IDAHO NATIONAL ENGINEERING LABORATORY (INEL), SANDIA, AND OTHER ARID DEPARTMENT OF ENERGY (DOE) SITES CONTAINING TRU/MIXED SOURCE TERMS WILL USE THE DEVELOPED TECHNOLOGIES TO STABILIZE BURIED WASTE. PROJECT TASKS WILL INCLUDE PREPARATION OF SIMULATED BURIED WASTE CELLS AT THE INEL COLD TEST PIT (IN SUPPORT OF FUTURE IN-SITU STABILIZATION ACTIVITIES), INVESTIGATING PROMISING ENCAPSULATING MATERIALS AND REPLACEMENT TECHNIQUES FOR LONG-TERM DURABILITY, ASSESSMENT OF ENCAPSULATING MATERIALS AS AN INTERIM SOLUTION TO ENHANCED RETRIEVAL AT A LATER DATE, AND DEVELOPMENT AND TESTING OF A METHODOLOGY FOR EVALUATING WASTE FORM PERFORMANCE COMPARISONS OF PROSPECTIVE IN-SITU STABILIZATION, MATERIALS, AND TECHNOLOGIES PRIOR TO FIELD TESTING.

WM Descriptor(s): alpha-bearing wastes; environmental management; hazardous materials; radioactive waste storage; technology development; transuranium elements

Principal Investigator(s):
LOOMIS, GUY G.

Idaho National Engineering and Environmental Lab
Idaho Falls
83415

Organization Performing the work:
Idaho National Engineering and Environmental Lab
Idaho Falls 83415 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0039354

USA19980190

Title:
BURIED TANK WASTE REMEDIATION SYSTEM

Title in Original Language:

Topic Code(s):

166 -Waste Storage

Abstract:

THE PRIMARY OBJECTIVE OF THIS WORK IS TO DEMONSTRATE THE FEASIBILITY OF STABILIZING/ENCAPSULATING UNDERGROUND STORAGE TANKS CONTAINING MIXED WASTE. STABILIZING/ENCAPSULATING PROCESS IS DESIGNED TO IMMOBILIZE AND, OR, ISOLATE WASTE FROM THE ENVIRONMENT FOR A PERIOD OF TIME EXCEEDING THE LIFE OF THE RISK DRIVERS IN THE WASTE. THIS TECHNIQUE IS EXPECTED TO BE MOST USEFUL FOR AREAS THAT ARE DIFFICULT TO REACH BECAUSE OF SURROUNDING FACILITIES, TANKS THAT CONTAIN WASTES THAT ARE PHYSICALLY DIFFICULT TO REMOVE, AND TANKS THAT CONTAIN WASTES WHICH POSE A SIGNIFICANT HEALTH THREAT DURING REMOVAL.

WM Descriptor(s): encapsulation; hazardous materials; tanks; technology development; underground storage

Principal Investigator(s):

MATTHERN, GRETCHEN E.

Idaho National Engineering and Environmental Lab
Idaho Falls
83415

Organization Performing the work:

Idaho National Engineering and Environmental Lab
Idaho Falls 83415 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0039356

USA19980191

Title:

PLUTONIUM

Title in Original Language:

Topic Code(s):

154 -Waste Immobilization; 156 -Waste Storage; 157 -Waste Disposal

Abstract:

THE PLUTONIUM FOCUS AREA (PFA) WAS CHARTERED TO DEVELOP AND DEMONSTRATE SOLUTIONS TO SITE-SPECIFIC AND COMPLEX-WIDE TECHNOLOGY ISSUES ASSOCIATED WITH PLUTONIUM REMEDIATION, STABILIZATION, AND PREPARATION FOR FINAL DISPOSITION. PFA'S SCOPE INCLUDES PU-BEARING MATERIALS (EXCLUDING TRANS-URANIUM WASTES AND FINAL-FORM WEAPONS COMPONENTS), AND INCLUDES INTEREST IN OTHER FISSILE MATERIALS AND SPECIAL ISOTOPES.

WM Descriptor(s): environmental management; plutonium; radioactive waste management; remedial action; technology development

Principal Investigator(s):

SOUTHWORTH, FINIS H.

Idaho National Engineering and Environmental Lab
Idaho Falls
83415

Organization Performing the work:

Idaho National Engineering and Environmental Lab
Idaho Falls 83415 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0039367

USA19980192

Title:

HEAT RESEARCH PROGRAM

Title in Original Language:

Topic Code(s):

102 -Programme Strategy, Planning and Management

Abstract:

We study fundamental principles of thermal physics and their application in science and technology. Specifically, we explore novel concepts in heat engines, especially thermoacoustics, with an emphasis on establishing scientific foundations for new technologically useful energy-conversion devices. We also study thermal convection and liquid-solid dissolution, with applications including nuclear-waste processing and reactor thermal management.

WM Descriptor(s): energy research; materials sciences; physical properties; radioactive waste processing

Principal Investigator(s):

PARKIN DON MERRILL,

Los Alamos National Laboratory
Los Alamos
87545

Organization Performing the work:

Los Alamos National Laboratory
Los Alamos 87545 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Energy Research

Associated Organization(s):

none

Recent publication info:

US0041897

USA19980193

Title:

PLTONIUM WASTE & RESIDUE CAPABILITY

Title in Original Language:

Topic Code(s):

155 -Waste Packaging; 156 -Waste Storage

Abstract:

For the express purpose of continuing with the task of treatment and disposition of the legacy transuranic (TRU) inventory at Los Alamos, this project includes support for process development tasks with the goal of demonstrating potential technological improvements addressing compliance or significant engineering problems that may affect ability to process vault residues. Process development activities include salt distillation to augment the aqueous chloride processing capability, waste stream polishing for actinide removal from hydrochloric acid waste streams, ultrafiltration as an alternative to waste stream polishing for actinide separation at the source, and process-specific shielding and shielded equipment for the handling and minimal processing of some of the high exposure materials in the inventory. Main thrust is the stabilization of transuranic materials and preparation for packaging.

WM Descriptor(s): alpha-bearing wastes; defense programs; packaging; plutonium; radioactive waste management; radioactive waste storage; weapons stockpile management

Principal Investigator(s):

TRAPP TURNER J,

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87545

Organization Performing the work:

Los Alamos National Laboratory
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Defense Programs

Associated Organization(s):

none

Recent publication info:

US0042082

USA19980194

Title:
Pre-treatment of sludges

Title in Original Language:

Topic Code(s):

501 -Project Planning and Management; 502 - Feasibility Studies

Abstract:

Los Alamos has participated in sludge-washing and alkaline-leaching screening tests on actual Hanford tank sludges. In collaboration with Pacific Northwest Laboratory, we have documented the behavior of various sludges; these studies will be used to develop remediation strategies for the Hanford Tank Farms. We conduct small-scale studies on actual sludge samples. This project was successful because Los Alamos has experienced personnel, the facilities to handle and work with highly radioactive material, and extensive instrumental holdings. This task involved collecting data reflective of the chemical behavior of important sludge components, both radioactive and non-radioactive, as well as the physical characteristics of the sludge particles. Scientists and engineers will apply the results of these studies to design operational flowsheets to retrieve and pretreat the recovered sludges from the tanks. The information will help determine the glass-limiting components that would invade the vitrification process.

WM Descriptor(s): environmental management; Hanford reservation; leaching; remedial action; sludges; technology development; vitrification

Principal Investigator(s):

ERDAL BRUCE ROBERT,

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Organization Performing the work:

Los Alamos National Laboratory
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0042146

USA19980195

Title:

Technetium migration

Title in Original Language:

Topic Code(s):

112 -Liquid Waste Treatment; 116 -Waste Storage

Abstract:

Approximately 1800 kg of technetium are present in the Hanford waste tanks. Technetium's potential to migrate in groundwater and its long half-life (213,000 years) make it a major contributor to the long-term hazard associated with the storage of Hanford low-level waste. We are mitigating this hazard by developing a process to remove 99% of the technetium from this waste. This process uses anion exchange, an 'off-the-shelf' technology, with a new resin, Reillex TM HPQ. We are currently obtaining flow data on large columns that can be used for a full-scale processing design that will remediate Hanford tank waste.

WM Descriptor(s): environmental management; ion exchange chromatography; low-level radioactive wastes; radioactive waste storage; tanks; technetium; technology development

Principal Investigator(s):

ERDAL BRUCE ROBERT,

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Los Alamos National Laboratory
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0042147

USA19980196

Title:
WASTE TANKS CHARACTERIZATION AND SAFETY

Title in Original Language:

Topic Code(s):
116 -Waste Storage

Abstract:
Los Alamos is working with Hanford researchers and engineers on a number of safety issues. For example, Los Alamos scientists assisted with the development of a 150-horsepower pump to continuously mix the sludge within Tank 101-SY. This pump provided the means to slowly mix and release the gas in a controlled manner. Los Alamos wrote the safety assessment for the installation and operation of the mixing pump, which was installed in late July 1993. Los Alamos also conducted extensive modeling analysis to describe the gas concentrations in Hanford tanks. For example, Los Alamos built a one-fiftieth scale model of Tank 101-SY and filled it with the chemical constituents, minus radioactive compounds. These models help researchers predict what might develop in 101-SY or other tanks at the site in the future. As a result of these efforts, 101-SY has not exceeded 25% of the lower flammable limit for hydrogen since the pump was installed.

WM Descriptor(s): environmental management; Hanford production reactors; mixing; pumps; safety; sludges; tanks; technology development

Principal Investigator(s):
ERDAL BRUCE ROBERT,

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Organization Performing the work:
Los Alamos National Laboratory
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Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0042148

USA19980197

Title:
ELECTROLYTIC TREATMENT OF WASTE

Title in Original Language:

Topic Code(s):
162 -Liquid Waste Treatment

Abstract:
Los Alamos and Faraday Technologies, Inc., are developing an electrochemical process to treat hazardous and radioactive wastes that contain metal solutions, cyanide solutions, nitrate solutions, and various organic wastes that may contain chlorinated organic compounds. This technology does not generate secondary waste for many waste types and is easily controlled, thereby eliminating the potential for uncontrolled emissions or explosions. This technology consists of a stack of electrolytic cells with peripheral equipment, such as a rectifier, feed system, tanks with feed and treated solutions, and a gas-venting system. The cells enable this technology to handle as much waste as necessary. Scaling up the process simply involves stacking more single-cell units into batteries of cells, each of which runs at identical conditions independent of overall throughput. Certain difficult to treat waste streams found at Los Alamos and throughout the DOE Complex have been effectively treated by Electrochemical Treatment. Cost comparisons with off-site treatment has been completed.

WM Descriptor(s): cost estimation; electrochemistry; hazardous materials; technology development;

waste processing

Principal Investigator(s):
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Organization Performing the work:
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Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0042150

USA19980198

Title:
MWFA TREATMENT TRAIN AND DEVELOPMENT

Title in Original Language:

Topic Code(s):
181 -Methodologies, Analytical Methods, Measurements Instrumentation

Abstract:

Improved transuranic (TRU) and low-level waste assay accuracy is needed to meet increasingly stringent shipping and disposal regulations and is widely recognized as a top priority by DOE waste generators and regulators. Conventional waste assay methods can give rise to very large errors, an order of magnitude or more, depending on the waste form and TRU isotope distribution. The CTEN task will improve the neutron assay of containerized waste to the quality standards required for acceptance at the Waste Isolation Plant (WIPP) and increasingly stringent shipping regulations. The conventional waste assay methods can give rise to very large errors, depending on the waste form and TRU distribution. To improve assay accuracy, Los Alamos scientists are developing an instrument that will assay waste in 55- and 83-gal drums, which will incorporate several new developments that provide matrix and TRU isotope distribution information and mitigate the self-shielding problem in many types of wastes: the combined thermal/epithermal neutron (CTEN) interrogation device. The CTEN device interrogates with thermal neutrons and, uniquely, with epithermal neutrons, which can result in more accurate assays of 'lumps' of fissile material. Also incorporated is a capability to correct results for waste matrix inhomogeneities and non-uniform fissile distributions that will provide more accurate results even in those waste drums in which self-shielding is not a problem.

WM Descriptor(s): alpha-bearing wastes; compliance; environmental management; legislation; low-level radioactive wastes; technology development; waste characterization; waste transportation

Principal Investigator(s):
ERDAL BRUCE ROBERT,

Los Alamos National Laboratory
Los Alamos
87545

Organization Performing the work:
Los Alamos National Laboratory
Los Alamos 87545 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0042153

USA19980199

Title:
DEVELOPMENT OF REAL TIME MONITOR FOR AIR-BORNE RADIOACTIVITY

Title in Original Language:

Topic Code(s):
241 -Monitoring Programmes

Abstract:

Staggering volumes of low-level radioactive waste await disposal. Thermal treatment such as incineration is currently accepted as the best method for reducing this tremendous volume of material, but concerns over effective emissions monitoring have kept some incinerators from being built and others from operating. Los Alamos personnel have invented a gas stack monitoring instrument using an innovative approach to monitoring airborne radioactive emissions. Rather than extracting a small volume of gas for analysis, the Large-Volume Flow-Through Detector System (LVFTDS) monitors the entire volume of air. This provides real-time feedback on emissions, preventing alarm delays and minimizing the risk of exposure.

WM Descriptor(s): environmental management; gaseous wastes; incinerators; low-level radioactive wastes; monitoring; technology development

Principal Investigator(s):
ERDAL BRUCE ROBERT,

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Organization Performing the work:
Los Alamos National Laboratory
Los Alamos 87545 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0042157

USA19980200

Title:
VACUUM DISTILLATION SEPARATION OF PLUTONIUM

Title in Original Language:

Topic Code(s):
153 -Solid Waste Treatment

Abstract:

Pyrochemical processing of plutonium results in large amounts of plutonium salt residues. Traditional recovery methods of the plutonium require aqueous dissolution and subsequent recovery of the plutonium. These aqueous processing methods create large volumes of waste solution and solid wastes due to the multi-step process

sequence. In response to the need to recover the large amounts of pyrochemical residues, Eduardo Garcia of Los Alamos National Laboratory has developed a process that distills the waste salts away from the actinide compounds in a simple physical process based on the large differences in vapor pressure of the salt matrix compared to the actinide oxides in the salt. This process can be accomplished in a small furnace with a vacuum system to give a residue salt that can meet low level waste disposal criteria. Similar techniques could be applied to salts containing hazardous or valuable materials.

WM Descriptor(s): alpha-bearing wastes; distillation; minimization; plutonium; technology development; vapors; volume

Principal Investigator(s):

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Organization Performing the work:

Los Alamos National Laboratory
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0042158

USA19980201

Title:
MAGNETIC SEPARATION OF SOILS

Title in Original Language:

Topic Code(s):

152 -Liquid Waste Treatment

Abstract:

Large volumes of contaminated soil and fluid exist in and are being generated by the DOE Defense Complex. Chemical treatment or direct disposal of these wastes can be prohibitively expensive. One of the Los Alamos responses to this problem is the development of high gradient magnetic separation or HGMS. The technology can be used to extract slightly magnetic radioactive particles from host materials such as water, soil, or air. All uranium and plutonium compounds are slightly magnetic while most host materials are 'nonmagnetic'. The process operates by passing contaminated fluid or slurry through a magnetized volume. The magnetized volume contains a magnetic matrix material such as steel wool that extracts the slightly magnetic contamination particles from the slurry. Los Alamos and Lockheed Environmental are currently developing the soil decontamination aspect of this technology through a CRADA.

WM Descriptor(s): decontamination; magnetic separators; separation processes; slurries; soils; technology development; transuranium compounds

Principal Investigator(s):

ERDAL BRUCE ROBERT,

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Organization Performing the work:

Los Alamos National Laboratory
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Other Investigators:

Organization Type:

Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0042159

USA19980202

Title:
SEQUESTERING AGENTS / REMOVAL OF TRANSURANIUM ELEMENTS

Title in Original Language:

Topic Code(s):
152 -Liquid Waste Treatment

Abstract:

There is an urgent need for alternative technologies for treatment of radioactive waste water to meet regulatory limits, decrease disposal costs, and minimize waste. In particular, this technology would address the need to replace precipitation methods that generate large volumes of radioactive sludge and reduce TRU wastes that will be generated from processing the multitude of plutonium-contaminated residues that exist at DOE facilities. This technology is also applicable to removal of specific metal ions from multiple aqueous waste streams at Rocky Flats, Hanford, INEL and other DOE sites that will be generated by the treatment of residues and wastes, decontamination and decommissioning of facilities, and cleanup of various environmenta contamination sites. The application of water-soluble, metal-selective chelating polymer ultrafiltration to the treatment of such waste waters is a relatively new separations technology being developed at Los Alamos. The basis for metal ion separation involves the retention of metal ions bound to the chelating water-soluble polymer while smaller unbound species pass freely through the ultrafiltration membrane. The polymer filtration process allows for the selective concentration of dilute solutions of metal ion contaminants. The reduced volume containing the polymer/metal ion complex can go directly to disposal or the metal ions can be recovered by a stripping reaction and the polymer recycled for further metal ion recovery.

WM Descriptor(s): alpha-bearing wastes; polymers; separation processes; technology development; transuranium compounds; ultrafiltration

Principal Investigator(s):

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Organization Performing the work:

Los Alamos National Laboratory
Los Alamos 87545 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:
Other

Program Duration: From: Not provided To: Not provided

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0042161

USA19980203

Title:
RADIATION EFFECTS ON MATERIALS IN THE NEAR-FIELD OFA NUCLEAR WASTE REPOSITORY

Title in Original Language:

Topic Code(s):

136 -Waste Storage

Abstract:

Successful, demonstrated containment of radionuclides in the near-field can greatly reduce the complexity of the performance assessment analysis of a geologic repository. The chemical durability of the waste form, the corrosion rate of the canister, and the physical and chemical integrity of the back-fill provide important barriers to the release of radionuclides. However, near-field containment of radionuclides depends critically on the behavior of these materials in a radiation field. The principal sources of radiation in high-level nuclear waste are -decay of the fission products (e.g., Cs-137 and Sr-90) and decay of the actinide elements (e.g., U, Np, Pu, Am and Cm). Both types of radiation can cause important chemical and physical changes in materials (e.g., increase in leach rates, volume expansion, solid state radiolysis and bubble formation, and reduced cation exchange capacity). The radiation-solid interactions are complex because they involve a combination of ionization effects due to electronic excitations and ballistic effects due to elastic collisions. The strength of the radiation field decreases dramatically with time, and the type of radiation damage varies over time (-decay damage due to actinides dominates over -decay effects due to fission products with increasing time due to the long half-lives of the actinides). Further, the radiation effects vary as a function of the type of solid (ionic vs. covalent), the type of damage (inelastic vs. elastic interactions), the temperature of the irradiation, and the kinetics of the annealing mechanisms. We propose a systematic study of elastic and inelastic damage effects in materials in the near-field. These include: 1.) waste forms (glass and crystalline ceramics); 2.) alteration products of waste forms (clays and zeolites); 3.) back-fill materials (clays and zeolites). We have selected materials whose durability or chemical behavior can potentially have a major effect on the retention of radionuclides (e.g., monazite as a waste form; smectite clays in back-fill), but for which there is very little previous systematic study. We have not included canister materials in this proposal, as there is already a substantial body of previous work on radiation effects in metals. The proposed work draws on over twenty years of experience in studying radiation effects in minerals and complex ceramics and utilizes an unusual combination of studies of natural phases of great age with ion beam and electron irradiations of synthetic phases under carefully controlled conditions.

WM Descriptor(s): actinides; cesium 137; containers; high-level radioactive wastes; materials; none; physical radiation effects; radioactive waste storage; strontium 90

Principal Investigator(s):

FARRELL, HELEN

Idaho Operations Office
Albuquerque
87131-0000

Organization Performing the work:

Idaho Operations Office
Albuquerque 87131-0000 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Institution of higher education

Program Duration: From: 9/9/1996 To: 9/14/1999

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0042986

USA19980204

Title:

Bench Scale Testing for Separation on Idaho National Engineering and Environmental Laboratory Waste

Title in Original Language:

Topic Code(s):

132 -Liquid Waste Treatment

Abstract:

The objective of this Technical Task Plan is to investigate promising alternative technologies for the removal of actinides and fission products from high-level waste streams at the Idaho National Engineering and Environmental Laboratory. These separation technologies have the potential to significantly reduce the quantity of high-level waste requiring disposal in a federal repository. The program covers four technical areas and one administrative task. The first area is to support the on-going joint research program between the Idaho National Engineering and Environmental Laboratory and the Khlopin Radium Institute in St. Petersburg, Russia. Testing of an improved cobalt dicarbollide solvent extraction process using actual radioactive waste will be performed. The second area is to test promising new technologies for the removal of cesium from actual waste. The technology to be tested includes hexaferrocyanides sorbent on a polyacrylonitrile support in conjunction with the Czech Technical University. The third area is to demonstrate a combined cesium/strontium solvent extraction process developed at the Argonne National Laboratory in countercurrent equipment using actual tank waste. The fourth area is to test novel sorbents for strontium and cesium removal from contaminated groundwater.

WM Descriptor(s): actinides; bench-scale experiments; daughter products; high-level radioactive wastes; minimization; separation processes; technology development

Principal Investigator(s):

Todd, Terry

Idaho National Engineering and Environmental Lab
Idaho Falls
83415-5218

Organization Performing the work:

Idaho National Engineering and Environmental Lab
Idaho Falls 83415-5218 RUSSIAN FEDERATION

Other Investigators:

Organization Type:

Other

Program Duration: From: 10/1/1996 To: 9/30/1999

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0043888

USA19980205

Title:

Individual Review of Mixed Low Level Waste

Title in Original Language:

Topic Code(s):

104 -Database & Information Systems, including Technology Transfer Systems. Technical Assistance and Costs

Abstract:

The objective of this work is to provide a database of glass properties (both processing and leach performance) and models to guide, focus, and expedite continuing development studies required for new low level waste / low level mixed waste streams. This should help to reduce overall development costs, and reduce cycle time from waste characterization to technology implementation. This glass compositional envelope information should permit more rapid identification of optimal formulations and provide an evaluation of the applicability and potential benefits of the Minimum Additive Waste Stabilization technology for relevant remediation problems.

WM Descriptor(s): chemical properties; data base management; data compilation; glass; physical properties; waste management (defense)

Principal Investigator(s):

McBride, Kathryn A

Idaho National Engineering and Environmental Lab
Catholic University of America
83415-2503

Organization Performing the work:

Idaho National Engineering and Environmental Lab
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Other Investigators:

Organization Type:

Other

Program Duration: From: 12/23/1994 To: 9/30/1998

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0043944

USA19980206

Title:

Dry Rod Consolidation Technology Disposition

Title in Original Language:

Topic Code(s):

146 -Spent Fuel Storage

Abstract:

The Dry Rod Consolidation Technology project removed the fuel rods from 48 Pressurized Water Reactor spent fuel assemblies for testing the feasibility of dry horizontal rod consolidation. The Dry Rod Consolidation Technology-Disposition Project was authorized to remove the nonfuel bearing components from the Test Area North storage pool at the Idaho National Engineering and Environmental Laboratory (Idaho National Engineering and Environmental Laboratory). The nonfuel bearing components were cut into smaller pieces, separated by isotope concentration level, and placed in 86-gallon drums. Part of the waste was classified as Low Level Waste and was buried at the Radioactive Waste Management Complex (RWMC) at the Idaho National Engineering and Environmental Laboratory. The remaining material was classified as Department of Energy Special Case Waste and was stored in the Intermediate Level Transuranic Storage Facility at the RWMC, where it will remain until a permanent disposal facility becomes available for the material.

WM Descriptor(s): fuel rods; radioactive waste management; spent fuel storage; waste management system

Principal Investigator(s):

Elwood, R K

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83415-9206

Organization Performing the work:

Idaho National Engineering and Environmental Lab
Idaho Falls 83415-9206 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: 10/1/1992 To: 4/27/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Civilian Radioactive Waste Management

Associated Organization(s):

none

Recent publication info:

US0044042

USA19980207

Title:
Systems Engineering Analysis of Complex Wide Waste Flow

Title in Original Language:

Topic Code(s):
101 -General policies; 102 -Programme Strategy, Planning and Management

Abstract:
The purpose of the Integrated Process Analysis project is to provide systems engineering analysis of baseline and alternative systems/technologies for management of Department of Energy wastes, including options for pretreatment handling and storage, transport, treatment, final waste form packaging and performance, post-treatment handling and storage, and final disposition. Analysis of alternatives for mixed low-level waste treatment are based on the results of the Integrated Thermal and Nonthermal Treatment Studies. A Complex Wide Waste Flow analysis tool is presently under development to provide for analysis of alternative configurations for Department of Energy complex wide waste treatment and disposition. Systems are evaluated to assess opportunities for increased system performance, including reduction of total life-cycle cost and health and safety risks. Interface is maintained with the Mixed Waste Focus Area, the EM Integration effort, and the Department of Energy-supported air pollution monitoring and control test bed effort at the Diagnostic Instrumentation and Analysis Laboratory.

WM Descriptor(s): environmental management; management; planning; radioactive waste management; systems analysis; technology development

Principal Investigator(s):
Bechtold, Thomas

Idaho National Engineering and Environmental Lab
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83415-3710

Organization Performing the work:
Idaho National Engineering and Environmental Lab
Idaho Falls 83415-3710 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:
Other

Program Duration: From: 10/1/1996 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0044078

USA19980208

Title:
Technical Support of Base Waste Management Storage

Title in Original Language:

Topic Code(s):
102 -Programme Strategy, Planning and Management

Abstract:
This project provides programmatic support to the Department of Energy Carlsbad Area Office/National Transuranic Program Office and Experimental Programs Branch for: 1) development of advanced waste characterization tools and end processes, 2) development of the revised Waste Isolation Pilot Plant Transuranic Waste Characterization Program Quality Assurance Program Plan, 3) development of performance demonstration programs for nondestructive radioassay and Resource Conservation and Recovery Act solidified

waste, 4) continued support of Gas Generation Experiment with Contact Handled Transuranic Waste, 5) matrix depletion program coordination, data review interpretation and model development, 6) providing technical and strategic support to assist in the cradle-to-grave management of transuranic waste, 7) technical coordination and oversight of all waste characterization activities supported by the Department of Energy, Carlsbad Area Office and conducted by Lockheed-Martin Idaho Technology Company at the Idaho National Engineering and Environmental Laboratory and 8) provides labor and non-labor funding for all personnel performing the above tasks.

WM Descriptor(s): environmental management; management; planning; waste characterization; waste management (defense)

Principal Investigator(s):

Sayer, Dale L

Idaho National Engineering and Environmental Lab
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43201-4201

Organization Performing the work:

Idaho National Engineering and Environmental Lab
Columbus 43201-4201 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: 10/1/1994 To: 10/1/2008

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0044110

USA19980209

Title:

Developing Base Waste Management Storage Protocols

Title in Original Language:

Topic Code(s):

156 -Waste Storage

Abstract:

Initiate and conduct experiments with contact handled transuranic waste and provide pre-test and post-test brine analysis in support of the Waste Isolation Pilot Program.

WM Descriptor(s): alpha-bearing wastes; brines; environmental management; radioactive waste management; radioactive waste storage; waste management (defense)

Principal Investigator(s):

Sayer, Dale L

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83401-4201

Organization Performing the work:

Idaho National Engineering and Environmental Lab
Idaho Falls 83401-4201 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: 10/1/1995 To: 9/30/2002

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0044111

USA19980210

Title:
TR ANSPORTABLE MELTER VITRIFICATION DEMO ON ACTUAL MIXED WASTE

Title in Original Language:

Topic Code(s):
164 -Waste Immobilization

Abstract:

The primary objective of this task is to demonstrate a stabilization treatment on an actual mixed hazardous and radioactive waste stream. This objective will be accomplished by a parallel program of radioactive mixed waste treatability studies (at bench and pilot scale) of actual ORR mixed wastes and a field-scale vitrification demonstration of a waste stream using the Transportable Vitrification System (TVS).The tasks and milestones include:1) Setup the TVS at ORR, complete safety and readiness reviews, and commence the demonstration program. Process 80,000 kg of actual mixed waste. Gather operational data to support future treatment of this waste stream. Data will include glass composition, glass performance (leachability by TCLP and PCT), air emissions data, and melter performance information. This work will be accomplished with the assistance of Oak Ridge person nel under TTP OR1-6-MW-43 with additional support from EM-30.2) Provide technical direction to Clemson University for their support of the TVS. Clemson is performing pilot-scale melter tests on surrogate and actual ORR mixed waste, utilizing separate funding. This task will provide glass formulations, test plans, and technical guidance to Clemson.3) Leverage existing HLW glass composition models to determine mixed wastes glass composition models in the soda-lime-silica and borosilicate glass systems. This subtask will result in a computer algorithm which will allow the operator to select the proper mix of glass forming chemicals for the waste being treated.

WM Descriptor(s): bench-scale experiments; feasibility studies; hazardous materials; radioactive waste processing; technology development; vitrification

Principal Investigator(s):

Whitehouse, John

Savannah River Technology Center
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29808-001

Organization Performing the work:

Savannah River Technology Center
Aiken 29808-001 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:
Other

Program Duration: From: 10/1/1996 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:

US0044113

USA19980211

Title:
DC ARC MELTER ENHANCED CAPABILITIES

Title in Original Language:

Topic Code(s):
154 -Waste Immobilization

Abstract:

A DC graphite arc melter was installed in a glove box during FY96 to perform vitrification experiments with

radioactive materials. The primary goal of Task 2 shall be to perform partitioning studies with the contained DC graphite arc melter comparing the migration of Pu-238, Pu-239, and cerium in various types of simulated job control wastes. INEL soil will be used to test the melter and off-gas system before starting the job control tests. The experimental plan for the job control tests will be developed by a committee with representatives from SRS, MWFA, and other Pu experts. The test results shall be documented at the completion of this work.

WM Descriptor(s): cerium; environmental management; gloveboxes; plutonium 238; plutonium 239; technology development; vitrification

Principal Investigator(s):

Congdon, James

Savannah River Technology Center
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29808-001

Organization Performing the work:

Savannah River Technology Center
Aiken 29808-001 UNITED STATES OF AMERICA

Other Investigators:

Organization Type:

Other

Program Duration: From: 10/1/1996 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0044115

USA19980212

Title:

SAVANNAH RIVER SMALL QUANTITY WASTE STREAM TREATMENT

Title in Original Language:

Topic Code(s):

162 -Liquid Waste Treatment; 169 - Removal/Recycling of Organics

Abstract:

This project consists of three tasks as follows:Task A: Mercury Disposal via Sulfur Reaction Develop a sulfur based laboratory method for converting reasonable amounts of mixed mercury waste to an insoluble waste form, which can be stored as low-level radioactive waste. Most mixed waste mercury streams at Savannah River Site (SRS) are radioactively contaminated mercury streams, with varying amounts of radioactive impurities including tritium. The radioactivity of these mercury mixed wastes will vary depending on the generation source and location. Successful implementation of this treatment process will allow future SRS waste of this type (estimated 1996-2000 volume generation of 0.525 M3) to be treated similarly. Contact-handled contaminated elemental mercury waste from other DOE sites may also be treated using this sulfur based technology approach.Task B: Treatment of Mixed Waste Paint Thinners The objective of this study is to sample and characterize the SRS mixed waste paints and thinners (SR-W042) for possible incineration at the SRS Consolidated Incineration Facility (CIF). The waste stream (which may contain paint chips, solvent and sludge) is not definitively characterized with respect to its physical form(s). In this study, we propose to 1) inspect and sample the waste stream, 2) characterize the physical form(s) of individual waste containers, 3) sample and analyze the waste, and 4) recommend disposal options.Task C: Treatability Study of Tank E-3-1 Cleanout Material Mixed waste stream SR-W049 will be sampled, characterized, and treatment options recommended. This waste stream consists of 5 drums (1.0 m3) of sludge from the bottom of Tank E-3-1 which is reported to be contaminated with Hg. This waste stream carries the EPA waste code D009A (Toxic Characteristic Leaching Procedure Hg for nonwastewater).

WM Descriptor(s): hazardous materials; low-level radioactive wastes; mercury; separation processes; sludges; technology development; waste characterization

Principal Investigator(s):

Siler, Jeffery

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: 10/1/1996 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0044117

USA19980213

Title:

REMOTE SENSING SUPPORT FOR CONTAMINANT SIGNATURE ANALYSIS

Title in Original Language:

Topic Code(s):

302 -Site Survey and Characterization

Abstract:

In 1992, Congress directed federal agencies to determine if national technical means (NTM) could be used for environmental applictions. The Environmental Task Force (ETF) was formed to study the problem.The ETF consisted of a group of environmental scientists who were briefed on the capabilities of NTM. Following the initial briefings, ETF scientists proposed experiments to evaluate specific capabilities of NTM. The ETF funded a preliminary evaluation of NTM at a few selected waste sites at Savannah River, Oak Ridge, and Hanford. The ETF study indicated that NTM has significant value for waste site characterization.The work performed under this proposal will support additional, more-detailed investigations of NTM with other conventional remote sensing techniques (aerial photography, aerial hyper-and multi-spectral imaging, and commercial satellite imaging). This effort is a highly leveraged collaboraion with the Office of Research and Development (ORD), the Army Corps of Engineers Topographic Engineering Center (TEC) and the Government Applications Task Force (GAFT). ORD has provided aerial hyper-and multi-spectral imaging, TEC has provided ground-based spectral reflectance data, GAFT and ETF has provided NTM data, and DOE has provided on-site characterization data. In addition, DOE will support the analysis of data, correlation and comparisons of the ground truth, NTM, and spectral measurements for specific environmental applications. The study will concentrate on various aspects of the following sites at Savannah River: the Oil Test Site, the F&H Seepage Basins, the F&H High Level Waste Tanks, R-Area and D-Area Ash Basin, D-Area Oil and Seepage Basin, D-Area Bioremediation Site, and portions of the Upper Three Runs Creek.Task A: Compile Available Data for the Study Areas Extract subsets of all NTM and digital multispectral data for each study area and digitize appropriate maps, charts and diagrams. Register various images to common map scale and determine location of ground truth measurements on images.Task B: Perform Analysis and Report Results Perform a comparison between NTM and conventional spectral imagery. Specifically, determine the value of: resolution, spectral band width, cost and scheduling problems. The objective of the comparison is to provide a report showing the value-added of NTM for SRS site characterization.

WM Descriptor(s): savannah river plant; site characterization

Principal Investigator(s):

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Organization Type:

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Program Duration: From: 10/1/1996 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0044120

USA19980214

Title:

ELECTROCHEMICAL TREATMENT OF LIQUID WASTES

Title in Original Language:

Topic Code(s):

132 -Liquid Waste Treatment

Abstract:

This task is at the engineering development stage. Electrochemical processes have been demonstrated for the destruction of nitrates, nitrite and organic compounds in SRS and Hanford high-level waste. Activities this year will focus on providing support for EM-30, and the Tanks Focus Area to design a nitrate destruction system and complete transfer of nitrate/nitrite destruction technology to EM-30 at SRS. Resolve remaining process control activities and work with TFA and EM-30 to identify and resolve any problems associated with evolution of ammonia or hydrogen. Work done at LANL and LLNL on nitrate construction will be accessed and reviewed to be sure technology is fully understood in the context of prior work. Determine the feasibility of removing Tc from Hanford waste. The University of S. Carolina will complete design of a porous electrode system for use in reducing dilute species such as chromate and pertechnetate at SRS. Determine the feasibility of using electrochemical technology to separate RCRA metals and actinides from dilute wastes.

WM Descriptor(s): hazardous materials; high-level radioactive wastes; liquid wastes; nitrates; nitrites

Principal Investigator(s):

Hobbs, David

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Other Investigators:

Organization Type:

Other

Program Duration: From: 10/1/1996 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0044124

USA19980215

Title:
PU-238 WASTE CHARACTERIZATION SYSTEMS

Title in Original Language:

Topic Code(s):
156 -Waste Storage; 157 -Waste Disposal

Abstract:
This TTP is for the development or demonstration and implementation of characterization systems and computer models to support safe handling, reclassification, transportation and disposal requirements (e.g. Local Performance Assessment, WIPP, DOT) for waste containing transuranics, specifically Pu-238.

WM Descriptor(s): alpha-bearing wastes; plutonium 238; simulation; waste characterization

Principal Investigator(s):
Hane, Richard

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Other Investigators:

Organization Type:
Other

Program Duration: From: 10/1/1996 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0044133

USA19980216

Title:
REMOVAL/TREATMENT OF WASTE CONTAINING PU-238 AND LONG LIVED WASTE

Title in Original Language:

Topic Code(s):
156 -Waste Storage; 157 -Waste Disposal

Abstract:
This task will focus on development of a system capable of handing Transuranic (TRU) and mixed wastes and will include the development, demonstration, and implementation of removal and treatment technologies/systems for TRU (Pu-238) and long-lived wastes to support transportation, site disposal, and WIPP disposal requirements. SRTC worked with industry to develop and demonstrate drum handling tools for treatment systems. These tools have allowed remote handling of 55-gallon drums to be removed from close-packed configuration, such as in pallets or in concrete culverts, and placed in an exposed location. This task supports the development of the plasma and graphite arc melter systems presently being develop ed by EM-50. This task will complete FY-96 obligations for demonstration of a Russian hybrid melter to process heterogenous TRU wastes and to commercialize the technology by identifying a U.S. manufacturer as a licensee.

WM Descriptor(s): alpha-bearing wastes; containers; environmental management; plutonium 238; radioactive waste processing; radioactive waste storage

Principal Investigator(s):

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Organization Type:

Other

Program Duration: From: 10/1/1996 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0044134

USA19980217

Title:

STABILIZATION/CONTAINMENT SYSTEMS

Title in Original Language:

Topic Code(s):

116 -Waste Storage

Abstract:

Develop containment systems that will be capable of performing by themselves or in conjunction with other remedial actions. Focus will be on passive actions. Emplacement methods should provide for verification. Stabilization/containment will be performed by in situ biological, chemical and physical methods. This overall task includes the following subtasks: Closure cap repair techniques for compacted clay barriers will be developed. Techniques that will be investigated will include injection grouting, re-compaction, expansion material placement, etc. Techniques to characterize, model, and verify the appropriateness of intrinsic bioremediation for the containment of organic contaminants are required to validate that the concept of intrinsic bioremediation meets RCRA, CERCLA, and SDWA requirements. This will facilitate regulatory acceptance of intrinsic bioremediation. In-situ vitrification avoids excavation costs and material handling safety concerns associated with ex-situ stabilization techniques. Plasma arc in-situ vitrification offers potential cost and safety advantages for contaminated soil stabilization over the existing (joule heated) in-situ vitrification approach.

WM Descriptor(s): containers; containment; radioactive waste storage; remedial action; vitrification

Principal Investigator(s):

Phifer, Mark

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Other Investigators:

Organization Type:

Other

Program Duration: From: 10/1/1996 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0044136

USA19980218

Title:
SOLID WASTE DISPOSAL SYSTEMS

Title in Original Language:

Topic Code(s):
136 -Waste Storage

Abstract:

Demonstrate improved, innovative disposal systems for humid environments. Wastes generated in future environmental restoration and D&D activities in addition to currently generated waste are included in the scope of this effort. The objective of developing alternative landfill designs is both improved performance and cost reduction. The approach is to design and demonstrate chemical and biological systems for reducing contaminant transport from disposal sites containing waste, soil, and debris in humid environments. Demonstrate design and emplacement of chemically reactive barriers and backfills to enhance the performance of engineered low level and mixed waste disposal systems in the DOE Complex. Develop a beneficial reuse of emptied high-level waste (HLW) tanks as disposal systems for cement or other grout stabilized low level radioactive waste soils, sand, and rock.

WM Descriptor(s): containers; decommissioning; decontamination; design; environmental management; high-level radioactive wastes; humidity; tanks

Principal Investigator(s):
Langton, Chris

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Other Investigators:

Organization Type:
Other

Program Duration: From: 10/1/1996 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0044137

USA19980219

Title:
WSRC IMMOBILIZATION

Title in Original Language:

Topic Code(s):
132 -Liquid Waste Treatment

Abstract:

The current strategy for immobilization and disposal of Oak Ridge tank wastes is based on privatization. Expressions of interest and comments on a draft Request for Proposal for treatment of the Melton Valley Storage Tank (MVST) waste have been solicited from the private sector. This task addresses the following technical issues: Effects of average sludge waste composition on glass processing. Effects of average sludge waste composition on glass suitability for disposal. Effects of average sludge waste composition on glass volume. Effects of average sludge waste composition on glass disposal costs. This task consists of four subtasks: definition of the range of compositions to be investigated; development of glass formulations; preparation for radioactive testing; radioactive testing of forms containing actual waste. One of the technologies being developed is removal of cesium from the soluble fraction of the HLW.

WM Descriptor(s): cesium 137; glass; high-level radioactive wastes; separation processes; sludges; waste characterization

Principal Investigator(s):

Harbour, John

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Organization Type:

Other

Program Duration: From: 10/1/1996 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0044138

USA19980220

Title:

WSRC PRETREATMENT

Title in Original Language:

Topic Code(s):

136 -Waste Storage

Abstract:

Significant quantities of sodium hydroxide (caustic) will be required to store and retrieve high-level wastes (HLW) and leach sludges at the Hanford and Savannah River sites. The technical feasibility of a caustic recycle process on actual waste needs to be shown. The ability to produce NaOH that meets operational specifications must be demonstrated. Electrochemical salt splitting is a possible method to recover caustic from HLW solutions. Sludges at Savannah River Site, Hanford, and Oak Ridge will be washed to remove salts before immobilization. The High Level Waste (HLE) sludge must be washed to remove soluble salts as a pretreatment to vitrification. Technical Issues Related to This Task Include: Technology to remove the desired components, such as aluminum and selec ted radionuclides from the sludge, to produce a more concentrated lower volume wash water, and to produce a more consistent treated sludge feed for vitrification are all desired.

WM Descriptor(s): high-level radioactive wastes; radioactive waste storage; sludges; sodium hydroxides; technology development

Principal Investigator(s):

Hobbs, David

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Organization Type:

Other

Program Duration: From: 10/1/1996 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0044139

USA19980221

Title:
WSRC RETRIEVAL AND CLOSURE

Title in Original Language:

Topic Code(s):
136 -Waste Storage

Abstract:

The Waste Retrieval and Tank Closure Demonstration will provide test data and configuration controls that will allow a more cost-effective process for removing heel from High Level Waste (HLW) Tanks than the current use of three mixer pumps for salt tanks. It will also provide technology for removal of residual heels that cannot be removed by the current slurry pumps process. The heel removal demonstration and development and control of tank closure criteria for a HLW tank with review and approval by State and Federal regulators, and public input, will allow demonstration of closure on a HLW tank.

WM Descriptor(s): environmental management; radioactive waste storage; tanks; technology development; waste retrieval

Principal Investigator(s):

Dixon, Gene

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Other Investigators:

Organization Type:
Other

Program Duration: From: 10/1/1996 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:

US0044140

USA19980222

Title:
AmCm Stabilization by Vitrification

Title in Original Language:

Topic Code(s):
154 -Waste Immobilization

Abstract:

SRTC provides the technology for stabilization of Strategic Nuclear Material, such as Americium (Am), Curium (Cm), Plutonium (Pu), and Neptunium (Np). Identify the appropriate technology, develop process operating parameters and equipment, and demostrate process. Vitrification using a "bushing melter" approach to reduce criticality concerns has been selected and is being developed and demonstrated. The AmCm campaign will result in glass-filled canisters for shipment to Oak Ridge National Laboratory for recovery and resale, or for safe storage.

WM Descriptor(s): alpha-bearing wastes; americium; containers; curium; neptunium; plutonium; radioactive waste storage; transuranium elements; vitrification

Principal Investigator(s):
Marra, John

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Other Investigators:

Organization Type:
Other

Program Duration: From: 10/1/1996 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0044155

USA19980223

Title:
Fissile Materials Disposition - Plutonium Stabilization

Title in Original Language:

Topic Code(s):
154 -Waste Immobilization

Abstract:
SRTC provides the technology for stabilization of excess plutonium (Pu) in a glass waste form that meet non-proliferation objectives. Glass formulations have been developed that demonstrate the feasibility of incorporating 10 weight percent plutonium in the glass. Analysis of the plutonium glasses showed that a very durable glass surpassing current high level waste disposal requirements is produced.

WM Descriptor(s): fissile materials disposition; glass; plutonium; storage and disposition options; vitrification

Principal Investigator(s):
Goetzman, Rudy

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Other Investigators:

Organization Type:
Other

Program Duration: From: 10/1/1996 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Fissile Materials Disposition

Associated Organization(s):
none

Recent publication info:
US0044156

USA19980224

Title:
Defense Waste Processing Facility Chemical Flowsheet and Improvements

Title in Original Language:

Topic Code(s):

101 -General policies; 102 -Programme Strategy, Planning and Management

Abstract:

SRTC provides the vitrification technology for high level wastes, waste acceptance technology, and process operational and safety boundaries. The objectives are to support safe startup and operation of the Defense Waste Processing Facility (DWPF), to demonstrate that the DWPF waste form will meet repository requirements; and to provide performance parameters for DWPF. Direct technical support is provided for chemical and melter cell technical issues, analytical methods development, preparation of radioactive process requirements, late wash filter performance with both irradiated and unirradiated material, and chemical flowsheet and material balance evaluations. The following major DWPF technical needs will be addressed: rheological constraints on sludge-slurry stimulant , coil fouling process demonstration, technical options for resolution of the melter feed loop bias (analytical support to that test series), and completion of Version 3 of the Product Composition Control System (PCCS). Preparation and revision of the Waste Form Qualification Report (WQR) will address the technical basis for the Glass Product Control Program, chemical compatibility, glass thermal stability, radionuclide inventory projections, and foreign material in the DWPF product. Large Scale Pilot Facilities placed in "cold standby" will be studied. SRTC will provide startup assistance for late wash on-line a nalyses and troubleshooting support.. SRTC will also provide sample analyses of DWPF glass canisters, leachate analyses for DWPF samples, DWPF cold feeds and for backup samples from the DWPF Lab.

WM Descriptor(s): environmental management; management; planning; radioactive waste processing; waste management (defense); waste processing

Principal Investigator(s):

Randall, Chris

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: 10/1/1996 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0044157

USA19980225

Title:
Defense Waste Processing Facility Melter Insert

Title in Original Language:

Topic Code(s):

100 -RADIOACTIVE WASTE - GENERAL

Abstract:

SRTC developed an insert to correct glass pouring anomalies associated with the first Defense Waste Production Facility (DWPF) production melter. The insert was remotely installed in the melter while in radioactive operation and at operating thermal temperature. The insert has corrected the pouring problem and has actually extended the useful life of the melter by eliminating the effect of material corrosion in the pour spout area.

WM Descriptor(s): environmental management; maintenance; melting; technology development; waste management (defense)

Principal Investigator(s):

Tibrea, S. L.

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Other Investigators:

Organization Type:

Other

Program Duration: From: 10/1/1996 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0044162

USA19980226

Title:

Characterization Requirements - Aluminum Spent Nuclear Fuel Alternate Treatment Technology Program

Title in Original Language:

Topic Code(s):

143 -Spent Fuel Storage

Abstract:

This task will evaluate the characterization requirements for the disposal of aluminum Spent Nuclear Fuel (SNF) in a repository. It consists of analyzing the repository requirements for SNF; identifying the characterization requirements; developing and building the characterization database and the associated characterization technologies needed for both direct/co-disposal and melt-dilute treatment of aluminum SNF.

WM Descriptor(s): aluminium; environmental management; spent fuel storage; spent fuels; waste characterization

Principal Investigator(s):

Iyer, Natraj

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: 10/1/1996 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0044168

USA19980227

Title:

Test Protocol for Aluminum Spent Nuclear Fuel Forms - Aluminum Spent Nuclear Fuel Alternate Treatment Technology Program

Title in Original Language:

Topic Code(s):

143 -Spent Fuel Storage

Abstract:

This program will develop the necessary scientific base required to develop a set of test protocols for aluminum Spent Nuclear Fuel (SNF) forms. Test protocols currently exist for glass and commercial SNF forms for disposal into a geologic repository. However, these protocols are not directly applicable to metallic or alloy SNF forms. This program will assess the degradation of aluminum SNF forms in the repository environments and identify the characteristics that best define the performance of the aluminum SNF form in the repository. It will then identify the appropriate tests or series of tests to evaluate its characteristics. It will drive towards incorporation of this test protocol into an ASTM standard guide.

WM Descriptor(s): aluminium; spent fuel storage; spent fuels; waste characterization

Principal Investigator(s):

Iyer, Natraj

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Organization Performing the work:

Savannah River Technology Center
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Other Investigators:

Organization Type:

Other

Program Duration: From: 10/1/1996 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0044169

USA19980228

Title:

Melt-Dilute Technology - Aluminum Spent Nuclear Fuel Alternate Treatment Technology Program

Title in Original Language:

Topic Code(s):

143 -Spent Fuel Storage

Abstract:

This program will evaluate the technical feasibility of melt-dilute technology for the dilution of high enriched aluminum Spent Nuclear Fuel (SNF) prior to packaging for direct disposal in a geologic repository. Melt Dilute technology involves melting the high enriched (up to 93%) Aluminum SNF and addition of depleted uranium to dilute the enrichment to less than 20%. Major benefits are achieved from decreasing the criticality potential, proliferation potential and volume reduction. The resultant SNF form may be packaged in a canister for interim of repository storage. This program involves developing the melt-dilute technology for aluminium SNF. It involves developing the melt-dilute process and the aluminum SNF form. Process development includes evaluating the role of process variables e.g. temperature, composition, crucible materials, heat source, off-gas etc. on the aluminum form characteristics. Aluminum form development includes definition of the composition of the aluminum SNF form and its degradation characteristics.

WM Descriptor(s): aluminium; dilution; melting; spent fuel storage; spent fuels; waste characterization

Principal Investigator(s):

Iyer, Natraj

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: 10/1/1996 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0044170

USA19980229

Title:

Direct Disposal Technology - Aluminum Spent Nuclear Fuel Alternate Treatment Technology Program

Title in Original Language:

Topic Code(s):

143 -Spent Fuel Storage

Abstract:

This technology development program will evaluate the feasibility of direct and co-disposal of research reactor aluminum clad Spent Nuclear Fuel (SNF) in the geologic repository. The road ready package required for direct or co-disposal was defined and the storage criteria for aluminum SNF for geologic storage times was also developed. The drying specifications needed for packaging the SNF in the road ready package was also developed. The thermal models for both the 100 year interim storage and the 10,000 year are also being developed. The degradation models including corrosion in aqueous and vapor environments is also being developed. The degradation models also include creep of aluminum during storage periods. The material's configuration and redistribution during geologic storage times is also being evaluated. Further, the criticality potential during these storage periods is also being analyzed. Finally, an instrumented test canister is being designed and fabricated. This canister will be loaded with SNF with used to validate the storage criteria and may also serve the purpose of a lead surveillance program for future storage.

WM Descriptor(s): aluminium; containers; simulation; spent fuel storage; spent fuels

Principal Investigator(s):

Iyer, Natraj

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Organization Performing the work:

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Other Investigators:

Organization Type:

Other

Program Duration: From: 10/1/1996 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0044171

USA19980230

Title:
Comparative Test of Pipeline Slurry Monitors

Title in Original Language:

Topic Code(s):
118 -Waste Transportation (Methods, Containers, Transportation Means)

Abstract:
A cross-site transfer of about 145,000 gallons of low radioactive tank waste (liquids and solids) is scheduled at the Oak Ridge National Laboratory (ORNL) in FY 1998 for the Gunite and Associated Tank Treatability Study (GAAT-TS). In preparation for tank closure, the waste in the unlined tanks of concrete construction is to be removed and transported through a two-inch diameter pipeline. Monitoring of the waste slurry properties, including specific gravity, viscosity, volume percent solids, particle size, and flow velocity, will be required before and during the transport process because the pipeline will be susceptible to plugging if the volume percentage of solids or size of solids exceeds certain limits.

WM Descriptor(s): flow rate; liquid wastes; low-level radioactive wastes; monitoring; pipes; slurries

Principal Investigator(s):
Edelson, Martin C.

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Organization Performing the work:
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Other Investigators:

Organization Type:
Other

Program Duration: From: 11/15/1996 To: 12/31/1999

State of Advancement: Research in progress

Sponsoring Organization(s):
USDOE Environmental Restoration and Waste Management

Associated Organization(s):
none

Recent publication info:
US0044993

USA19980231

Title:
Treatment of Low Level Radioactive Mixed Waste by Chemical Oxidation - Delphi DETOX Process Support - Rocky Flats

Title in Original Language:

Topic Code(s):
122 -Liquid Waste Treatment; 123 -Solid Waste Treatment

Abstract:
Rocky Flats Environmental Technology Site has an opportunity to demonstrate a large-scale chemical oxidation process patented by Delphi Research, Inc under the name DETOX. The process destroys organic compounds while dissolving and holding most metals, including uranium and plutonium, in the process solution. Delphi Research has been working with the Site, Los Alamos National Laboratory, the Mixed Waste Focus Area, and FETC to develop the system for the treatment of DOE complex waste forms. As a result of the work with FETC, a 25 kg/hour system was designed and fabricated, and is now available for demonstration. The Site has been identified as a user of this system. At the conclusion of the demonstration, the Site will be able to retain the system and implement it for additional waste treatment. DETOX is highly tolerant of waste composition, form, water content, and particle size, and is applicable to at least 36 Site waste streams. DETOX is an effective

treatment for both solid and liquid combustible waste. Using an iron catalyst and co-catalysts, combined with an acid solution, slightly elevated operating temperatures (200 degrees C) and moderate pressure (100 psi), wastes are chemically degraded, releasing carbon dioxide and water, while producing no nitrogen oxides or sulfur dioxides under normal operating parameters. The main catalyst is iron(III) which oxidizes organic compounds. The iron(II) produced in the oxidation is regenerated to iron(III) by oxygen. In the 25 kg/hour demonstration system, organic liquids and solid combustible materials will be fed into the pressurized reaction vessel for treatment. Any soluble metals will be dissolved and retained in the solution. The off-gas from the system will contain some hydrochloric acid, water vapor, and carbon dioxide. The water vapor containing HCl will be condensed and neutralized. The remaining off-gas, consisting primarily of C02, will be fed to a carbon bed. Waste proposed to be treated during the demonstration are line and non-line produced combustible low level mixed waste including solid combustibles, cutting oil, and miscellaneous liquids. This waste may be contaminated with hazardous metals, volatile organic compounds, semivolatile organic compounds, trace cyanide, and/or PCBs. Each waste stream will be characterized prior to introducing it to the DETOX system. The demonstration unit consists of three transportable modules. A vertical module includes the solids feed, reaction vessel, reflux condenser, solution cooler, particulate filter, surge tank, process solution return pump, evaporator and evaporator overhead condenser, evaporator bottoms return pump, and reaction vessel quench tank. A horizontal module includes the remainder of the pumps, the overhead condenser, overhead receiver, evaporator overhead receiver, distillate neutralization tank, vent knock out tank, and vent gas carbon bed. The third module contains the heating and cooling oil system. The DETOX process has proven feasible for the treatment of Rocky Flats surrogate mixed waste oils and solid combustibles. To date, two oils and eight solid combustible materials, including cellulose and plastic, and a variety of miscellaneous waste forms, have been successfully tested. Scale-up to a demonstration system is promising for these waste forms.

WM Descriptor(s): low-level radioactive wastes; oxidation; radioactive waste processing

Principal Investigator(s):

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Organization Performing the work:

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Organization Type:

Other

Program Duration: From: 10/1/1994 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0045815

USA19980232

Title:

Treatment of Low Level Radioactive Mixed Waste by Supercritical Carbon Dioxide Extraction

Title in Original Language:

Topic Code(s):

122 -Liquid Waste Treatment; 123 -Solid Waste Treatment; 162 -Liquid Waste Treatment; 163 -Solid Waste Treatment

Abstract:

Supercritical Carbon Dioxide Extraction treats low level radioactive mixed (LLM) solid and sludge waste that require the removal of hazardous volatile and semivolatile organic compounds to meet Resource Conservation and Recovery Act (RCRA) disposal requirements. SCDE accomplishes removal of these compounds by liquid extraction (washing the waste in supercritical C02). SCDE operates at 1500 psi and 60 degrees C, or the process

can be operated as liquid C02 (900 psi, 20 degrees C). SCDE extracts one or more organic contaminant from a non-homogeneous waste stream with radionuclides present. Essentially, this process takes advantage of the phase behavior of carbon dioxide. These characteristics allow the supercritical fluid to permeate a matrix quickly and facilitate transfer out of a matrix while requiring little pump work. Solvent recovery is accomplished with relatively small temperature and pressure reductions. An automated 60-litre mixed waste demonstration system was procured by the Site in FY95. The system has been designed to recycle the carbon dioxide. As currently configured, this system is pilot-scale. However, this system has the capability to have a second 60-liter extraction vessel added, which would allow the system to be run semi-continuously. After demonstration against actual Site waste, a second vessel can be added, making the system full-scale for the Site. SCDE development is being coordinated with programs at other DOE sites with similar waste types. This project will prepare the extraction system for demonstration on actual waste at Rocky Flats. A one-liter unit has been used at the University of Colorado at Boulder to demonstrate the effectiveness of this technology for extracting organic compounds from waste matrices. In addition, a one-liter unit at the Idaho National Engineering Laboratory, which was configured to match the Site 60-liter unit, is being used to demonstrate and document the radionuclide partitioning characteristics of the system. Data developed during this effort will be used to perform demonstration of the 60-liter unit. Several small volume waste streams will be treated in treatability studies during the demonstration.

WM Descriptor(s): carbon dioxide; extraction; hazardous materials; low-level radioactive wastes; phase transformations; radioactive waste processing; sludges; technology development

Principal Investigator(s):

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Program Duration: From: 10/1/1994 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0045816

USA19980233

Title:

Treatment of Low Level Radioactive Mixed Waste by Low Temperature Thermal Desorption

Title in Original Language:

Topic Code(s):

113 -Solid Waste Treatment; 163 -Solid Waste Treatment

Abstract:

In the low temperature thermal desorption (LTTD) process, solid wastes are either introduced into an oil-heated, jacketed vacuum drying chamber or circulated between two electrically-heated screw augers. Resource Conservation and Recovery Act (RCRA) solvents are volatilized in a reduced pressure, non-oxidizing atmosphere and carried off from the solid matrix by nitrogen purge gas. Most of today's commercially available systems use condenser and granular activated carbon capture systems to separate and collect the volatilized RCRA solvents. As part of the Rocky Flats LTTD demonstration, a non-thermal plasma unit was used to break down the volatilized organic compounds. In the event that a waste form is not RCRA compliant after treatment, the LTTD technology still renders the resulting waste, containing metals and radionuclides, more amenable to stabilization by a final treatment process such as polymer solidification or cementation. The organic compounds

separated from the low level mixed waste by the LTTD process are destroyed using a non-thermal destruction technology or sent to a commercial treatment facility for final disposition. Incineration of the organic compounds, an efficient method for their destruction, is not an option due to stakeholder concerns about high temperature thermal treatment processes. LTTD has been demonstrated in treatability studies to remove organic contaminants from the waste leaving residual contamination of only about one-tenth the RCRA requirement. The radionuclides are isolated in the waste matrix. Radionuclides in the condensate are considered to be below quantifiable limits.

WM Descriptor(s): desorption; hazardous materials; low-level radioactive wastes; organic compounds; waste processing

Principal Investigator(s):

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Organization Type:

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Program Duration: From: 10/1/1994 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0045817

USA19980234

Title:

Treatment of Low Level Radioactive Mixed Waste by Polymer Encapsulation

Title in Original Language:

Topic Code(s):

113 -Solid Waste Treatment; 163 -Solid Waste Treatment

Abstract:

There are two types of polymer encapsulation being considered by this project for the treatment of low level radioactive mixed (LLM) waste to meet Resource Conservation and Recovery Act (RCRA) disposal requirements. Microencapsulation: Waste requiring stabilization to meet RCRA requirements is microencapsulated in polyethylene using a commercially available compounding extruder. The appropriate extruder for this application uses two co-rotating intermeshing screws. Electrical resistance heaters in the extruder barrel and friction introduced by the rotation of the screws melt polyethylene pellets. Dry waste is fed into the extruder using a down stream side feeder, at which point the waste encounters molten polyethylene. Kneading blocks and/or pin mixers downstream of the waste feed port mix the waste with the molten polyethylene. A vent port can be used to remove excess moisture and reduce the porosity of the final waste form. The molten mixture is output into the final disposal container, where solidification occurs as the mixture cools. Macroencapsulation: The epoxy (thermosetting)system is composed of a resin and a curing agent selected to be non-hazardous under RCRA. The resin and curing agent are mixed in a ratio of 70:30 by weight. After mixing the resin and curing agent, 40% by weight Class C fly ash is blended into the mixture as filler. The fly ash is used as a filler to lower peak exotherm temperature during curing and to help reduce the cost. Known weights of LLM waste are repackaged into mesh baskets to hold the waste suspended in the drum. The pour occurs in a Site Type IV rigid drum liner (carbon black filled high density polyethylene), inside a 55 gallon carbon steel waste drum. The basket is covered with a mesh top and angle brace to anchor it to the rigid liner of the drum to ensure that buoyant forces will not allow the basket to float prior to curing of the liquid epoxy system. The liquid epoxy system is batch mixed and transferred to the prepared drum. Macroencapsulation

using thermoplastic extrusion uses the similar equipment to the microencapsulation process, although a single-screw extruder is better suited to this application. As with the thermosetting macroencapsulation process, the debris waste is contained in a basket and thermoplastic polymer is extruded around the waste. Polymer encapsulation of mixed waste produces a superior waste form with less volume increase than conventional grout-based solidification technologies. By reducing the number of processed drums required for storage, transport, and disposal, this technology has the potential for significant cost benefits compared to cementation. Another anticipated benefit is a complexwide solution to stabilizing soluble salts. Other DOE sites generating large volumes of soluble salt waste include Hanford, SRS, ORNL, and West Valley. Polymer microencapsulation is also a potential solution for the buried salt waste at INEL. Polymer macroencapsulation is a viable solution to many types of debris waste that will be produced during D&D operations. These technologies will also be required to treat the beryllium contaminated waste.

WM Descriptor(s): encapsulation; hazardous materials; low-level radioactive wastes; polymers; waste processing

Principal Investigator(s):

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Other Investigators:

Organization Type:

Other

Program Duration: From: 10/1/1994 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0045818

USA19980235

Title:

Treatment of Low Level Radioactive Mixed Waste by Mercury Retort and In-situ Off-gas Stabilization

Title in Original Language:

Topic Code(s):

113 -Solid Waste Treatment; 163 -Solid Waste Treatment

Abstract:

The mercury retort and amalgamation process will react vaporized mercury from a retort furnace with particulate sulfur in the gas phase, forming a mercury amalgam. The process uses existing vacuum retort equipment with the addition of ADA Technologies' sulfur reactor. The retort furnace was used in a limited FY95 treatability study which treated 26 kg of mercury-contaminated waste. During the retorting process, crushed fluorescent lamps were vacuum baked at low temperature to volatize the mercury. The volatilized mercury vapor was recovered via a condensing unit downstream from the thermal process. Following the condensing unit, the off-gas was passed through a granular activated carbon (GAC) filter, and then sent to a vacuum pump. After the pump, the off-gas was passed through an oil mist filter, a second GAC filter, and then released to room air. The current configuration of the retort system will have to be modified to accommodate the sulfur reactor. The amalgamation system will be tested in place of the mercury condensation unit. Mercury retort and amalgamation will demonstrate the capability of a low temperature thermal desorption system to retort mercury from a wide variety of waste matrices, including porous and non-porous materials. In addition, ADA Technologies, Inc., has developed an off-gas treatment component that stabilizes elemental mercury, while in the gaseous phase, using sulfur.

WM Descriptor(s): hazardous materials; low-level radioactive wastes; mercury; off-gas systems; waste processing

Principal Investigator(s):

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Other Investigators:

Organization Type:

Other

Program Duration: From: 10/1/1994 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0045819

USA19980236

Title:
METAL RECYCLE/REUSE

Title in Original Language:

Topic Code(s):

103 -Effluents and Discharges

Abstract:

RMMA Metal Recycle/Reuse/Release - This project evaluates waste metals exiting Radiological Control Areas for the best waste management/waste minimization procedure such as verification of clean and free release or sending to a radioactive smelter.

WM Descriptor(s): decontamination; extraction; metals; minimization

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Program Duration: From: 10/1/1996 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0049006

USA19980237

Title:
HIGH FLUENCE NEUTRON SOURCE

Title in Original Language:

Topic Code(s):

181 -Methodologies, Analytical Methods, Measurements Instrumentation

Abstract:

High Fluence Neutron Source for Nondestructive Characterization of Nuclear Materials - We are addressing the need to measure nuclear wastes, residues, and spent fuel in order to process these for final disposition. For example, Transuranium wastes destined for the WIPP must satisfy extensive characterization criteria outlined in the Waste Acceptance Criteria, the Quality Assurance Program Plan, and the Performance Demonstration Plan. Similar requirements exist for spent fuel and residues. At present, no nondestructive assay instrumentation is capable of satisfying all of the PDP test cycles. One of the primary methods for waste assay is by active neutron interrogation. We plan to improve the capability of all active neutron systems by providing a higher intensity neutron source (by about a factor of 1,000) for essentially the same cost, power, and space requirements as existing systems.

WM Descriptor(s): alpha-bearing wastes; neutron activation analysis; neutron sources; non-destructive analysis; sensitivity; transuranium elements; waste characterization

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Program Duration: From: 10/11/1996 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0049008

USA19980238

Title:

Nevada Test Site Area 3 Radioactive Waste Management Site Assessment

Title in Original Language:

Topic Code(s):

302 -Site Survey and Characterization

Abstract:

This project is for a site assessment and characterization of the Area 3 low-level radioactive waste management site on the Nevada Test Site. Tasks include borehole analysis, interpretation of results, and reporting; geologic assessments to include surficial geologic mapping, trench mapping, fault studies, and cosolidation of geologic data; and ongoing monitoring of soil water content and potential, soil temperature, and precipitation and evapotransportation (water balance). Deliverables include two reports - a final borehole interpretive report and a final site data report.

WM Descriptor(s): boreholes; environmental management; geologic surveys; Nevada Test Site; site characterization; waste management (defense)

Principal Investigator(s):

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Organization Type:

Other

Program Duration: From: 10/1/1996 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Defense Programs; USDOE Environmental Restoration and Waste Management

Associated Organization(s):

none

Recent publication info:

US0100028

USA19980239

Title:

Nevada Test Site U3ax/bl Resource Conservation and Recovery Act Closure

Title in Original Language:

Topic Code(s):

302 -Site Survey and Characterization

Abstract:

This project is part of to the Radioactive Waste Management Integrated Closure Program. Closure and post-closure care plans will be developed for the U3ax/bl low-level radioactive waste storage cell on the Nevada Test Site. Deliverables include the plans and a summary report for the waste inventory database.

WM Descriptor(s): environmental management; inventories; low-level radioactive wastes; Nevada Test Site; radioactive waste storage; waste management (defense)

Principal Investigator(s):

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Program Duration: From: 10/1/1996 To: 9/30/1997

State of Advancement: Research in progress

Sponsoring Organization(s):

USDOE Environmental Restoration and Waste Management; USDOE Defense Programs

Associated Organization(s):

none

Recent publication info:

US0100029

Yugoslavia

YUG19980001

Title:
Scientific basis on the environmental control

Title in Original Language:
Naucne osnove zastite zivotne sredine

Topic Code(s):
114 -Waste Immobilization (Bituminization, Cementation, Including Tests of Properties, Leaching Studies)

Abstract:

In this project preliminary investigations on the physico-chemical and mechanical characteristics of the radwaste materials of the low and intermediate level of bonded activity immobilized in the mortar matrices are presented. The aim of the investigations is to improve the characteristics by the addition of certain additives in the mortar matrix formulation such as TiO_2 in the form of rutile as well as polyethylene granulates. Results of the experiments have shown that there is a possibility of improving either physico-chemical and mechanical characteristics of the solidified radwaste-mortar mixture forms by decreasing the leach rates of the radionuclides that are immobilized in the mortar matrix when the leaching experiments were performed and increasing the mechanical properties of solidified forms when they were introduced to the press. Leach rates decreased up to 30 percents and mechanical resistance up to 40 percents when comparing the samples prepared without and with additives.

WM Descriptor(s): additives; intermediate-level radioactive wastes; leaching; low-level radioactive wastes; matrix materials; mechanical properties; mortars; radioactive waste disposal; rutile; solidification

Principal Investigator(s):

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Plecas I.; Pavlovic R.; Bigovic D.

Organization Type:
Other

Program Duration: From: 1995-1-1 To: 1999-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):
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Recent publication info:
1173

YUG19980002

Title:
Radioactive waste disposal centre in FR Yugoslavia

Title in Original Language:
Centralno odlagaliste RAO materijala u SR Jugoslaviji

Topic Code(s):
114 -Waste Immobilization (Bituminization, Cementation, Including Tests of Properties, Leaching Studies)

Abstract:

As a concept for the final disposal system of the processed and solidified radioactive waste materials of low and intermediate level of bonded activities engineered trench system is adopted. This system consists of four barriers to the influences that might occur due to the trench system environment. They are: immobilized matrix-

radwaste mixture form solidified inside metal drums or in concrete containers depending on the applied immobilization technique; drainage materials and trench walls made of concentrate of high mechanical strength. Engineered trench system will be divided into sections each representing independent trench system with control possibility of potential damages expressed as radionuclides presence in the drainage network system that goes under the trenches and collects liquids that might penetrate through the facility. All R and D work that is performed would have its final goal in constructing the Yugoslav final disposal centre of radwaste materials.

WM Descriptor(s): cavities; concretes; ground disposal; intermediate-level radioactive wastes; low-level radioactive wastes; radioactive waste disposal; solidification; waste forms; waste-rock interactions

Principal Investigator(s):

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Program Duration: From: 1995-1-1 To: 1999-12-1

State of Advancement: Research in progress

Sponsoring Organization(s):

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Recent publication info:

1174

YUG19980003

Title:

Radioactive waste management

Title in Original Language:

Obrada i odlaganje radioaktivnog otpada

Topic Code(s):

102 -Programme Strategy, Planning and Management

Abstract:

In this paper generation treatment und final disposal of radioactive waste materials is shown. Main goals in radwaste management from the technological treatment and environmental control points of view in correlation with IRPA principles and IAEA recommendations are discussed. Overview of radwaste categories generation sources and composition is given as well. Management on liquid and solid radwastes and hazardous materials generated in nuclear and other power generating facilities is presented underlining cementation as a technique of their immobilization.

WM Descriptor(s): cements; iaea; irpa; liquid wastes; radioactive waste disposal; radioactive waste processing; recommendations; reviews; solid wastes

Principal Investigator(s):

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Program Duration: From: 1996-1-1 To: 1997-1-1

State of Advancement: Research in progress

Sponsoring Organization(s):

Vinca Institute of Nuclear Sciences Radiation Protection Department; P.O.Box 522 Belgrade Yugoslavia

Recent publication info:

1175

YUG19980004

Title:

Modelling of radionuclide migration in cement-waste composition

Title in Original Language:

Modelovanje migracije radionuklida iz kompozicije cement-radioaktivni otpad

Topic Code(s):

201 -Dispersion and Migration of Radionuclides;
306 -Barrier Studies and Tests

Abstract:

WM Descriptor(s): cavities; cements; ground disposal; radioactive waste disposal; radionuclide migration; retention; solidification; waste forms

Principal Investigator(s):

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State of Advancement: Research in progress

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Recent publication info:

1176