Waste Management Research Abstracts

Information on Radioactive Waste Management Research in Progress or Planned

Volume 26

IAEA/WMRA/26

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FOREWORD

The research abstracts contained in Volume 26 of the Waste Management Research Abstracts (WMRA 26) were collected between January 1 and June 30, 2001. The abstracts reflect research in progress, or planned, in the field of radioactive waste management. For abstracts of completed research and other published information, the reader is advised to consult one of the many available commercial or non-commercial bibliographic information services, such as the IAEA's International Nuclear Information System (INIS). Please refer to the following URL for INIS:

http://www.iaea.org/programmes/inis/index.html

Though the information contained in this publication covers a wide range of programmes in many countries, the WMRA should not be interpreted as providing a complete survey of ongoing research in IAEA Member States. Enquiries for further information concerning a particular research abstract should be addressed to the author(s) at his/her institute.

The total number of abstracts published in WMRA 26 is 190. This is lower than previous WMRA volumes (297 for WMRA 25 and an average of 339 per volume for WMRA 23/24). The reduction in the number of abstracts per volume might be attributable to:

- decreased international interest in the WMRA, perhaps related to the variety of information sources on the Internet, and/or
- a higher rejection rate for abstracts (quite a few submissions were rejected because key information was missing).

While the number of submissions to WMRA 26 is lower than for past volumes, there has been a dramatic change in the accessibility and availability of the abstracts that were submitted. Nearly six years transpired between the publication of WMRA 22 and WMRA 23/24. During that time frame, none of the abstracts submitted for WMRA 23/24 were accessible outside of the IAEA. With the implementation of the Internet-based submission for WMRA, and combined with an automated "in-house" administrative system, abstracts in both WMRA 25 and WMRA 26 were accessible via the Internet at the URL listed below as soon as they were authorized for publication by the WMRA Programme Officer.

http://www.iaea.org/cgi-bin/irais.showwmt.pl?wmwmra.wmt

Most abstracts for WMRA 26 were authorized and became accessible on the Internet within 2-3 days of the date that they were submitted to the IAEA.

Individual abstracts may be viewed via the cited URL. In addition, searches may be carried out to find and view abstracts according to various search criteria, such as by volume, by waste management topic code, by specific database fields (such as title, country, principal investigator), et cetera. As such, for WMRA 25 and onward, it will not be necessary to wait until a collection of abstracts is published - abstracts may be viewed interactively via the Internet as soon as they are authorized.

Even though individual abstracts are directly accessible via the Internet, collections of abstracts in WMRA 26 and future WMRA volumes are or will be published on CD ROM to assist persons that may have difficulty accessing abstracts via the Internet.

WMRA 26 is a collection of Adobe[tm] Acrobat[tm] PDF files. In addition to being published on CD ROM, WMRA 26 may be downloaded from the cited URL. After downloading during a brief on-line session, users can work with WMRA 26 off line.

WMRA 23/24 and WMRA 25, also collections of PDF files, may be ordered on CD ROM or downloaded from the cited URL.

The database that holds the abstracts for WMRA 23/24 and onward also contains the abstracts for WMRA 22. It should noted that WMRA 22 data were converted and loaded from a different electronic format. Thus slight differences in content and print format may appear when compared to later WMRA volumes. Although already in printed form, WMRA 22 data were "back loaded" to enable full text search and query functions via the Internet at the cited URL. The collection of abstracts in WMRA 22 is available only in printed form, which may be ordered from the cited URL.

Volumes of Waste Management Research Abstracts are available free of charge, on request, to governmental and private organizations and to researchers. To order additional copies of volumes, please use the electronic request form on the cited URL or mail a request to:

WMRA Programme Officer
Waste Management Research Abstracts
Division of Nuclear Fuel Cycle and Waste Technology
International Atomic Energy Agency
PO Box 100
A-1400 Vienna
Austria

The collection of waste management research abstracts is made possible by the continued participation of researchers who are willing to invest the time and effort necessary to complete abstract forms or to submit information about their research via the Internet. The work of the Resident Missions to the IAEA in Vienna and the other governmental organizations in Member States who co-ordinated the submission of these abstracts is greatly appreciated.

Submissions from the United States of America were provided in a single "batch file" that was prepared by the Office of Scientific and Technical Information (OSTI) of the US Department of Energy (DOE). The information in the batch file was imported into the WMRA database. Due to differences in the OSTI information system and the WMRA database, some information, such as Recent Publications (see Figure 1 in the Introduction), was not provided to the IAEA.

This report was prepared by G.W. Csullog, Division of Nuclear Fuel Cycle and Waste Technology, Waste Technology Section.

INTRODUCTION TO WMRA 26

It is with pleasure that the International Atomic Energy Agency presents the twenty-sixth issue of the Waste Management Research Abstracts (WMRA). This issue contains 190 abstracts that describe research in progress in the field of radioactive waste management. The abstracts present ongoing work in 12 countries. Although the abstracts are indexed by country, many programmes are actually the result of co-operation among several countries. Indeed, a primary reason for providing this compilation of programmes, institutions and scientists engaged in research into radioactive waste management is to increase international co-operation and facilitate communications.

Data provided by researchers for publication in WMRA 26 were entered into a research in progress database named IRAIS (International Research Abstracts Information System). The IRAIS database is available via the Internet at the following URL:

http://www.iaea.org/programmes/irais/

This database will continue to be updated as new abstracts are submitted by researchers world-wide.

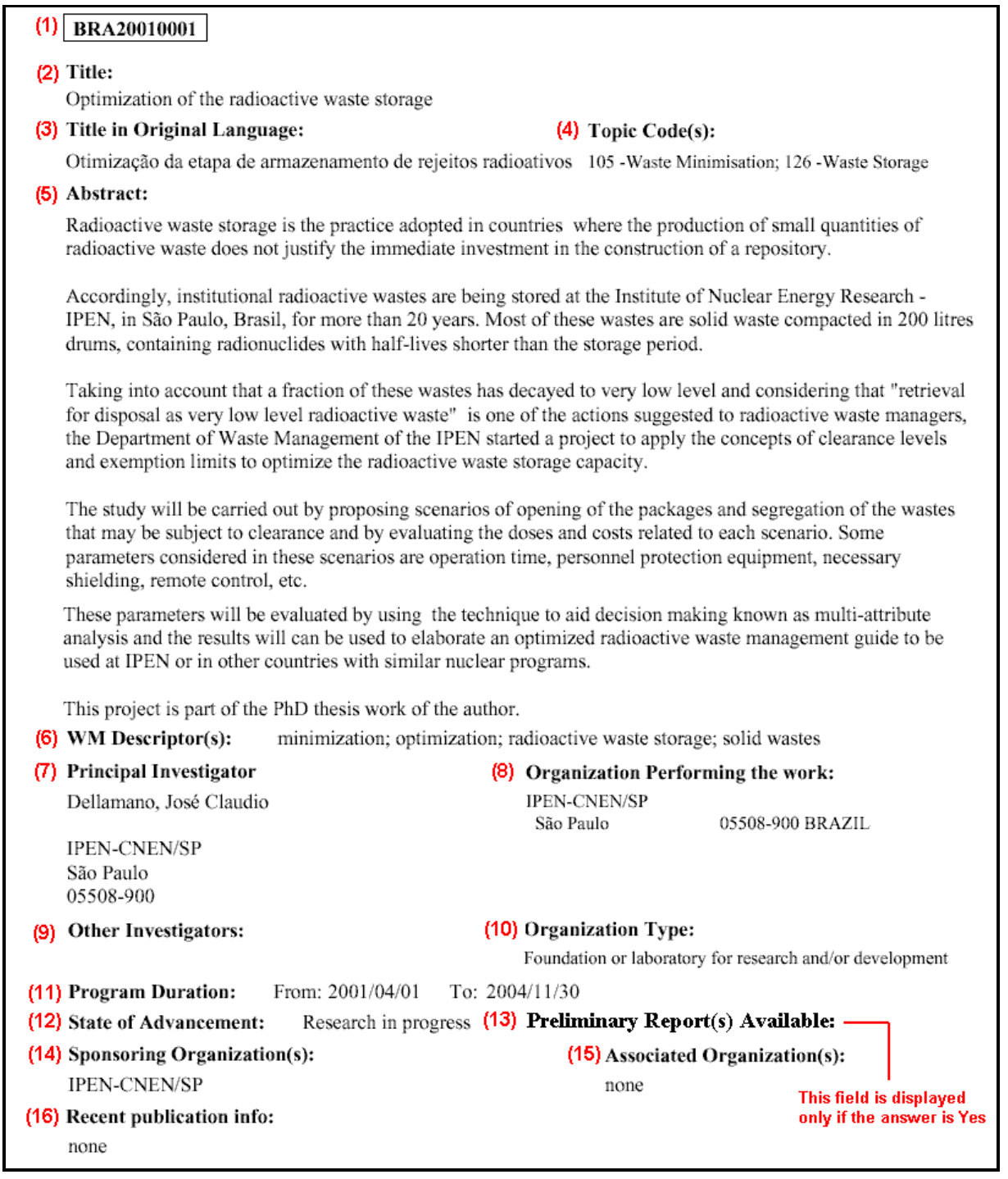
The format of WMRA 26 is similar to that used for WMRA 25. The abstracts are listed by country (full name) in alphabetical order. All abstracts are in English. The volume includes six indexes by: principal investigator, title, performing organization, descriptors (key words), topic codes and country. Figure 1 provides a description of the elements of an abstract.

Internet access to WMRA supports a variety of search functions and allows searching by words or phrases included in the texts of the abstracts. When performing searches, users should take note of the following conventions used in full texts:

isotope numbers: ^{60}Co, ^{235}U etc. are represented by Co-60, 60Co, U-235, 235U, etc.
chemical formulas: UO_2, H_2O, Fe_2O_3 etc. are represented by UO2, H2O, Fe2O3, etc.
m^2 is represented by m2 but m^3 may be written out 'cubic metres' or 'm3'
ms^{-1} is represented by 'm per s' and **Bqm^{-3}** by 'Bq per cubic metre'
exponentials are written out, for example '10 to the power of 20' or '10E20' is used in place of 10^{20}

A list of waste management topic codes can be found starting on page viii.

FIGURE 1 Elements of an Abstract



(1) **BRA20010001**

(2) **Title:**
Optimization of the radioactive waste storage

(3) **Title in Original Language:**
Otimização da etapa de armazenamento de rejeitos radioativos

(4) **Topic Code(s):**
105 -Waste Minimisation; 126 -Waste Storage

(5) **Abstract:**

Radioactive waste storage is the practice adopted in countries where the production of small quantities of radioactive waste does not justify the immediate investment in the construction of a repository.

Accordingly, institutional radioactive wastes are being stored at the Institute of Nuclear Energy Research - IPEN, in São Paulo, Brasil, for more than 20 years. Most of these wastes are solid waste compacted in 200 litres drums, containing radionuclides with half-lives shorter than the storage period.

Taking into account that a fraction of these wastes has decayed to very low level and considering that "retrieval for disposal as very low level radioactive waste" is one of the actions suggested to radioactive waste managers, the Department of Waste Management of the IPEN started a project to apply the concepts of clearance levels and exemption limits to optimize the radioactive waste storage capacity.

The study will be carried out by proposing scenarios of opening of the packages and segregation of the wastes that may be subject to clearance and by evaluating the doses and costs related to each scenario. Some parameters considered in these scenarios are operation time, personnel protection equipment, necessary shielding, remote control, etc.

These parameters will be evaluated by using the technique to aid decision making known as multi-attribute analysis and the results will can be used to elaborate an optimized radioactive waste management guide to be used at IPEN or in other countries with similar nuclear programs.

This project is part of the PhD thesis work of the author.

(6) **WM Descriptor(s):** minimization; optimization; radioactive waste storage; solid wastes

(7) **Principal Investigator**
Dellamano, José Claudio

IPEN-CNEN/SP
São Paulo
05508-900

(8) **Organization Performing the work:**
IPEN-CNEN/SP
São Paulo 05508-900 BRAZIL

(9) **Other Investigators:**

(10) **Organization Type:**
Foundation or laboratory for research and/or development

(11) **Program Duration:** From: 2001/04/01 To: 2004/11/30

(12) **State of Advancement:** Research in progress

(13) **Preliminary Report(s) Available:**

(14) **Sponsoring Organization(s):**
IPEN-CNEN/SP

(15) **Associated Organization(s):**
none

This field is displayed only if the answer is Yes

(16) **Recent publication info:**
none

FIGURE 1 (continued)

1	Reference Number	A unique identifier for each entry, in bold face, starting with the ISO code for the country followed by the year of update (four digits) and a four-digit number assigned in ascending numerical order.
2	Title	English title of the abstract.
3	Title in Original Language	(optional) For work originally prepared in a language other than English, the title in the original language may be included here. Please note that non-Roman characters are not supported.
4	Topic Code(s)	Radioactive waste management subject category codes. A list of these codes can be found starting on page viii
5	Abstract	All abstracts are printed in English. For the representation of special characters such as chemical formulas, isotope numbers etc. see the information given in the Introduction.
6	WM Descriptor(s)	Descriptors or key words taken from the Radioactive waste management Thesaurus. The assigned descriptors are indexed in this volume and represent an additional search possibility.
7	Principal Investigator	The name of the primary researcher or author contributing to the document. Corporate/organization authors are also cited where applicable.
8	Organization Performing the work	Name and location of the primary author/investigator.
9	Other Investigator(s)	Name(s) of other researcher(s) or collaborator(s).
10	Organization Type	The type of organization where the research is being performed: an institution of higher education; a foundation or laboratory for research and/or development; private industry; or other.
11	Program Duration	The start and finish dates are normally given in the format YYYY-MM-DD. However, formats such as YYYY.MM.DD, YYYY/Month, etc. are also given.
12	State of Advancement	State of the research: research planned or in progress.
13	Preliminary report(s) available	This field is displayed in abstracts only if the answer is Yes.
14	Sponsoring Organization(s)	The organization(s) providing the funding for the research.
15	Associated Organization(s)	Any other organization(s) also performing the research.
16	Recent Publications info:	This fields lists related published reports.

WASTE MANAGEMENT TOPIC CODES

10 - RADIOACTIVE WASTE

100 - RADIOACTIVE WASTE - GENERAL

101 - General policies
102 - Programme Strategy, Planning and Management
103 - Effluents and Discharges
104 - Database & Information Systems, including Technology Transfer Systems. Technical Assistance and Costs
105 - Waste Minimisation
106 - Quality Assurance Aspects
108 - Waste Management System Analysis
109 - Waste Characterisation (Radionuclide Inventory Determination), including Computer Codes and Measuring Methods and Techniques

110 - LOW AND INTERMEDIATE LEVEL WASTE FROM NFC FACILITIES

111 - Gaseous Waste Treatment
112 - Liquid Waste Treatment
113 - Solid Waste Treatment
114 - Waste Immobilization (Bituminization, Cementation, Including Tests of Properties, Leaching Studies)
115 - Waste Packaging
116 - Waste Storage
117 - Waste Disposal
118 - Waste Transportation (Methods, Containers, Transportation Means)

120 - RADIOACTIVE WASTE FROM NON-NFC SOURCES

121 - Gaseous Waste Treatment
122 - Liquid Waste Treatment
123 - Solid Waste Treatment
124 - Waste Immobilization
125 - Waste Packaging
126 - Waste Storage
127 - Waste Disposal

130 - HIGH LEVEL WASTE

131 - Gaseous Waste Treatment
132 - Liquid Waste Treatment
133 - Solid Waste Treatment
134 - Waste Immobilization/Vitrification (including Heat Transfer, Leaching and Other Studies)
135 - Waste Packaging (Canister Types, Materials, Corrosion Studies)
136 - Waste Storage
137 - Waste Disposal (including Spent Fuel)
138 - Waste Transportation (Methods, Containers, etc.)

140 - SPENT FUEL

- **141 - Spent Fuel Immobilization/Conditioning**
- **142 - Spent Fuel Packaging (Canisters, Materials. etc.)**
- **143 - Spent Fuel Storage**
- **144 - Spent Fuel Immobilization/Conditioning**
- **145 - Spent Fuel Packaging (Canisters, Materials. etc.)**
- **146 - Spent Fuel Storage**
- **148 - Spent Fuel Transportation (Methods, Casks, etc.)**

150 - ALPHA BEARING/TRU WASTE

- **151 - Gaseous Waste Treatment**
- **152 - Liquid Waste Treatment**
- **153 - Solid Waste Treatment**
- **154 - Waste Immobilization**
- **155 - Waste Packaging**
- **156 - Waste Storage**
- **157 - Waste Disposal**
- **158 - Waste Transportation (Methods, Containers, etc.)**
- **159 - Recovery of Radionuclides from the Waste**

160 - HAZARDOUS/MIXED WASTE

- **161 - Biodegradation/Biotreatment**
- **162 - Liquid Waste Treatment**
- **163 - Solid Waste Treatment**
- **164 - Waste Immobilization**
- **165 - Waste Packaging**
- **166 - Waste Storage**
- **167 - Waste Disposal**
- **168 - Waste Transportation (Methods, Containers, etc.)**
- **169 - Removal/Recycling of Organics**
- **171 - Technologies and Methodologies**
- **174 - Rehabilitation of Mill Tailings**

180 - WASTE CHARACTERIZATION

- **181 - Methodologies, Analytical Methods, Measurements Instrumentation**
- **182 - Waste from form characterization**
- **183 - Waste packages characterization**
- **184 - Mixed waste characterization**
- **185 - Radionuclide characterization in storage tanks**
- **186 - Radionuclide characterization in drums**
- **187 - Radionuclide characterization in-situ**
- **188 - Radionuclide scanning**
- **191 - ROHE in waste management facilities**
- **192 - ROHE in laboratories**
- **193 - ROHE in site characterization**
- **194 - ROHE in D&D**
- **195 - ROHE in drums characterization and retrieval**
- **196 - ROHE in characterization and retrieval of buried waste**
- **197 - ROHE in characterization and retrieval of liquid waste served in underground**

20 - ENVIRONMENTAL IMPACT/ASSESSMENT STUDIES

200 - ENVIRONMENTAL IMPACT/ASSESSMENT

201 - Dispersion and Migration of Radionuclides
202 - Dispersion and Migration Models
203 - Gas Diffusion Studies
204 - Impacts from Landfill Sites

210 - BIOLOGICAL UPTAKE AND TRANSFER

211 - Biological Uptake Mechanisms and Models

220 - ENVIRONMENTAL TRANSFER

221 - Environmental Transfer Models
222 - Microbial Effects
223 - Effects of Gaseous Releases

230 - RADIOLOGICAL ASSESSMENT

231 - Radiological Assessment Models
232 - Environmental Risk Assessment
233 - Long Term Environmental Impact

240 - ENVIRONMENTAL MONITORING

241 - Monitoring Programmes
242 - Monitoring Techniques

30 - FACILITY AND/OR SITE SPECIFIC STUDIES

300 - FACILITY/SITE - GENERAL

301 - General Planning and Management
302 - Site Survey and Characterization
303 - Earth Science Models and Studies
304 - Safety Assessment and Performance Studies
305 - Design, Construction, Commissioning
306 - Barrier Studies and Tests

310 - STUDIES FOR NEAR SURFACE DISPOSAL FACILITIES

312 - Site Survey and Characterization
313 - Earth Science Studies and Models
314 - Safety Assessment and Performance Studies
315 - Design, Construction, Commissioning
316 - Barrier Studies/Tests/Impacts

320 - STUDIES FOR GEOLOGICAL REPOSITORIES

321 - General Planning and Management
322 - Site Survey and Characterization
323 - Earth Science Studies and Models
324 - Safety Assessment and Performance Studies
325 - Design, Construction, Commissioning
326 - Barrier Studies/Tests/Impacts including Near Field Effects
327 - Waste Emplacement
328 - Natural Analogue Studies