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Low and Intermediate Level Waste Repositories: Socioeconomic Aspects and Public Involvement

Proceedings of a workshop
held in Vienna, 9–11 November 2005

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FOREWORD

While non-technical aspects, when developing a deep geological repository, have recently been at the centre of interest in many countries, socioeconomic issues and public involvement with regard to the disposal of low and intermediate level waste (LILW) have not yet been as visible. Many Member States commissioned disposal facilities before such industrial activities and their environmental matters had become a public and, as a consequence, political affair.

Nevertheless, in many Member States without disposal capacities, radioactive waste has been generated to the extent that disposal facility construction must be considered and some countries have already initiated facility development. For them, public acceptance has grown to be an essential condition for selecting a proper site for the facility construction. Not only for planned repositories, but also for numbers of existing ones the ecological concerns have been raised by municipalities and interest groups, sometimes not originating in the affected region.

Technical progress and experience gained when operating LILW disposal facilities have resulted in searching for safe, but at the same time economically optimal and socially acceptable solutions. As a result, a number of old facilities have been upgraded, some others even abandoned and retrieved waste disposed of in new ones complying with the current safety and technological measures.

The practices and experience reached in Member States when dealing with public and socioeconomic aspects of LILW disposal have been selected as a topic for the IAEA workshop where the aforementioned problems could be revealed, shared and discussed; the workshop was held 9–11 November 2005 in Vienna. The response from Member States was encouraging: 25 countries delegated their representatives to attend the event. They delivered national presentations which together with a summary of discussions are published in this TECDOC to disseminate the experience gained to other interested parties.

It is anticipated that this publication will be particularly useful to managers and decision makers in Member States that are in the relatively early stages of a repository development programme. The report may also be of interest to government officials (national, regional and local), industry, trade and environmental organizations, indigenous people, other interest groups and members of the general public interested in the potential impacts associated with LILW disposal facilities throughout the repository life cycle.

These proceedings were prepared with the help of the workshop chairman W.B. House. The IAEA officer responsible for the publication was L. Nachmilner of the Division of Nuclear Fuel Cycle and Waste Technology.

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SUMMARY

1. Introduction

There are many disposal facilities for low level and intermediate level radioactive waste in operation worldwide. They were commissioned some years or even decades ago, at a time when both the public interest in existing practices and the fear of the radio toxicity of waste being disposed of mostly in near surface formations were rather limited. The whole life cycle of LILW repositories has well been elaborated and some facilities have even been permanently closed. Safety aspects have been carefully considered and improved with time, due to activities such as multinational cooperation and exchange of relevant information. As a consequence, applying updated standards has sometimes resulted in termination of operation and/or upgrading of some old facilities. Technical solutions for different LILW disposal systems have been worked out and their feasibility has been demonstrated. In spite of this progress, a growing involvement of various stakeholders when planning, constructing and operating radioactive waste management facilities indicates that administrative and economic aspects, social impact and public interest need to receive still more attention. These facilities have become a public concern, with the highest sensitivity during the siting stage.

Low and intermediate level wastes (LILW), derived from both nuclear power and other nuclear applications are currently in interim storage in many countries that have no operating disposal facilities. In many Member States, the preferred option for the long term management of LILW is disposal in surface or near surface facilities with varying levels of engineering, including placement in mined or natural cavities some tens of metres below the surface. In other Member States, deep geologic repositories are being used or planned for management of the LILW in those countries. Many such facilities are now in operation, proposed for approval, or in the conceptual planning phase.

The importance of the underlying scientific and technical issues in support of repository development and radiological safety to the disposal of LILW has long been recognized. This technological progress needs to be adequately communicated to the general and professional non-nuclear public who are displaying increasing interest in economic and environmental issues of industrial activities, in general, and nuclear ones in particular, but this technocratic approach does not seem to be sufficient. Proving social benefit may also play a key role in developing successful new disposal facilities and operating existing ones.

Recent experience suggests that broad public acceptance will enhance the likelihood of project approval. An important element in creating public acceptance is the perceived trust and credibility of the responsible organization and of the reviewing agency or agencies. Establishing trust can be enhanced when an inclusive approach to public involvement is adopted from the beginning of the planning process to help ensure that all those who wish to take part in the process have an opportunity to express their views, and have access to information on how public comments have been considered and addressed. Experience further suggests that trust is promoted by providing open access to accurate and understandable information about the development programme.

The audiences for public involvement activities may include representatives from local communities, administrative units (e.g. national, regional and local), government officials, indigenous peoples where appropriate, regulatory agencies, community and public interest groups, environmental organizations, industry and trade groups, the scientific community and the news media. Communities along transport routes may also indicate interest. Significant

levels of interest may exist at regional and national levels throughout the project development phase. Interest may also extend to neighbouring countries, as mandated under a number of international treaties and conventions, particularly if the proposed facility is located near an international border.

In some Member States, committees representing a range of local community interests (e.g. local government, schools, business and environmental groups, and interested citizens) have been formed to assist impact assessment and impact management planning activities. Experience suggests that these local committees may have continuing value during the repository construction and operation phases to help with the implementation of the impact management measures. Other potential functions include monitoring-related repository operations and serving as an independent information source to interested parties.

Given this background, it was considered important to continue addressing the socioeconomic and non-radiological environmental impacts of LILW disposal facilities.

The nature and extent of public involvement and participation varies among Member States, depending upon existing legal and political frameworks and cultural context. This workshop attempted to address a number of basic concepts that have general application.

2. Scope and objectives

The objective of the workshop was to share experiences in searching and promulgating technically/economically optimal and socially acceptable solutions for disposal systems for low and intermediate level waste. The social benefits of such facilities may be the deciding factors in successfully developing new disposal facilities and operating existing ones. Therefore, presenting both positive and negative experiences of involving the public in dealing with sociologic, environmental and economic impacts of such facilities on the society may provide the necessary guidance to interested countries on how to outline and implement or improve their national approaches when integrating non-technical aspects with technical ones for LILW disposal facilities. The presentations and discussions at the workshop included the list of topics below:

- Involvement of the public in particular phases of repository lifecycle and negotiation processes;
- Communicating environmental impacts of disposal facility lifecycle to the society;
- Public concerns in different stages of repository lifecycle and confidence building;
- Solving problems in the coexistence of a repository and municipalities (land use, change of infrastructure, services);
- Dealing with the different categories of stakeholders (NGO's, environmental groups, public associations, associations of municipalities);
- Changes of social conditions elicited by a repository (demography, social structure, community nature and health);
- Economical and indirect privileges for involved municipalities (privileges, taxation, investments, compensation, sponsoring, services, education, healthcare).

3. Overview of presented papers

The papers presented at the workshop covered a wide spectrum of disposal programmes regarding repositories in planning, development and operational stages. A common message

was to clearly identify the public interests and meet the material, psychological and social needs of local communities. The particular lectures provided mostly positive examples of implemented approaches and included the following:

- past experiences mostly underestimating the role of public opinion or keeping the radioactive waste disposal somehow secret and relevant lessons learnt;
- formulation of public communication programmes and tactics employed to acquire a repository hosting agreement;
- the description of new approaches to gain a public support for siting disposal facilities;
- ways of cooperation between repository developers and local communities;
- procedures applied to allow for the repository development in societies having right of veto on siting the facility;
- identification of stakeholders and their interests;
- multinational negotiations regarding the disposal facility sited close to state borders;
- content, extent, forms and terms of information provided to public in different stages of a repository lifecycle;
- ways of involving the public in decision making processes;
- necessity to educate general public in waste safety and security matters;
- positive effects of co-location of waste generating nuclear facilities and repositories.

Even if examples exist that an incentive for local community is not a prerequisite for receiving agreement with siting a disposal facility, most presenters considered some direct or indirect material support as an effective tool to reach this goal. However, the means, their level, timing and a way of implementation differ significantly in national programmes due to their particularities. A win-win approach and inclusion of non-nuclear matters were indicated as prospective ways for reaching public consensus when developing and operating repositories. Populistic political decisions not respecting long term duration of the repository lifecycle and, thus, resulting in setting excessive levels of incentives were mentioned as a sensitive issue: once promised the supporting programmes must be adhered no matter how costly they might be. The presentations provided enough challenges for discussion which is summarised in the following section.

4. Discussion

The operation of disposal facilities has resulted in collecting data that, together with improvements to predictive modelling methods, allow for technical/economic optimization of repository designs. Provided that both operational and long term safety is assured, cost effective, durable and fully functional elements of repository constructions can be proposed. Also, the tuning of repository infrastructures and of operational procedures is another result of the growing level of experience.

There are numbers of approaches applied and planned in searching stakeholder support for LILW disposal facilities, most of them being country specific, but hardly any guidance could be developed to generalize these approaches. However, sharing experiences in searching and promulgating technically/economically optimal and, at the same time, providing socially acceptable solutions of a disposal system seems to be an effective way to provide guidance for interested parties. The applied international practices, bringing both positive and negative results, may help in outlining and implementing or improving their national approaches when

integrating non-technical aspects with technical ones. Other benefits of the information exchange are seen in becoming acquainted with experiences regarding the involvement of the public and debates over sociological, environmental and economic impacts of the disposal system on society.

The participants of the workshop held lengthy discussions concerning the need and level of incentives to the local and regional communities hosting or proposed as the siting location for radioactive waste management facilities. Incentive is defined as encouragement, motivation, stimulation, suggestion, or impetus. Incentive is not re-compensation, substitution, reimbursement, or indemnity. Incentives provide support to the community to balance any inconvenience associated with the waste disposal facility. Economic incentives can be direct such as grants, sponsorships, donations, and fees; indirect incentives include local contracts, purchasing local supplies and materials, hiring practices, infrastructure improvements, and payment of taxes.

Many developers accept that incentives have become part of waste disposal facility projects, and there have been many different types and magnitudes of incentive programmes. There were certain guidelines voiced by workshop participants related to incentive programmes as follows:

- Incentives should not be interpreted as compensation of risks.
- Nuclear power plants provide contributions and support to local communities in which they are located.
- It is preferable to keep incentives local or regional.
- Some countries prohibit the use of direct incentives.
- Sociological professionals should be engaged in the establishment of incentive programmes and levels of incentive, not just technical and financial personnel.
- The level and magnitude of incentives should be considered over the expected life cycle of the facility.
- Incentives can bring unintended consequences to local communities such as increased population near the facility.

The siting and development of waste management facilities adjacent to the primary waste generation facilities can provide some additional economic advantages to the incentive programmes of both facilities. The local and regional communities have accepted the industry producing the waste and have had the benefit of educational programmes and public involvement activities for the existing nuclear facility. The impacts and economics of transporting the radioactive waste can be minimized by co-location of the waste generation and disposal facilities.

The consensus of the participants was that incentives will continue to be part of radioactive waste management facility projects and, if applied, must be carefully considered as they may significantly increase the overall cost of the projects. There was no consensus on the amount or level of incentive or the timeframe for the incentive programme. Vice versa, there were no doubts that any supportive economical scheme must respect the national legislative background. However, involving local citizens through economical tools has not been found to be essential. Depending on the maturity of the society and in accordance with national practice, the experience of some countries indicate that the disposal facility can be implemented without any economical incentives, neither direct nor indirect.

Another topic of considerable discussion at the workshop was public involvement. Positive public involvement results from education on the subjects of radioactive material uses, waste generation, and waste management, and from stakeholder participation in the standards setting and decision making processes during facility development.

The form and depth of education programmes are dependent on which stakeholder group is being addressed. The general public, politicians, regulatory authorities, regional leaders, business owners, host community leaders, professionals, educators, local and regional work force, non-government organizations, bordering country populations can all be stakeholders to a LILW disposal facility. Academic institutions will generally have better acceptance by stakeholders than developer organizations or regulatory authorities, and these institutions already understand and use appropriate educational methods and equipment. Use of mass media can also be helpful since they have established distributions, audiences, equipment, and broadcast systems in place. Regardless of the group or educational methods chosen, there must be specific information on the problem and a range of possible solutions.

In addition to information dissemination and education, public involvement must include opportunities for the public and the local and regional government entities to be a part of the decision making progress for the waste management facility. Facility location, site characterization, design concepts, performance objectives, monitoring methods, routes for delivery, community incentive programmes are all topics for stakeholder input and involvement.

A number of existing nuclear facilities, like nuclear power plants, have elaborated visitor information and training centres at the facility or in the local community. These centres host hundreds and even thousands of visitors annually to inform them about the nuclear industry and the disposal facility in particular. The community typically has access to the centre for local events unrelated to the nuclear industry.

5. Conclusions

The workshop provided a forum where experts from Member States shared their experiences in non-technical aspects of planning, licensing and operating LILW disposal facilities. Participants presented approaches and practices applied in their countries, established new contacts and were able to take advantage of activities and experiences from abroad.

There were 25 interesting presentations made during the workshop and frank, open discussions of the issues identified. The written papers of the presentations discuss many successes in the development and operation of radioactive waste disposal facilities and along with them have been many positive and successful public involvement programmes. Yet with all the successes, there are many challenges ahead to continue operations of the current facilities, upgrade facilities that need improvement, and develop new facilities required for the proper disposition of LILW.

Public involvement plays a key role and the sophisticated and extensive public education systems that exist provide a vital service to gain public acceptance. There is a full range of compensation and benefit programmes used as incentives for hosting a LILW facility. Even if exemptions exist the experience in most countries indicate the direct/indirect incentives as a necessary part of gaining public acceptance. The countries, regions and local communities have their own established processes to make public decisions. Each organization developing

a site must select and implement the methods that are acceptable within their framework of laws and regulations.

Waste management facilities are needed to protect the environment and improve public health for the long term future. One significant challenge is to inform the public on the relative hazards of radioactive waste compared to other hazards in our modern society and to get the acceptance of the appropriate members of the public for these necessary facilities. Over the entire life cycle of these facilities, the projects must be managed without expending a disproportionate share of the collective resources.

The workshop opened new opportunities to many participants for discussion and consultation on common issues associated with the development and operation of LILW disposal facilities. More information and broader perspectives have been gained on the general topic of radioactive waste management around the world, and specific understandings of the socioeconomic and environmental impacts of these facilities were obtained. Considerations should be given by the IAEA to hosting periodic workshops on this topic to promote continued discussion of the successes and sharing of the failures to all Member States.

Present situation of the low level waste repository in Argentina and the necessity for developing a new site

E. Maset, R. Andresik
National Radioactive Waste Management Programme,
National Atomic Energy Commission,
Buenos Aires, Argentina

Abstract

Low and intermediate level wastes generated in Argentina have been managed by the National Atomic Energy Commission (NAEC) from 1971 onward in a site known as Ezeiza Radioactive Waste Management Area (EMA), which is part of the Ezeiza Atomic Center (EAC), located in the Province of Buenos Aires. In view of the design characteristics and the Operating License ruling the EMA final disposal facilities since 1995, only conditioned wastes considered low level wastes requiring isolation periods of up to 50 years were subjected to final disposal since then. The wastes that were disposed of before 1995 are considered historic wastes and the source term must be carefully evaluated. In addition the design of the disposal systems corresponds to the state of the art of the beginning of the 70's decade, and the operation stage of most of these systems achieved thirty years by 2001. These facts combined with meteorological phenomena as more frequent heavy rains that modified the groundwater level, have induced to reassess the impact that such facilities could have on the environment and nearby population. The safety reassessment was initiated in 2001 and at the same time the operation of all disposal systems was suspended. Societal aspects were taken into account too, because since some years ago there is an important public concern in the local community towards this repository. This complex situation was evaluated by the NAEC and it was decided not to continue with the disposal of wastes in the EMA independently from the final results of the safety reassessment of the operation stage. It is necessary to implement a social communication programme to change the negative public perception on radioactive waste management in order to fulfil the objectives of the stewardship programme. It is very important to involve the local community near the EMA in the future decisions to be taken on this site because it will be the antecedent for the acceptance of new sites by other communities. Argentina requires a new location for siting of low level radioactive waste final disposal systems and a repository for intermediate level wastes. It is planned to build both facilities in the same site. It is currently mandatory to have a social and political consensus to obtain the corresponding agreements so it is very important to identify and involve stakeholders from the beginning of the project in order to improve the decision making process.

1. INTRODUCTION

Since its creation in 1950, the National Atomic Energy Commission of Argentina has worked on the development of applications for the peaceful use of nuclear energy. They have included, among others, research and development activities in basic and nuclear technology areas, the operation of important facilities working on the production of radioisotopes for medical and industrial applications and the performance of tasks in connection with the nuclear fuel cycle, mining and uranium processing activities, manufacturing of fuel elements, production of heavy water and the operation of two nuclear power plants. At the appropriate time demonstrative reprocessing programmes were performed.

As a result of such activities and of other activities performed in the nuclear field by other private and public entities, various types of radioactive waste have been and are produced. Since the early sixties the NAEC through the Safety and Radiological Protection Department has implemented a programme of safe management of such wastes and started the radio-

ecological studies associated with release of radionuclides into the environment. These studies yielded the necessary basic experience to develop criteria and models to be used in environmental assessments.

A site located in the Ezeiza Atomic Center was selected to fulfil some of the main activities of the waste management programme.

2. SHORT DESCRIPTION OF THE SITE AND PRESENT SITUATION

Ezeiza Radioactive Waste Management Area (EMA) covers an area of 8 ha used for treatment, conditioning and final disposal of low level solid and liquid wastes. In addition, the Area is used for temporary storage of wastes that, for their characteristics, type of radionuclides and activity concentration cannot be disposed of in the EMA and are waiting for the construction of an appropriate repository. In this area, used sealed sources, as well as spent fuels from the RA 3 Research and Radioisotopes Production Reactor, are also stored.

The main disposal systems are two trenches for disposal of low level solid radioactive wastes, three ionic exchange beds for low level and very short half-life liquid radioactive wastes, and two underground deep silos for structural radioactive wastes and sealed sources.

In view of the design characteristics and the Operating License ruling the EMA final disposal facilities since 1995, only conditioned wastes considered low level wastes requiring isolation periods of up to 50 years were subjected to final disposal since then.

The location of these facilities in the EMA site is shown in Figure 1.

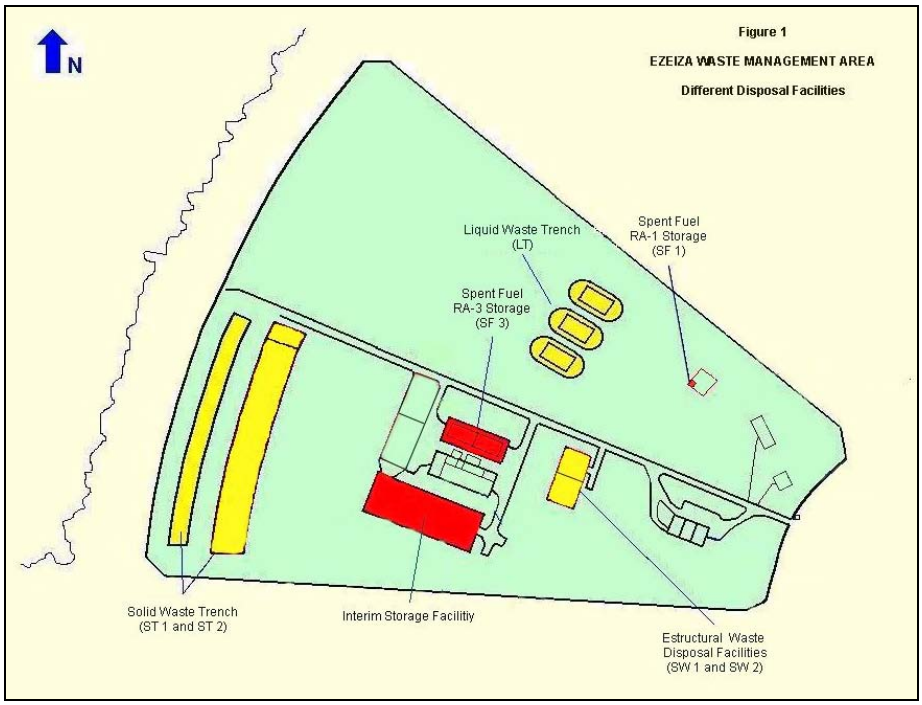

Fig. 1. Ezeiza Radioactive Waste Management Area: different disposal facilities.

The wastes that were disposed of before 1995 are considered historic wastes and the source term must be carefully evaluated. In addition the design of the disposal systems corresponds to the state of the art of the beginning of the 70's decade. Most of these systems had been in operation for thirty years by 2001.

These facts combined with meteorological phenomena as more frequent heavy rains that modified the groundwater level, have induced to reassess the impact that such facilities could have on the environment and nearby population. The safety re-assessment was initiated in 2001 and at the same time the operation of all disposal systems was suspended.

Societal aspects, that will be described in a separate section, were taken into account too because since some years ago there is an important public concern in the local community in relation to this repository. This complex situation was evaluated by the NAEC and it was decided not to continue with the disposal of wastes in the EMA independently from the final results of the safety reassessment.

For these reasons studies for the characterization of the site and surrounding areas were started in order to reassess the area safety, to maintain an appropriate radiological and environmental surveillance and to decide on future actions.

These studies are included in a project formally initiated in January 2003, with the technical assistance of the United States Department of Energy expertise through the Agreement for Scientific and Technical Cooperation between the National Atomic Energy Commission of Argentina (NAEC) and the USDOE.

It is worth mentioning that demographic, social, economic evolution studies on the surroundings of the EMA site are being carried out.

All this information will be used to complete the safety reassessment of the EMA and then it will be presented to the Nuclear Regulatory Authority for evaluation and decision of future actions.

The different alternatives cover a wide range of options, taking into account the present state of the evaluation:

- the definite closure of the disposal facilities and initiation of institutional control;
- upgrading to comply with additional remediation requirements;
- removal of historical buried wastes in cases where they cannot be properly isolated with additional engineering barriers;
- implementation of a long term stewardship programme to maintain the control of the site above a 50 years period, in case the permanence of the alpha contaminated buried wastes or residual contamination in groundwater or soil after clean-up activities may represent a risk for public.

3. SOCIOECONOMIC ISSUES

The EMA site is located in a national government property that was transferred to the NAEC in 1954. It is adjacent to the International Airport of Ezeiza. This zone is known as "Ezeiza Forests".

The urban planning code designated the zone for recreational and low-density residential use, but respecting the specific use made by the NAEC and by the Airport of their respective territories.

Demographic, social, economic evolution studies were initiated this year in order to get enough information to evaluate the impact of the repository till now, and to predict the evolution of the zone and the future influence of the population in the decision making process related with the stewardship programme after closure and to plan the land use according to the restrictions or conditions for the free release of the site, if this situation is possible.

In the future, when deciding on land-use restrictions at the EMA site, it will be necessary to register them in the Property Register of the Province of Buenos Aires. The final destination of this site will have to be discussed and negotiated with all stakeholders, trying to satisfy reasonable demands. It is expected that the public participation programme will make an important contribution to a successful and reasonable conclusion on the land-use.

The present studies are being conducted by a consultant group for qualified professionals in the fields of Sociology, Economy and Statistics. They are analyzing data collected from a zone of 10 km around the EMA site, it means an area of 314 km^2. The data was mainly obtained from the national surveys made in 1991 and 2001 as well as from some specific polls. The first stage of the studies is oriented to have a diagnosis of the actual situation. Some of the most relevant conclusions are related in this document.

Some small lands near the EMA site are being used with agriculture purposes. Others are dedicated to clubs or sport centres for recreational activities. An Air Force Base and a State Prison are also located in the surrounding area.

Thanks to the urban planning code that designated the zone for recreational and low-density residential use, the demographic growth near the EMA was relatively low. Only some new private neighbourhoods were located with very low population density, as well as a few very poor isolated houses on federal properties near rivers, roads, or railways. The period between 1991 and 2001 shows a demographic growth of 30%.

An adequate infrastructure for provision of drinkable water and sewage system is not available in the zone. Only the Ezeiza Atomic Center, where the EMA is located, has a sewage treatment plant. Most of the population consumes water from the Puelche aquifer that is about 40 metres average depth.

Urban population is located some kilometres away from the EMA, and upstream in the Puelche flow direction. Most of this population has neither drinkable water nor sewage services, so they are contributing to the pollution of the underground water.

Downstream of the EMA site the land belongs to the national government (NAEC), and a small river behaves as a natural barrier for potential underground water contamination according to the results of the hydro-geological studies performed this year as part of the environmental characterization project.

There is not enough registered data to link the causes of death and disease in relation with the impact of environmental contaminants in public health. It is planned to perform a specific study in the future. Prospective analysis based on the whole relevant data must still be done as a second stage of the socioeconomic studies.

4. PUBLIC INVOLVEMENT PRACTICES

At the beginning of the 70's decade when the EMA site was developed, it was not necessary to have social consensus for the location of a repository. The radioactive waste management activities were seen as the normal consequence of the nuclear programme and the EMA site was a common part of the Ezeiza Atomic Center that was created in the middle of the 50's decade. Public opinion in general supported nuclear energy and its applications.

Chernobyl nuclear accident (April 1986) triggered a worldwide sort of *radiophobia,* which generated distrust, and which was generalized to all nuclear activity by some non-governmental organizations (NGO's), initiating an international anti-nuclear movement.

Since then, the public close to the EMA site began to be influenced by some environmental groups and NGOs. There is a real public concern about the Atomic Center activities and especially about the low level waste repository environmental impact. Even with significant educational efforts in schools, civilian associations, municipality, participating in debates and round tables, inviting people to visit the Ezeiza Atomic Center, it is not enough to clear the suspicion of general public influenced by antinuclear groups through mass media.

Lately some antinuclear groups convinced most of the community that the water obtained from the Puelche aquifer is not drinkable because of radiological contamination and that the Ezeiza Atomic Center is polluting the aquifer with nitrates.

It is necessary to implement a social communication programme to change the negative public perception on radioactive waste management in order to fulfill the objectives of the stewardship programme. It will be also necessary to establish a Social Forum with representatives of all stakeholders to facilitate a dialogue to clarify the present situation of the EMA site. The decision of closing the disposal systems and the remediation actions that may be applied in the future depends on the conclusions of the safety reassessment. The implementation of this second step will be very sensitive because a very strong controversy is installed in public opinion.

5. CONCLUSIONS

Argentina requires a siting for the repository of intermediate level waste. It plans to install the new disposal system for low level waste in the same site.

It is currently mandatory to have a social and political consensus to obtain the corresponding agreements. As in some other countries, the specific National Law # 25.018, (Regimen for the Radioactive Waste Management Generated in Argentina, issued in 1998) states the necessity of presenting a Strategic Plan for the management of radioactive waste generated in the country. This Strategic Plan must be approved by a Law of the National Parliament and include research and development activities as well as the design of a *Social Communication Programme* to inform the public about the scientific and technological aspects of the radioactive waste management that must be carried out by the National Atomic Energy Commission. It will also report on the direct and indirect benefits or impacts on the communities close to the repository.

The specific National Law states that the location of a new repository must be approved by a Law dictated in the proper province of the location, and that the community must be consulted through the social communication programme. To reach the societal and political approval of a new site for a repository it is necessary to develop a permanent communication link with the

national, provincial and municipal representatives together with other opinion leaders such as NGO's, private companies, schools, professionals, neighbourhood associations etc. It is essential to identify clearly all stakeholders and involve them from the very beginning of the project in order to improve the decision making process.

It is also very important to involve the local community near the EMA site in the future decisions to be taken on this site because it will be the societal example for working towards the acceptance of new sites by other communities. The strategy requires the implementation of a public participation programme that must be carefully developed. This will allow the public to have access to the scope of activities included in the stewardship programme.

The lesson learned is: the social communication activities must be carefully undertaken in order to move forward with the appropriate management of the radioactive wastes generated in our country.

Local partnership for developing an integrated project for the disposal of low level short lived waste — The Belgian experience

E. Hooft, J-P. Boyazis
ONDRAF-NIRAS, Brussels, Belgium

A. Bergmans
Department of Social and Political Sciences of the University of Antwerp,
Belgium

Abstract

After a brief historical reminder of the several phases of the Belgian programme for the disposal of short lived low level waste since the creation of ONDRAF-NIRAS and the very bad results obtained in the 1990's by using a pure technical and very naïve approach, the presentation will explain the main lines of the new methodology developed, as a consequence of the government decision of 16 January 1998 in ONDRAF-NIRAS to improve local acceptance for the disposal project. The way local partnerships were created with four nuclear municipalities under the form of a non-profit organization with a clear mission, the functioning, on a voluntary basis, of the different partnerships during four to six years and the concrete results obtained until now using this very innovative method will be addressed. The current situation of the Belgian programme for the disposal of short lived low level waste will be explained. Eventually, the conclusions of the presentation will include the lessons learned and a set of recommendations for Member States intending to launch similar programmes.

1. BACKGROUND

1.1 Twenty years of short lived low level waste management

The radioactive waste is managed by ONDRAF/NIRAS, the Belgian Agency for radioactive waste and enriched fissile materials. Created in 1980, ONDRAF/NIRAS is entrusted with developing a coherent and safe management policy for all radioactive waste that exists on Belgian territory, including short lived low level waste (category A waste). By the end of 2004, Belgium's stock of conditioned category A waste was 12.624 m³ and ONDRAF/NIRAS estimates the total volume of waste that will be produced until 2060, i.e. the end of the dismantling activities, at 70 500 m³ of category A waste. This estimate is based on the complete dismantling of each of the seven Belgian nuclear reactors after their operating period of forty years. It also implies that the non-nuclear industry and the medical world will continue to use radioactive materials at the present rate.

1.2 Disposal of category a waste: the failure of the pure technical approach

ONDRAF/NIRAS started working on the long term management of short lived low level waste shortly after its creation. Practiced on a regular basis in Belgium until the early eighties, sea disposal of conditioned low level waste had indeed become very uncertain in 1984, when Belgium decided to adhere to the international moratorium of 1983 between the signatory countries of the London Convention on sea pollution.

This decision prompted ONDRAF/NIRAS to launch studies to look for another solution, which would be safe and technically acceptable, for the final disposal of this type of waste on Belgian territory. One of the agency's first actions after sea disposal had been suspended, was the development and implementation of a methodology for waste processing and

conditioning, to ensure the stabilization of short lived low level waste. At the same time, the agency began with the construction of interim storage buildings. All these activities were concentrated on the site of Belgoprocess, the industrial subsidiary of ONDRAF/NIRAS, located in Mol–Dessel. Once the short-term management of the waste had been ensured, ONDRAF/NIRAS was able to concentrate on the development of solutions for the long term management of this waste.

ONDRAF/NIRAS' first study on the final disposal of short lived low level waste considered three options: disposal in old charcoal mines or quarries, shallow-land burial, and deep geological disposal. The corresponding final report, the NIROND 90–01 report, published in 1990, concluded that shallow-land burial was the most promising of the three proposed options in terms of technical feasibility, safety and cost. ONDRAF/NIRAS therefore decided, after approval by its regulatory authority, to focus its efforts on near surface disposal.

The studies carried out between 1990 and 1993 aimed to assess the technical feasibility of building a surface repository on various types of geological formations. The results were recorded in the NIROND 94–04 report, published in 1994. This report concluded the feasibility of disposing of at least 60% of the short lived low level waste produced in Belgium at surface level, while strictly following the recommendations of the various relevant international organizations. It also identified 98 zones on Belgian territory as potentially suitable, according to the bibliographical survey carried out, for hosting a surface repository for short lived low level waste. The multidisciplinary scientific advisory committee set up by ONDRAF/NIRAS' Board of Directors to examine the report issued a globally positive evaluation, but recommended extending the research to fields related to economics and human sciences.

Far from going unnoticed, the 1994 report was rejected unanimously by all the local councils on the list. To its surprise, ONDRAF/NIRAS had caused a general outcry. And yet, had it not been given the responsibility to develop and propose, through an objective and rational approach, a safe solution to the radioactive waste problem? Neither the political authorities nor ONDRAF/NIRAS had realized in due time what the implications were in the field of public consensus when it turned out to be necessary to look for a favourable geology outside the existing nuclear sites. As a result, the publication of the NIROND 94-04 report in April 1994 led to a public deadlock.

1.3 Autopsy of a failure

The working method applied in the past by ONDRAF/NIRAS aimed to select the future disposal site for short lived low level waste on the basis of a scientific approach that had been carefully worked out by its experts. At that time, ONDRAF/NIRAS thought – maybe rather naively – that the actual setting up of a repository would cause no problems once it had been proven that the chosen site was one of the best possible choices from a technical point of view. ONDRAF/NIRAS looked for a solution for the radioactive waste problem in an objective and rational manner. Gradually, the agency realized that important parameters were missing in its mathematical model. Setting up a disposal infrastructure would inevitably have economic, social and ecological consequences. Also, the public's reactions confirmed the validity of the committee's recommendations regarding the necessity to take into account the socioeconomic aspects of setting up a final repository on the national territory. ONDRAF/NIRAS therefore, progressively started to develop an adequate methodology to select, according to objective criteria, the best surface disposal sites among the 98 formerly identified zones. In addition to the expected geological, hydrogeological and radiological aspects, this methodology included environmental and socioeconomic factors. Unfortunately, these last parameters were impossible to model satisfactorily.

In 1995, in an attempt to break the stalemate, the government commissioned a study by ONDRAF/NIRAS on the possible alternatives to surface disposal. The final report, the NIROND 97–04 report, published in 1997, compared surface disposal with deep disposal and prolonged interim storage. It recommended that the government should base its decision on ethical considerations. Indeed, ONDRAF/NIRAS supports the view that the current generations are responsible for ensuring that future generations will not have to actively take care of the management of the radioactive waste they will have inherited.

On the basis of this report the Belgian federal government opted, on January 16, 1998 for a final or potentially final solution for the long term management of short lived low level waste. The government also wanted this solution to be implemented in a progressive, flexible and reversible manner. With this decision, the prolonged interim storage option was abandoned in favour of either surface disposal or deep geological disposal.

At the same time, the government entrusted new missions to ONDRAF/NIRAS, to allow the government to make the necessary technical and economic choice between surface disposal and deep geological disposal. ONDRAF/NIRAS was assigned to develop methods, including management and dialogue structures, necessary to integrate a repository project at local level. Furthermore, ONDRAF/NIRAS had to limit its investigations to the four existing nuclear zones in Belgium, namely Doel, Fleurus, Mol–Dessel, and Tihange, and to the municipalities interested in preliminary field studies.

2. A NEW CONCEPT: THE LOCAL PARTNERSHIP

2.1 Introduction

After the government's decision of January 16 1998, ONDRAF/NIRAS set up a work programme based on a new work methodology. The idea of local partnerships was developed to ensure that every party liable to be directly affected by a collective decision has an opportunity to express its opinions. The local partnership project is an attempt to address the low level waste disposal-siting problem through both technical research and concept development, and interaction with the (local) stakeholders. The partnership concept was developed by researchers from the Department of Social and Political Sciences (PSW) of the university of Antwerp (UIA) and the research group SEED (Socioeconomic Environment Development) of the university of Luxemburg (FUL), on the basis of intense dialogue with ONDRAF/NIRAS. The concept was then discussed with different local stakeholders and, on their recommendation, adapted to meet local needs.

As a result, three local partnerships have been created; the first with the municipality of Dessel (creation of STOLA-Dessel in 1999), the next with the municipality of Mol (creation of MONA in 2000) and the third with the municipalities of Farciennes and Fleurus (creation of PaLoFF in 2003).

The idea behind the partnership concept stems from the presumption that collective decision making in a democratic environment is always a process of negotiation. Different interests, opinions and values are thereby weighted one against the other. This weighting of interests is something that should be done by the stakeholders and not for them. The mere technical aspects of building and safeguarding a low level waste repository are but one element in the negotiations that inevitably precede decision making. Other elements such as the socioeconomic context of the community concerned, the values, interests and emotions of different stakeholders all play a part in the decision making process.

By creating partnerships we intended to bring the decision making process closer to the public, and to lower the threshold for active participation. As many stakeholders, with as many different backgrounds and opinions as possible, should therefore be invited to actively participate in the partnership. Local partners should represent different political, economic, social, cultural and environmental movements or organizations within the community.

2.2 The local partnership as a non-profit organization with a clear mission

The idea was to create a representative body of the different stakeholders involved in this decision making process. On the one hand this is necessary to obtain a complete picture of the viewpoints, interests, needs and values that are at stake in this particular community, regarding this particular issue. The general interest of the community will be the outcome of a process of dialogue and discussion among these different stakeholders. On the other hand, this setup should provide the key to creating an inclusive, transparent, flexible and stepwise decision making process that can be considered to be sustainable and fair by all parties. Even if, in the end, not everybody is completely happy with the outcome of the process, the fact that it was seen as fair, representative and transparent, can still make the outcome an acceptable one for the entire community.

Discussing in depth the pro's and con's of a low level nuclear waste repository in the surroundings, however, is not something that can practically be done through public hearings with several hundred people attending. Therefore, it was decided to work out an adapted, clear organizational structure that fits the goal. The local partnerships were set up as non-profit organizations of volunteers willing to discuss whether and under which circumstances they could possibly accept a repository; and with the mandate to work out an integrated pre-proposal of a repository, integrated in a broader value-added project designed to fit the specific environment supported by the local population.

A local partnership should be considered as a representative democracy on a micro level. Overseeing the whole "operation", a *general assembly*, uniting representatives of all participating organizations, decides on the main course and sets out the beacons for the actual discussions. The general assembly appoints an *executive committee*, in charge of the day-to-day management of the organization. The committee is, among many other things, responsible for the coordination of working group activities, decision making on budget spending and the supervision of the project coordinators.

In several *working groups,* all different aspects of the implantation of a low level waste repository in the community are being discussed. Here all relevant existing research is taken into consideration, the need for additional studies is evaluated and independent experts are invited to participate in the debate. The working groups concentrate on technical aspects, such as siting and design, environment and health, safety assessment as well as on social aspects: local development. The working group on local development analyses socioeconomic issues and projects, formulates prioritization criteria and founding modalities. The more technical working groups evolve from general information through specific information on siting and the disposal concept towards a final disposal concept. The working groups report regularly to the executive committee. They are composed of both representatives of the organizations that founded the partnership, as well as individual citizens who expressed an interest to participate actively in this discussion forum. Since all these people participate on a voluntary basis, at least two full time *project coordinators* need to be employed by the partnership. These project coordinators take care of administrative, communication tasks, and support the working groups both logistically and scientifically.

It was considered important that the partnership should have its seat at the heart of the community concerned. A partnership is not a field office from ONDRAF/NIRAS, but an independent local organization in which ONDRAF/NIRAS participates as the only non-local partner among a multitude of local stakeholders. This location "on site" gives the partnership a "face". A clearly visible presence in the community creates awareness among the citizens not participating and the premises of the partnership can serve as an open platform where citizens can come with their questions, remarks or concerns. On a practical level, it also facilitates the meeting of local participants in the discussions, for the simple reason that they do not have to travel too far. In order to allow the partnership to work independently, each partnership receives an annual budget from ONDRAF/NIRAS.

2.3 Mutual project development

Through dialogue, all interested parties are invited to express their interests, concerns, fears and values, to listen to the views of other parties and to come to terms on what this particular group of citizens, in this particular community, at this particular point in time defines as a common goal. In this way, ONDRAF/NIRAS, in its role of project developer, enters into direct dialogue with the local community, interested in hosting the project. Experts from ONDRAF/NIRAS are given a forum to explain what, in their view, a low level radioactive waste repository should look like and why they consider that to be a safe solution given the characteristics of the site in question. The members of the working groups can then question the ONDRAF/NIRAS experts directly and/or invite other experts, whose opinion they consider relevant. By entering into dialogue with the local community, the concept-designers have an opportunity to better explain their project to the local stakeholders. Questions and reactions from the public, however, may require them to be more creative and to rethink certain aspects of their initial concept for the project.

Maybe the most important and probably the most innovative aspect of the partnership approach, is that the partnership does not only decide (or at least advises to the community council) on the repository concept and where it should (or should not) be implanted. Through the partnership, the local community can decide on what they consider to be the necessary conditions (technically, environmentally, aesthetically, etc.) for such a repository.

Furthermore, within the partnership, an accompanying local project that seeks to bring added value to the community will be developed. Both the repository project and the accompanying local project are developed and discussed in depth within the partnership. All pieces of the puzzle (individual remarks, concerns and ideas -from brilliantly innovative to absurd and not to the point-; expert reports and interventions; interests of stakeholders; etc.) are brought together. When finally, all, or at least a majority of the parties involved come to an agreement on what their puzzle, their integrated project, should look like, this is presented to the municipal council.

Until the partnership has made its final proposal to the municipal council on whether, and under which conditions, a repository facility in the community would be acceptable, the partnership is the only body where decisions with regard to the potential repository are taken. The final outcome of the discussions in the partnership should therefore be either a "thanks, but no thanks" (i.e. based on all the information gathered, the community decides against the repository project for technical, safety or other reasons) or an integrated project, carried by both local stakeholders and ONDRAF/NIRAS.

In the end, the municipal council decides. They have a municipal veto right to reject or accept the proposal. They can also add some specific conditions. They will decide whether to put the municipality forward as a potential host for a low level nuclear waste repository facility or not. Since the final word in this matter lies with the municipal council, it is also essential that council members are fully aware of the implications of their decision. To avoid the risk of conflicting interests between local politicians and the other members of the community, an active involvement of the representatives of the political arena is encouraged.

The federal government at last has to make a choice between surface disposal or deep disposal, and has to decide where the repository should be implemented.

2.4 Situation today

The file of the long term management of low level and medium-level short lived waste (category-A waste) has moved into a crucial phase. On 5 November 2004, the STOLA-Dessel partnership has submitted its report to the municipal council. The MONA local partnership presented its findings to Mol municipal council on January 27, 2005. Both local partnerships considered the disposal of category A waste acceptable, provided all their conditions are met. These conditions relate to various areas. The concerns of the local communities about the possible effects of a repository on health, safety and the environment are reflected in a number of concrete and strict conditions regarding the disposal concept. Furthermore, the local inhabitants expect a disposal project will bring social, cultural and economic added value, which will benefit the future development of the municipality. Finally, they demand continuous participation in monitoring the dossier and explicit appreciation for the contribution made by the municipality for solving this important social problem.

The municipal council of Dessel pronounced itself unanimously on this dossier on the 27th of January. The municipal council of Mol pronounced itself on the 25th of April. It is for the first time in the history of the file of the long term management of this type of waste that local communities declare their willingness to accommodate this waste permanently on their territory, admittedly under well-defined conditions. As the municipalities have pronounced on the conditions that they lay down for a possible repository on their territory, the concrete implementation of the local conditions will be discussed with all stakeholders in the next stage of the decision making process. As before, local participation constitutes a critical factor for success in these discussions. In the community of Dessel a new partnership STORA has already been founded on the 27th of April. This partnership will not only do the follow-up of the STOLA file, but also will discuss the management of all radioactive waste stored on the territory of Dessel.

The final report of PaLoFF, the partnership in Fleurus and Farciennes, is as good as ready and will normally be submitted to both local councils in December 2005. We will know if the municipalities of Fleurus and Farciennes are willing to accept the disposal of low level and medium-level short lived waste and under what conditions.

Provided the current participation process is maintained and the discussions are extended to all stakeholders, ONDRAF/NIRAS is of the opinion that it should be possible to arrive at a sufficiently clear situation in 2006 or 2007, i.e. a situation in which the government can make a decision. This decision will mark the transition to a new stage in which the licence application files that are necessary to start the construction of the repository will actually be prepared. Numerous licenses and a safety report are required before construction of the repository can start. A repository can be operational in 2015-2020 at the earliest. The operational stage, i.e. filling the repository, will take about thirty years and will be followed

by the final covering and closure of the repository, and a monitoring phase of a few hundred years. Only when all parties involved are in formal agreement with the municipality's conditions does the conditional candidature become definitive.

3. RECOMMENDATIONS

Currently it is too early to evaluate the overall process, as final decisions have not been made. However, one of the major lessons we learned so far is that only through close interaction we can fully understand what the local stakeholder needs are. Reversely, in this way they can understand our needs. Mutual learning and mutual understanding is what it is all about. Respect, transparency, openness, and the ability to listen to each other are key elements. The partnership approach is an iterative process, the continuity of what was started, is vital. ONDRAF/NIRAS is committed to continue this approach.

The present status of public acceptance of radioactive waste repositories in Brazil

P.M. Fleming, R.P. Mourão
Center of Nuclear Technology Development (CDTN/CNEN),
Belo Horizonte, Brazil

Abstract

A synthesis of the Brazilian experience in public acceptance of the site for the construction of the permanent radioactive waste repository (Abadia de Goiás), emphasizing the positive and negative aspects of the adopted strategies and the current status of the qualification in stimulation techniques to the public acceptance of repositories, one of the tasks of the project BRA/04/055 (Assessing a Site for the Final Disposal of Low- and Medium-Level Radioactive Waste), are discussed and presented.

1. INTRODUCTION

The Brazilian experience about public acceptance of repositories occurred in the decade of 1980, with the accident of Goiânia. The accident of Goiânia was published thoroughly in all communication media and it showed the lack of preparedness of the population, its lack of information and ignorance of the characteristics and destiny of the radioactive wastes generated by the accident. The major repercussion of the Goiânia accident was to bring to the attention of Brazilian society the negative aspects of radioactivity [1].

The accident of Goiânia was chronologically characterized into three phases. The first phase, the phase of fear, started with the identification of the accident and ended with the total cleanup of the city, covering the period of three months. The decontamination procedures started in this phase and the waste generated, consisting of 3500 m^3 of materials weighing some 6000 tons, was temporarily stored next to Abadia de Goiás city, a town located at a distance of 23 km from Goiânia city [2].

The second phase, the phase of doubt or suspicion, covering the period of January 1988 to March 1991, was marked by the lack of decision of what to do with the waste stored in Abadia, and the consequent aggravation of the atmosphere of fear which hung over the city and the populations of the surrounding towns [2].

The acceptance phase, covering the period of March 1991 to July 1997, the period between the decision to build the repository and its inauguration, was characterized by the start of an intense process of exchange of information and consultation, involving CNEN and the population, in order to encourage the acceptance of the site and the construction of the final repository [2].

The strategy built public acceptance into the process and resolved to find a definitive solution for the storage of the radioactive waste generated by the accident. It addressed, in a absolutely transparent manner, the steps to be taken to answer the question of the Cs^{137} wastes, to all society sectors, including the mass media, the groups which form public opinion, to organized social groups, educational institutions, neighbourhood communities, associations, and so forth.

2. THE POSITIVE AND NEGATIVE REFERENCES

Some points of reference in the adopted strategy were established, looking for its easy understanding by the population and contributing positively in the public acceptance process. The relevant points were:

- The risk of the transport of the wastes stored in the temporary repository to another site.
- The prestige of the state Governor and the manager of CNEN's District in Goiânia who took the decision of selecting the definitive site.
- The risk of keeping the wastes stored in the open air, liable to future leakage or any kind of accident, including sabotage.
- The project was entirely national, and was considered important to bolster Brazilian competence, nationalism and self-esteem.
- The building process would be initiated only after a complete evaluation and analysis of the studies and surveys necessary for the licensing procedures, both in the nuclear and environmental areas. This point showed that the commitment to adhere to the established rules was an important point in the opinion formation on the planned repository.
- The environmental impact study had to be approved at the national, state and municipal levels and, in order to be implemented, the project had to undergo a public hearing, pointing a high degree of interaction between the society and its institutions.
- All the documents (reports, studies, analyses, surveys) generated during the development of the project and the construction of the permanent repository would be made available to the public. Transparency was a key argument in the articulation of the acceptance of the implantation of the project.

The negative point registered was the wrong attitude adopted by CNEN during the doubt or suspicion period (from 1988 to 1991), when information was not release to the media and requests for data were denied in the name of "radiological safety and protection".

The public acceptance of repositories should not be understood as an isolated subject, but as a part of a great process involving the acceptance of nuclear energy, its uses and applications. The Brazilian nuclear sector is undoubtedly shy about popularization and explanation of pertinent matters related to its performance. Some initiatives for obtaining the objective information about the public's perception of the radiation risks were accomplished during the Goiânia's accident period.

Several evaluation methodologies were adopted as courses, lectures, questionnaires, and the results showed that individual members of the public perceive the radiation risks and develop behaviours according to a constructive outline. Projects as "CNEN goes to the school", the Centre of Information of Furnas, near one of the nuclear power plants in Angra dos Reis city, magazine such as the "Brazil Nuclear", the bulletin "Fonte Nuclear" and the programme of the Brazilian Association of Nuclear Energy have unquestionable validity, but the reach is reduced in the sense of joining efforts for the information of the Brazilian society regarding the undeniable social reach of the peaceful applications of the nuclear energy. Few papers in the planning area, environment, socioeconomic and political-strategic aspects were presented in national Congresses and Symposiums, and, even so, they would have limited distribution to the attendees at the event or to technicians of the nuclear sector. The media (radio, TV, newspapers, etc) has also little interest in publishing these events. The Brazilian Congress of Energy receives an amount of papers from the gas, hydroelectric, oil and coal sectors, where

each one defends with energy its interests, unlike the nuclear sector. On the other hand, some erroneous and technically questionable information presented in textbooks, used mainly in schools, collaborates for molding the opinion of thousands of people.

The public does not know technical terms, being quite influenced by the media, from where it gets information of interest. The public orders the risks, relating them to accidents, according to subjective criteria and models them as unknown, new and not observed at short period, establishing destruction, environmental catastrophe and disease images [3]. There are strong indications that the public's irrational and absolute conviction that ionizing radiation causes only harm constitutes the biggest obstacle to be overcome by the defenders of the peaceful applications of nuclear energy.

Always when nuclear energy is to be a discussion object by the Brazilian society, the accidents of Three-Mile-Island, Chernobyl, Goiânia and the stops in Angra 1 Power Plant will come to the people's mind, and they will be against the installation of new plants and the use of the nuclear energy. The rejection of nuclear energy has been strongly associated with these events until the present days.

3. SUGGESTIONS FOR IMPROVEMENT

The acceptance of the risk of nuclear energy use for peaceful applications depends, fundamentally, on the degree of trust of the population in the institutions and in the pertinent legislation to the administration of the risk. Some points for the improvement of the public acceptance of the nuclear energy can be outstanding, and several authors have suggested improvements [4] [5] [6]. It is more than justifiable and necessary that the nuclear sector explains to the Brazilian population some points such as:

- Differences between nuclear power reactors and nuclear reactors that produces radioisotopes;
- Benefits provided by radioisotopes in the industrial and medical areas;
- Socio-environmental benefits offered by nuclear power plants;
- Differences between the types of radioactive wastes and the methods required for its management.

Other factors that can also contribute to the improvement of the public acceptance include the explanation and the comparison of risks associated to the several commercial energy options. The results of comparisons of risks of the several sources of energy indicate that nuclear and renewable are the safest sources, while coal, oil and gas are associated to larger risks [6].

A diversified programme of communication on nuclear subjects could be another factor of public acceptance improvement, supplying information on several levels and considering the heterogeneity of the population and approaching the following topics:

- Discussion of the risks associated to the use of nuclear energy in a fair way, without the intention of hiding reality;
- Expressing reality by the media and avoiding the labelling of nuclear power plants, radioactive sources and waste repositories simply as dangerous, without considering the risks associated with them;
- Explanation of the benefits of the use of the nuclear energy, showing that these are larger than the actual harms;

- Discussion of the options for energy supply in Brazil and their effects to man and the environment;
- Supplying audiovisual material for schools.

4. THE IAEA TC PROJECT BRA 4/055

At present, CNEN has the responsibility for the safe management of radioactive wastes in Brazil. This has been achieved through the issuing of regulations, inspections, collecting and storage of the Low and Intermediate Level Waste (LILW), not including wastes originating from the fuel cycle.

It should be emphasized that a Law 10308, recently approved by the President of Brazil, addresses site selection, construction and licensing, operation and enforcement of radioactive waste interim storage and final disposal in Brazil. Within this Law, some points are of special interest, such as Article 37 that demands that "CNEN must begin the studies for site selection, project construction and licensing, to start operation of a final disposal facility within national territory as soon as technically possible.

The CNEN interim storage facilities in Brazil have approximately 500 m^3 of LILW that stems from a large range of nuclear applications, not including the volume of waste from the fuel cycle. The growth rate is estimated to be 50% for each ten years, and consequently, the capacity available for this interim storage system will diminish quickly.

Also, about 8000 sealed sources, formerly used in industrial gauge instruments, in research or in radiotherapy, have been collected as radioactive waste. If Ra^{226} and Am^{241} sources attached to lightning rods and smoke detectors collected as waste are accounted for as sealed sources, the number of stored sources scales up to about 60 000. If all sealed sources currently held by licensees are eventually collected, the total will amount to nearly 300 000 sources.

The Centre of Nuclear Technology Development (CDTN) is now developing the TC IAEA Project BRA 4/055 concerning the assessment of a site for the final disposal of low and intermediate level radioactive wastes. The main objective of the project is the contribution to the final decision regarding the localization of a repository for disposal of low and intermediate level institutional radioactive waste and spent sealed sources.

The specific objectives are the establishment of an interaction process and network of participating institutions, the establishment of a methodical process for safety assessment and the completion of the technical selection of candidate sites for disposition of institutional waste and used sealed sources, according to the optimized process. Specific tasks are, basically, the establishment of a multi-institutional network for the project; the quality assurance programme; the establishment of the inventory for institutional waste and sealed sources; the development of disposal concepts and repository design; the establishment of criteria for site selection and characterization; the safety assessment and the preparation of report.

Once the main task of presenting candidate sites for the repository is complete, the tasks associated with the study of incentives for public acceptance of repositories was considered, with the objective of submitting to the CNEN directorate the more appropriate alternatives of incentives for public acceptance of repositories for the project.

5. CONCLUSIONS

Although it is understandable that the public acceptance of repositories is part of the process involving nuclear energy, the few initiatives taken by the Brazilian organisms are still insufficient and have had little effect on the population.

The most recent initiatives, mainly those transmitted by the television media, point out that the information on the nuclear energy provided to the public, in many cases, contain extremely technical information that is hard to understand by the common citizen that it is not familiar with nuclear terminology. This will be the largest barrier to be overcome.

The terms, risk, prestige, fear, self-esteem, nationalism, competence, transparency and participation, as pointed out by Tranjan and Rabello [2], represent important concepts with clear values and they are present in everyday life. These terms are part of the psyche of all individuals and represent the necessary values to address the process of public acceptance for nuclear energy and repositories.

All the initiatives and suggestions given by the Brazilian specialists should be considered in the current project and the experiences of other countries should be incorporated to the list of information for the best comprehension of the methods. It would be desirable if some of the suggestions could be applied independently of the development of the current project, and their results considered in the improvement of public acceptance in the future.

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Public information & ensuring transparency in the decision making process of SE RAW

K. Borissova
State Enterprise Radioactive Waste (SE RAW),
Sofia, Bulgaria

Abstract

State Enterprise Radioactive waste (SE RAW) was created on 1 January 2004 by the Act on the Safe Use of Nuclear Energy and is in charge with the responsibilities on management of RAW outside the generators' sites. The object of activity of SE RAW includes management of LILW from NPP and nuclear applications, including qualification, acceptance, manipulation, pre-treatment, treatment, conditioning and storage. Major PR priorities for SE RAW are namely:

- To inform the public at local and national level;
- To create public and media transparency;
- To minimize the negativism at local level;
- To establish confidence in the population living nearby a Repository.

SE RAW works on different projects under the Programme for Information and cooperation at local level. The current completed activities have included opening two information centres, two Open Door days, two internships and wide public involvement for the short period of 10 months. SE RAW seeks for further cooperation at local level through transparency in the decision making process.

1. INTRODUCTION

The State Enterprise "Radioactive Waste" (SE RAW) is the Bulgarian state-owned company responsible for the radioactive waste management in the country. The company was established on 1 January 2004, with the Act on the Safe Use of Nuclear Energy and has the status of a non-profit enterprise under the Commercial Code. The company is known by the Bulgarian acronym **DP RAO**.

According to the Bulgarian legislation, the main activities of SE RAW include planning, implementation and reporting of management of RAW, outside the premises of waste generation; construction, operation and decommissioning/closure of RAW management facilities; and establishment of waste acceptance criteria and acceptance of RAW for long term management.

The activities of SE RAW are subject to regulatory control according to the Act on the Safe Use of Nuclear Energy. The radioactive wastes become state property at their transfer to SE RAW, and SE RAW is responsible for the safety and security of the accepted waste and of the facilities where these waste are managed. SE RAW activities are financed by the Radioactive Waste Fund which is under the Minister of Economy and Energy.

SE RAW's management bodies are the Minister of Economy and Energy, the Management Board and the Executive Director. The Minister designates the members of the Board, including the Executive Director. The Executive Director represents the State Enterprise before courts of law, state bodies and third parties in Bulgaria and abroad.

SE RAW consists of a Head Office and three Specialized Divisions. The Head office has two departments. The specialized activities carried out by RAW Management Department are

planning, coordination and control of RAW management, facilities' life cycle management, and organization of the HLW management activities. The administrative activities are carried out by the Legal, Administrative & Financial Department and include the responsibility for legal, administrative, technical and financial issues.

The Specialized Divisions of SE RAW are the Specialized Division RAW Kozloduy, Specialized Division Novi Han Repository and Specialized Division of National Repository. Specialized Division *RAW Kozloduy (SD RAW Kozloduy)* is responsible for operation of facilities for processing and storage of LILW from the Kozloduy Nuclear Power Plant (NPP). The facilities are located on the NPP site. *SD National Repository* is responsible for construction and operation of a facility for disposal of LILW from nuclear applications and nuclear energy production. It will be established after site approval. *SD Novi Han Repository* is responsible for operation of the facilities for transportation, processing, storage and disposal of LILW from nuclear applications. At present, operation of the facilities and transportation of the waste is performed by the Institute for Nuclear Research and Nuclear Energy at the Bulgarian Academy of Science.

SE RAW is in process of organizing the *SD Novi Han Repository* as a specialized division to the State Enterprise, including state property allocations and licensing for operation of the facilities for RAW management at the Novi Han Repository. SE RAW is also in a process of site selection of the national repository for LILW.

The State Enterprise understands that these activities cannot be carried out without public acceptance and transparency in the decision making process. This creates the need for a proper and working public relations programme which is to be proceeded stepwise and at each level to leave as many options open as possible.

2. PUBLIC RELATION PROGRAMME

The State Enterprise works towards providing information on safety of installations, technological processes and optimization of technologies in order to minimize the risk from the nuclear applications in Bulgaria. This information is distributed to the public after a careful process of identifying the potential target groups and research on their particular needs for information. The experts at SE RAW understand the importance of presenting clear but detailed information in a proper manner to prevent further misunderstandings and misuse of the information.

The public relations programme of the State Enterprise has produced materials with the main purpose of clarifying questions on legal, technological, and safety issues. The programme has also provided information on the following topics: modern technologies used in countries with experience in RAW management; various ways for increasing the safety of the existing repository in Bulgaria and ways for its modernization in order to meet the international requirements; different ways for public involvement; and the importance of public involvement in general. The main idea is to increase the level of public information and simultaneously to lower the level of fear.

SE RAW's target groups requested availability of information on the process of site selection and characteristics of potential sites, various construction issues and explanation of the process of decommissioning a nuclear facility for RAW management. This open communication with the interested public tends to increase the transparency in the decision making process and to establish confidence in the population living near by an existing repository. Presenting the information on time and including all needed details is another way

to minimize the negativism at the local level. To answer the public's requests for 24-hour information availability, the State Enterprise launched its web page at www.dprao.bg and posted all needed information. This web page gives the population the ability to request detailed information and to receive an almost immediate answer. SE RAW understands that not all of the interested population has access to internet and in response has created two information centres at two different points close to Novi Han Repository. Besides the paper informational materials, the interested public can find more detailed information in a database available at the information centres.

These two activities are the first projects under the newly implemented Programme for Information and Cooperation at Local Level. This programme has provided positive results, because the local people have shown greater interest in the activities of SE RAW and the Repository at Novi Han. In response to their interest, the State Enterprise plans to create two more information centres for the local people in the beginning of 2006. The Programme for Information and Cooperation at Local Level also gives opportunities for visits of the Repository at Novi Han in order to present the processes used for RAW management. The Open Doors on February 2005 was visited by interested local people, representatives of the local authorities, NGOs and the national media. This wide media coverage allowed SE RAW to distribute more information, to explain basic priorities and goals, and to receive popularity at a national level.

SE RAW included two internships for students from the Mine and Geological University of Sofia in the Programme for Information and Cooperation at Local Level and experienced the professional results of recently graduated intelligent and devoted people.

Another Open Door Day was held in October 2005 for the school children of the village of Gabra (close to Novi Han Repository). This event brought together various experts and school children, both willing to learn and experience new things. The school children left the Repository admitting that they had learned and seen many new and interesting things.

The activities above are only few of the finished projects under the Programme for Information and Cooperation at Local Level. This Programme has proven to be a positive working model because the number of requests for information from the local public is increasing. SE RAW intends to continue the Programme and to include new projects for further public involvement.

3. STAKEHOLDER INVOLVEMENT

SE RAW is breaking ground for the establishment and development of stakeholder groups. This important practice is not yet familiar in Bulgaria, but the Bulgarian experts understand the importance of involving stakeholders in the decision making process.

The stakeholders should be involved personally and have the chance to influence and take the responsibility in the decision making process. The stakeholder groups will include the implementer, politicians, environmentalist, independent experts, regulator and the public as a whole.

SE RAW has to listen to the stakeholders and particularly to the public, because their concerns are important. By addressing stakeholder concerns, the issues of long term safety, operational safety, transport, environmental impacts, control and monitoring, irretrievability and reversibility, economics and in some countries aesthetics.

4. CONCLUSIONS

The State Enterprise aims for better and open communication with the local public, stakeholders and media in order to provide transparent decision making process including the public and their needs.

Canadian experience in seeking community support for a deep geologic repository

K. Orr
Ontario Power Generation,
Tiverton, Ontario, Canada

Abstract

This paper relates Ontario Power Generation's (OPG) recent experience in seeking community support to develop of a deep geologic repository (DGR) for low and intermediate level waste at the Western Waste Management Facility (WWMF) located within the Municipality of Kincardine, Ontario. The paper reviews the public communication programme followed by OPG - in particular, the various communication tactics employed by OPG - in leading up to the signing of the Hosting Agreement and the positive Community Poll on the DGR proposal. Based on the conclusion of an Independent Assessment Study that none of the options considered for long term management of low and intermediate level waste would have an adverse effect, Kincardine endorsed the DGR as the preferred course of study, and proceeded with a poll to determine the level of community support. With the poll results indicating community support, OPG is able to move the project to the next step. Environmental assessment work on the DGR project is now starting.

1. BACKGROUND ON THE WESTERN WASTE MANAGEMENT FACILITY AND HOST COMMUNITY OF KINCARDINE

Ontario Power Generation's WWMF is located on the Bruce nuclear site, and operates as an interim storage facility for radioactive waste. Low and intermediate level waste is transported by road from the Bruce, Pickering and the Darlington nuclear generating stations to the WWMF. Low level waste is processed for volume reduction through incineration or compaction, and is stored in low level storage buildings. Intermediate level waste is not processed, but is transported directly for storage to in-ground containers and trenches. The WWMF also includes the interim storage of used fuel from Bruce Power. The used fuel is stored in dry storage containers housed in dry storage building(s).

The Municipality of Kincardine has been host to nuclear facilities for decades, starting in the 1960s with Douglas Point. The 932-hectare Bruce site is located on the shore of Lake Huron and, in addition to hosting the WWMF, also includes the Bruce nuclear generating stations "A" and "B", owned by Ontario Power Generation and since 2001, leased to Bruce Power in a long term operational arrangement. The Bruce site employs over 3500 people.

Kincardine has reaped benefits from the nuclear industry, including stable employment, and the ensuing highly skilled and professional jobs. Alternatively, the industry has been the benefactor of positive relationships and support from the local citizenry and governments. The community is knowledgeable and well-informed when it comes to the nuclear industry. They also believe that they have an obligation to future generations to establish a long term solution for the management of low and intermediate level waste. This mindset contributed to the Kincardine Council's decision to consider entering into discussions on a long term storage facility for radioactive waste.

2. PRELIMINARY DISCUSSIONS ON LONG TERM MANAGEMENT OF LOW AND INTERMEDIATE LEVEL WASTE

In 2002, the Municipality of Kincardine approached OPG about the possibility of entering into preliminary discussions on the long term management of low and intermediate level radioactive waste management at the WWMF. Factors contributing to these discussions at the time included:

- Long term management of radioactive waste was topical, due to the 2002 passing of the Nuclear Fuels Waste Act;
- The Bruce Power lease agreement in 2001 increased the profile of nuclear waste management activities at the Bruce site;
- Kincardine was interested in economic development/diversification opportunities;
- Community impact payments had recently terminated, prompting Kincardine to investigate other community payment opportunities;
- Kincardine is knowledgeable and comfortable with nuclear power.

These discussions led to the signing of a Memorandum of Understanding (MOU) between OPG and the Municipality of Kincardine in April 2002. The purpose of the MOU was for OPG, in consultation with the Municipality of Kincardine, to develop a plan for the long term management of low and intermediate level waste at the WWMF. The work plan under the agreement included:

- Review of the safety and technical feasibility of various long term management options for low and intermediate level waste at the WWMF,
- Socioeconomic impact assessment in Kincardine of the existing operation of the WWMF and of the potential long term options, and
- Review of European and American models for long term management of low and intermediate level wastes, including site visits to look at issues such as technical infrastructure and community compensation.

A Nuclear Waste Steering Committee, comprising Kincardine Council members and representatives of OPG, directed and monitored the progress of the work plan. This study, referred to as the Independent Assessment Study (IAS), had been contracted to an expert consultant, Golder Associates. The results were published in the Independent Assessment Study Report in February 2004. The study concluded that each of the considered options (i.e. enhanced processing and long term storage, covered above-ground concrete vault disposal facility, and deep geologic repository) are technically feasible, safe, and could be constructed and operated with no significant adverse effect on the environment for low level waste and some of the options could handle a portion of the intermediate level waste. Other conclusions were that there would be no significant adverse social effects, and there would be spin-off economic benefits to the community.

3. INDEPENDENT ASSESSMENT STUDY (IAS) COMMUNICATIONS

As a part of the IAS, community information and consultation programmes were also undertaken. The objectives of the programmes were to inform the local community about the study of the options and for stakeholders to provide their input and discuss any concerns that they had. Communication tactics at this stage included: open houses, project newsletter and fact sheets, WWMF “Neighbours” newsletter articles, employee briefings, stakeholder

briefings, community committee presentations, First Nation briefings and briefings to community groups.

4. COUNCIL AGREES TO SUPPORT A DEEP GEOLOGIC REPOSITORY (DGR)

Following a review of the Independent Assessment Study Report, municipal support was indicated at the 21 April 2004 council meeting where the following resolution was carried:

> *"that Council endorse the opinion of the Nuclear Waste Steering Committee and select the "Deep Rock Vault" option as the preferred course of study in regards to the management of low and intermediate level radioactive waste".*

The Council's decision to support the DGR as its preferred option was based on the following key points:

- It provided the highest level of safety of any option,
- There would be a rigorous environmental assessment and the Canadian Nuclear Safety Commission regulatory process would provide opportunities for public input before construction is approved,
- The DGR would permanently isolate the low and intermediate level waste stream, much of which is already stored on site,
- It provides significant economic benefit to the residents of the municipality, and
- No high-level waste or used nuclear fuel would be allowed in the facility.

Kincardine's next step was to seek OPG approval and negotiate an agreement.

5. DESCRIPTION OF THE PROPOSED REPOSITORY

An illustration of the proposed repository concept is shown in Figure 1. It is composed of a series of vaults located at a depth of between 500 and 700 m in Ordovician age (~ 450M years old) limestone overlain by a 200 m "cap" of Ordovician shale. It is expected that the upcoming site geotechnical characterization investigations will show that both the limestone and shale formations are homogeneous in nature, have wide lateral extent and are of very low permeability such that contaminant transport would be controlled by diffusion (i.e., extremely slow).

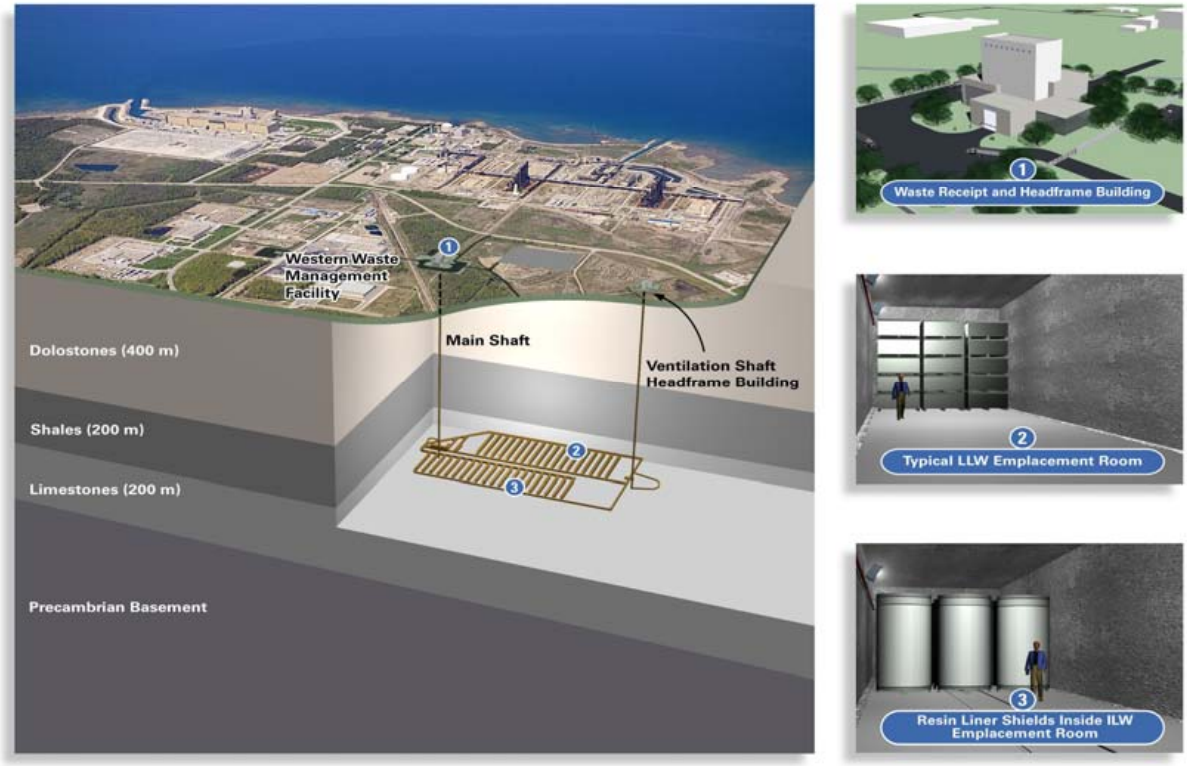

Fig. 1. Proposed Deep Geologic Repository for L&ILW on Bruce Nuclear Site.

5. THE HOSTING AGREEMENT

The Hosting Agreement was negotiated by a steering committee with representatives of OPG and Kincardine during the period from May to October 2004. The agreement is based on the implementation of the DGR at the WWMF.

The agreement included provisions for a community consultation exercise, allowing local residents an opportunity to express their endorsement/rejection/neutrality regarding Council's decision to support the DGR. A positive mandate from the community was required in order for the agreement to take effect.

The agreement doesn't affect OPG's right to pursue its existing waste management activities at the WWMF.

The Agreement includes payments to Kincardine and four adjacent municipalities, a property value protection plan, and provision of new jobs in the community among its features. The agreement does not include used nuclear fuel (high level waste).

6. COMMUNICATIONS LEADING UP TO THE COMMUNITY POLL

In October 2004, immediately following the signing of the Hosting Agreement, a storefront Community Consultation Centre was opened in the downtown core of the Municipality. The storefront, staffed by the Municipal Council and OPG representatives, provided an opportunity for the local residents to obtain information about the DGR proposal, and to provide feedback to the Municipality and to OPG and to discuss any issues and questions that they had.

Weekly newspaper ads began at this time. They featured specialists such as geoscientists, a public health official, EA consultant, and Kincardine Mayor - all in support of the proposal. Presentations to Kincardine groups such as the Chamber of Commerce, Service Clubs, Bruce Hydro Retirees, Senior's Club, Women's Institutes and Sororities were scheduled as well. Briefings continued to be provided to key stakeholders and Councils of the surrounding municipalities. Briefings were also provided to groups that at times have been critical of our WWMF operations, such as local Beach Associations.

A DGR project newsletter was mailed to residents in November, and in December the WWMF Neighbours newsletter carried a feature story on the DGR. In late December and early January, DGR booklets were mailed to all Kincardine residents. The mailing was timed to coincide with the start of the community polling process.

7. COMMUNITY POLL

Following the three-month consultation period, a telephone poll of permanent and seasonal residents was conducted by Kincardine to gauge community acceptance of the proposed facility. A total of 72% of eligible residents participated in the survey. Of those, 60% voted YES, 22% voted NO, 13% were NEUTRAL and 5% voted DON'T KNOW or refused to participate.

8. COMMUNICATIONS FOLLOWING THE COMMUNITY POLL

Following the positive community poll in Kincardine, OPG shifted its communication focus to surrounding municipalities. OPG had committed to these communities to hold similar Storefront Information sessions as had been held in Kincardine. OPG conducted a series of three day mini-storefront information sessions in each of the municipalities of Saugeen Shores, Brockton, Huron-Kinloss and Arran-Elderslie during April and May 2005. At these sessions, response to the DGR proposal was very positive. There was little concern expressed by the small number of people in attendance and the majority were genuinely interested in learning more about the DGR proposal. They tended to stay for a minimum of 30 to 45 minutes and appeared to leave the information session feeling very comfortable with OPG's plans. Following each of the mini-storefront sessions DGR booklets were mailed to all residents of the municipality.

DGR Open Houses were also held in May in the two local First Nations communities of Saugeen and Nawash. Hosting of the two sessions had been a commitment agreed to by OPG and First Nations in the ongoing Roundtable Discussions between the two parties. There was not a large turnout at the Open Houses but many questions were raised. OPG was encouraged to continue to hold these information meetings for the Bands.

In the summer, in an effort to reach seasonal residents, OPG hosted a series of three Open Houses in the shoreline cottage communities south and north of the Bruce site. Again, a small number of people attended the sessions. A handful of shoreline residents expressed concern however, the majority of attendees indicated support for the DGR proposal.

8. CONTRIBUTORS TO SUCCESS IN COMMUNICATIONS

Some of the specific practices and activities that contributed to the success of the communications and the positive community poll results are listed below:

- Information used for public communication was provided to staff working at the Bruce nuclear site allowing them to be ambassadors for the proposed project with their neighbours
- Bruce hydro retirees were given information at an early stage and acted as ambassadors of the proposal
- Special attention was given to providing briefings and information to community leaders
- Special attention was given to briefing the Medical Officer of Health and Ministry of Environment
- Special attention was given to briefing Union officials
- Where possible, communication efforts were a joint effort by Kincardine and OPG
- The Community Consultation Centre (a storefront office on main street Kincardine) provided an opportunity for the public to obtain information at their convenience
- The importance of surrounding communities was recognized in communication efforts.
- DGR booklets were mailed to all residents
- Local media were briefed early in the process and at critical junctures
- The Hosting Agreement Media Announcement demonstrated/showcased support from surrounding municipalities and MP and MPP
- Newspaper advertisements quoting respected specialists were used effectively
- Specific community questions and concerns were addressed promptly and directly
- Communications staff had long histories of living in the local area
- Visits made with Council members to international repositories provided an opportunity for them to meet with officials of existing host communities
- Public concerns about the polling process were addressed

9. DGR COMMUNICATIONS… NEXT STEPS

As OPG moves into the regulatory phase of the project and begins the Environmental Assessment, plans to significantly gear up communications are underway. This planned increase will be on top of an already intense existing communication programme at the WWMF. Additional activities planned for 2006 include:

- DGR Mobile Exhibit
- DGR video
- Attendance at more Community Events
- DGR Speakers Bureau, to significantly increase speaking engagements
- Increase local OPG sponsorships.

Further information on OPG's Deep Geologic Repository Project can be found at www.opg.com/dgr.

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Selected activities related to public acceptance of operating repositories in the Czech Republic

J. Faltejsek, L. Steinerová
RAWRA, Czech Republic

Abstract

RAWRA operates three repositories in different locations. Each of these locations has its own specific needs. Incentives are provided based on the governmental decision: each municipality on whose territory a repository is operating can apply for grant aid up to a limit set by the Government Resolution. To promote public interest a number of information facilities have been built in the affected municipalities, including those considered as a hosts for a geological repository. The visitor centres were also opened at RAWRA headquarters (1999) in Prague and directly at the Richard repository in 2001. The most of customers are recruited from schools, but also individual visitors are seeking information about the radioactive waste management issues. Information function is accompanied by other activities such as specialised training for local fire brigades in emergency activities regarding transportation of radioactive materials.

1. INTRODUCTION

The Radioactive Waste Repository Authority (RAWRA) was established on 1 June 1997 as a result of the Decision of the Minister of Industry and Trade. According to the Czech Atomic Act, the RAWRA is the only organization that can dispose radioactive waste in the Czech Republic.

All radioactive waste repositories in the Czech Republic which are in operation, i.e. the repositories Dukovany, Richard near Litoměřice and Bratrstvi in Jachymov, were put into state ownership on 1 January 2000. The repositories, which had been operated by private operators, have been transferred under the management of the state organization (RAWRA). RAWRA is now responsible for the safe operation of all repositories. These repositories were commissioned in 1965 (Richard in Litoměřice), 1975 (Bratrství in Jáchymov) and 1995 (Dukovany).

These repositories have different disposal concepts, accept different type of wastes and have received different requests from the local public. People in all three localities asked for financial support. RAWRA as the state organization has strictly limited capabilities to provide incentives. RAWRA can provide some grant aid to the municipalities in the territories where the repositories are located. However, the grant value is set by a government resolution.

Jáchymov is the municipality near the repository **Bratrství** which has disposed of waste containing naturally occurring radioactive materials. This area has had a long tradition of exploiting ionizing radiation. Many uranium mines were located in this area (also the material from which M. Curie separated radium originated from this location). Many houses are contaminated by radon emanation. Radon is used as main treatment in spa activities.

On the contrary, repository **Richard** has mainly accepted institutional wastes for disposal and is situated near to the town of Litoměřice. Repository Richard has been in operation for more than 40 years. In 2001RAWRA opened an information centre at the facility. Students are the major visitors to the Centre. A part of the exhibition is dedicated to the history of the site. During World War II the Germans converted part of the then limestone mine into an underground factory. Confidence building, primarily based on reporting to the municipality, is accompanied by other activities such as special training for local fire brigades in case of emergency concerning vehicles transporting radioactive materials.

The newest repository **Dukovany** is used mainly for disposal of operational wastes from Czech Nuclear Power Plants (NPPs) at Dukovany and Temelín. The location of the repository within the guarded area of NPP Dukovany makes it difficult to distinguish RAWRA as being an independent entity from the NPP´s operator. The repository (together with approx. half of the NPP area) is situated on the territory of the Rouchovany municipality. While the NPP

supports all municipalities in its surroundings, RAWRA is only entitled to support the Rouchovany one. A small information centre regarding radioactive waste management has been opened in the local public library. Three computers in the centre provide connection to internet; this has been well accepted as only limited access to internet was available in the Rouchovany area in the past years. A similar approach is now being used for information centres in the localities selected for planned research for the deep geological repository siting.

2. PUBLIC INFORMATION

RAWRA aims to enhance the public's awareness of radioactive waste and its management in the Czech Republic. The free availability of information on radioactive waste management is a necessary precondition for a full discussion involving all the parties interested in finding the best way to tackle the issue of high-level radioactive waste and spent nuclear fuel in the Czech Republic. The internet and RAWRA's information centres (at the head office building in Dlážděná Street in Prague, at the Richard repository and at Rouchovany) are employed primarily to provide information. They are visited by individuals as well as groups of young people from both primary and secondary schools. RAWRA participated in the preparation of a six-episode TV series on radioactive waste management, a part of the Popularis weekly programme which aims to present complicated scientific themes to a general audience, broadcast by the Czech state TV channel. The series is now used by RAWRA in presentations to the public at its information centres and on other occasions. RAWRA maintains good relations with the local populations of those areas in which operating repositories are situated as well as areas potentially eligible for the construction of a deep geological repository.

Another important communication channel is through the **RAWRA BOARD**. The RAWRA Board is an Administration Body of RAWRA with activities set forth under the Atomic Act. The Board mainly supervises the cost-effectiveness of RAWRA activities. The Board members include representatives of state administration, radioactive waste generators and the public; they are appointed by the Minister of Industry and Trade in compliance with the Principles for the selection and appointment of the Board, usually for 5 years. The Board has 11 members: four representing waste generators, one representative of Ministry of Industry and Trade, one representative of Ministry of the Environment, one representative of the

Ministry of Finance, one senator and three representatives of municipalities with operating repositories:

- Mayor of the city of Jachymov (where repository Bratrství is located)
- The head of Enviromental department of the City Council of Litoměřice (where repository Richard is located)
- Mayor of the city of Rouchovany (where repository Dukovany is located).

At the end of 2003, RAWRA's Managing Director invited all the communities concerned to a meeting to discuss programmes concerning the long term development of the region in which a future deep geological repository might be sited. Nevertheless, RAWRA has continued to search for appropriate forms of communication with communities in the areas involved. Following the refurbishment of the public library at Rouchovany and the establishment of a RAWRA information centre there, which was well received by the local community, similar information centres were set up at further villages – Lubenec, Rohozná, Milíčov. Opening ceremonies were held in March 2004 (in Lubenec), April 2004 (at Rohozná) and April 2005 (in Milíčov) and attended by chairmen of local councils, representatives of regional authorities and local journalists. Display posters, RAWRA's website and information from other domestic and foreign organizations responsible for radioactive waste management as well as printed materials and various relevant film clips are available to visitors. In August 2004, RAWRA information posters were put on display and printed materials were made available at specially altered premises on the ground floor of the community council building at Dolní Cerekev. Preparations for an information centre at Milíčov near Rohozná commenced towards the end of the year.

In May 2004, RAWRA organized a three-day excursion for community representatives to selected facilities in Switzerland (the Zwilag interim storage facility and the Grimsel underground laboratory). This trip was aimed at providing participants with the opportunity to become familiar with the various modern technologies employed in radioactive waste management (storage and fluidised bed combustion) and research work currently underway at the underground laboratory. The Grimsel laboratory is located in granite rock which has been the focus of the Czech deep geological repository development programme. Experiments carried out at the lab under real deep geological repository conditions concentrate primarily on the assessment of deep geological repository safety. A total of 36 representatives from all six locations took part in the excursion.

A major concern for local communities has been particularly those projects involving the siting process. In order to assure these communities of the complete transparency of these various projects, RAWRA invited community representatives to participate in an inspection day for the Geobariera siting project in April 2005. Unlike the previous inspection day, this time only a small number of community representatives took part, probably because information presented on the previous inspection day was considered too technical and not easily comprehensible. Subsequently, RAWRA prepared progress reports as of April 2004 for all six candidate sites; the reports were distributed to interested communities and respective information centres.

At a meeting held at the Rohozná location it was agreed that further information and discussions on the possible variants of the repository were needed. A Memorandum of Understanding (MoU), the wording of which had been discussed and approved beforehand by the Dolní Cerekev, Cejle, Milíčov and Batelov local councils, was signed by council chairmen and RAWRA's Managing Director in Jihlava on 29 September 2004 at a meeting attended by the regional press. The Cejle local council, however, later retracted its approval in a letter of 15 November 2004, following the results of a vote by the inhabitants of the village at a public meeting. By signing the Memorandum of Understanding, RAWRA pledges to seek a solution to the issue of the siting, construction and operation of a deep geological repository which would respect as much as possible the interests of the communities concerned, keep local inhabitants informed of developments through local information centres, organize excursions for those interested to relevant facilities and explore, in cooperation with the communities themselves, the possibilities and conditions for implementing an accompanying programme to the benefit of the microregion concerned. RAWRA also pledges to provide data to independent experts when required and to provide funding for their work. The communities, by signing the MOU, have expressed their willingness to at least discuss repository options thus allowing RAWRA to design a model procedure for approaching this issue and helping to create the right conditions for providing the local population with relevant information. These communities, however, reserve the right to reject in the future any further work concerning the siting or construction of a deep geological repository. At a meeting with community representatives held in early December 2004 to discuss the MOU, continuing cooperation for the foreseeable future was agreed. In December 2005, when the results of project Geobariéra will be publish, a representative of municipalities involved with the deep geological repository siting, will participate as an expert for public acceptance.

An excursion to interim storage facilities and the operated repositories, cooperation with local schools and public libraries as well as RAWRA's active participation in major local community events were seen as the main priorities. At the end of the year RAWRA had

contacted most of the 48 communities in the six candidate locations. RAWRA offered to organize meetings of local inhabitants and specialists to discuss issues relating to the disposal of radioactive waste in deep geological repositories and to set up excursions to the Dukovany repository. An excursion was organized to the Dukovany repository and interim storage facility for spent nuclear fuel followed by an informal question and answer meeting at Hrotovice.

3. CONCLUSION

RAWRA‘s communications activities are targeted particularly at the siting of a future deep geological repository, however, public acceptance of operating repositories is one of the most important parts of RAWRA‘s communication strategy which helps in effectively presenting to the public how radioactive waste is managed in The Czech Republic.

Assessment and management of socioeconomic issues and public involvement practices for the development of Inshas near surface LILW disposal facility

A.A. Zaki
Atomic Energy Authority,
Hot Laboratory and Waste Management Centre,
Egypt

Abstract

There are many issues and practices that could impact the development of Inshas near surface low and intermediate level radioactive waste disposal facility (Inshas-LILW-Facility), beside the radiological factors. These issues may be social, economic, public involvement practices, built environment, land use and natural environment. In addition to these issues, there are other impacts resulting from the widespread use of independent and opposition newspapers and open sky media (satellites) in Egypt. Social issues include the indicators such as demographics, social structure, character and community health. Economic issues comprise employment and labour supply and local economy. Trust building of public and their involvement in different stages of development of a near surface disposal facility could facilitate the development process. The development of Inshas-LILW-Facility involves a number of sequential steps, occurring over a time frame of several decades. These steps include planning and siting, construction, operation, closure and post-closure institutional control. For many of these steps, explicit approvals are required from national authorities, including regulators, before proceeding to the next step. Selection of a preferred site for development is normally subject to consent by the authorities responsible for land use planning. For the Inshas-LILW-Facility, the licensing process is divided into three stages; the first is site selection and construction, the second is operation, and the third is closure and post closure. The regulatory body approved both the site selected in the Inshas area and the construction of the facility. Now, the Inshas-LILW-Facility is in the operational licensing process. To establish public trust during the development stages of the Inshas-LILW-Facility, visitor programmes are prepared periodically for school students, university students, the local community, press people and other visitors to the Inshas-LILW-Facility. In this paper, assessment and management of all these issues and practices are discussed except the radiological factors.

1. INTRODUCTION

It is now broadly recognized that radioactive waste disposal involves both technical and societal dimensions which cannot be dissociated. New processes to forecast and monitor quality of life and social impacts are being brought to the forefront. A broad range of socioeconomic and environmental impacts needs to be assessed during the life cycle of a repository [1, 2]. Approaches have been developed to assess socioeconomic and other non-radiological impacts during the pre-operational, operational and post-closure phases [1] and the radiological impacts during the operational and post-closure phases [3]. Of particular importance is the need to ensure that the assessment of impacts is undertaken in a transparent, structured and well documented manner, thereby increasing confidence in the assessment.

The construction, operation and closure of a near surface repository must be subject to regulatory control, i.e. a site license is issued before the start of construction, enabling the operator to perform the necessary construction activities [4]. Additional authorizations are generally required to proceed to the subsequent phases of the repository life cycle, particularly disposal operations and closure [4, 5]. In some countries as well as in Egypt, the regulatory

authority responsible for licensing nuclear operations is the same as that responsible for authorizing waste disposal, so that regulatory oversight is provided by a single national agency. The Hot Laboratory and Waste Management Centre (HLWMC) is the operator of the Inshas-LILW-Facility and the National Centre for Nuclear Safety and Radiation Control (NCNSRC) is the regulatory body. Both the HLWMC and the NCNSRC are administered by one Authority. The regulators play a challenging task as the people's interface with the implementer. The regulators should be exposed to interfacing with the other stakeholders. It is understood that broad public acceptance will enhance the likelihood of the disposal facility approval.

2. BACKGROUND

The Egyptian Atomic energy Authority (EAEA) was established in 1955. EAEA consists of two main complexes in different locations. The first is the Nasr City complex located eastern of Cairo. It comprises the main headquarters, the National Centre for Radiation Research and Technology (NCRRT), and the NCNSRC. The second location is the Inshas complex, which occupies about 10 x 10^6 m^2 on the east bank of Ismalia Canal in the Inshas area. It is approximately 60 kilometres northeast of Cairo and includes the Nuclear Research Centre (NRC) and the HLWMC. At present more than 1500 scientists and technical staff are employed at the Inshas complex, about 20% of them live in the local community. A transportation system is used to carry the staff and worker from their homes to the two complexes.

HLWMC was established at 1980 as a central facility to collect the radioactive waste and to operate a national radioactive waste disposal facility. HLWMC is an integrated waste management facility for treatment, conditioning, interim storage and disposal of low and intermediate level waste. Two hundred persons work at HLWMC and in turn for Inshas-LILW-Facility. The population of the local community in a seven km diameter circle around the Inshas-LILW-Facility is about 120 000 persons. The majority of these people are either workers or farmers, and some of them work at the Inshas complex. Inshas-LILW-Facility covers an area of 4000 m^2, quite enough for future expansions. Inshas-LILW-Facility is currently a four module engineered structure, with dimensions of 10m length x 5m width x 3.30m depth. This module design can be repeated to expand the facility.

The Inshas-LILW-Facility will be able to hold the 6000 concrete containers expected to be produced up to the year 2020. The siting and construction of Inshas-LILW-Facility was approved and we are preparing the operational license these days. The radioactive wastes to be disposed of at Inshas-LILW-Facility are either disused sealed radiation sources or concentrated liquid sludge containing the isotopes Cs^{137}, Sr^{90}, I^{131} and Ce^{144} [6]. The main generators of these wastes are research reactors, universities, research institutes, agricultural, oil and other industries, as well as medical applications.

Potential Impacts during a Repository Life Time at Local and Regional Levels

A wide range of socioeconomic and other non-radiological impacts may arise during the repository life cycle. The type and magnitude of impacts relevant to a specific repository project will be influenced by the size and location of the repository, the types and amounts of waste to be accepted, the specific repository technology selected, the number of workers employed, specific community characteristics, proximity to populated areas and existing and future land uses. Table 1 illustrates the potential impacts during a repository lifetime at regional and local levels [1]. It is clear from the table that the greatest overall impacts are to

the local area and generally occur during the construction, operation and closure phases. The Inshas area is free of archaeological artefacts and valuable historical monuments in the proposed repository site.

3. MANAGEMENT OF SOCIOECONOMIC AND ENVIRONMENTAL IMPACTS

The environmental impact assessment will consider impacts on the natural environment (e.g. ecologically sensitive areas); the built environment (e.g. the transportation network); social conditions (e.g. the community character); economic conditions (e.g. employment and labour supply); and land use (e.g. parks and recreational lands). Table 2 illustrates the different impact factors, their potential and impact management measures [1]. The level of potential impact experienced for an individual factor may be significantly greater in one life cycle phase than in another, with the greatest overall impacts likely to occur during the construction, operation and closure phases. Development of a waste disposal facility may place increased burdens on local services, for example emergency services. Also, in the event of a significant influx of workers from outside the locality of the repository there may be a need for additional housing, education, and associated services. These aspects will require particular attention in the development of the impact management programme and it is likely that continuing close liaison between local authorities and the developer will be needed if such factors are to be addressed satisfactorily.

Impact management measures may be applied at different stages of the repository planning, siting and project approval phases [8]. For example, candidate site areas that have an impact on historical, cultural, ecological or archaeological sites, endangered biological species, or popular recreation areas may be excluded from further consideration by early application of the site screening criteria. Other impacts may be addressed following selection of a proposed site. For example, roads or utilities serving the site may require upgrading, or transportation routes through local communities may be avoided. Figure 1 presents a flow diagram that illustrates the various steps involved in the impact assessment and management process [1].

Table 1 Potential impacts during a repository life time at local and regional levels

Impact Factor		Repository Life Cycle Phases						Level of Potential impact	
		Siting	Review/ Approval	Const- ruction	Operation	closure	Post- Closure	Regional	Local
Natural Environment	Land resources			x	x	x	x		x
	Ecology sensitive areas			x	x			x	x
	Air quality			x	x	x			x
	Ground water resources			x	x	x	x		x
	Surface water resources			x	x	x	x	x	x
	Biotic resources			x	x	x	x		x
	Visual landscape			x	x	x	x		x
	Historical / archaeological sites	x	x						x
Social Conditions	Demographic			x	x	x			x
	Social structure			x	x	x			x
	Community health	x	x	x	x				x
	Community character	x	x	x	x	x			x
Economic Conditions	Employment and labour supply			x	x	x		x	x
	Local economic activity			x	x	x		x	x
Built environ.	Housing	x		x	x	x			x
	Education			x	x	x			x
	Transport network			x	x	x		x	x
	Community services			x	x	x			x
	Utility availability			x	x	x			x
Land use	Park and recreation lands			x	x	x			x
	Development plans	x	x	x			x	x	x

Table 2 Potential impacts and impact management measures

Impact Factor		Potential Impact	Potential Measure
Natural Environment	Land Resources	Disturbance of soil through excavation	Control erosion and re-vegetate distributed landscape
	Ecology Sensitive Areas	Harm to rare or endangered animal species	Create new habitats or hire biologists to plan and implement protec. plan
	Air quality	Increase in dust at site	Apply water to minimize dust
	Ground water resources	Reduction in water availability in neighbouring water wells	Obtain water from deeper well or offsite source
	Surface Water resources	Increase in storm water run-off to drainage system	Divert storm water to on-site use, or implement flood control measures
	Biotic resources	Removal of vegetation	Offset with new vegetation renewal project
	Visual landscape	Repository visible to local residents	Plant trees to screen view
	Historical /archaeological sites	Disturbance of historical or archaeological artefacts	Document and remove artefacts and place in a national museum or select another place
Social Conditions	Demographic	Increase in local population from incoming workers and families	Construct work camps and institute travel allowances during construction
	Social structure	Pressure on existing community due to discrepancy in economic circumstances of incoming workers	Work with local community representatives to help integrate newcomers
	Community Health	Stress caused by repository development	Involve residents or local community organizations in impact management, especially in monitoring programmes
	Community character	Decrease in people's enjoyment of property due to nuisance effects	Implement truck routing to avoid resident areas
Economical Conditions	Employment and labour supply	Increase in locally available job opportunities	Hire and train local residents as much as possible
	Local economic activity	Increase in local business activity if can supply project goods and services	Early information to local contractors regarding project requirements
Built environment.	Housing	Potential difficulty in selling homes	Provide property value protection program to purchase homes for later sale
	Education	Increase in student population overcrowding school facilities	Advanced planning with school authorities and support for temporary classroom facilities
	Transport network	Increase in traffic congestion	Schedule truck deliveries to avoid peak times
	Community services	Increased demand for emergency service response	Work with local emergency response agencies and support training and facility development
	Utility availability	Demand for water service from local supply system exceeds system capability	Work with local authority and support system capability expansion if needed
Land use	Park and recreation lands	Restricted access to popular park	Work with community to either establish new park or improve other existing park
	Development plans	Repository proposal not compatible with approved development plan	Work with local authority to find compatible location within existing plan framework

4. PUBLIC INVOLVEMENT DURING THE LIFE CYCLE OF THE FACILITY

Public involvement in decision making processes should be facilitated by promoting constructive and high-quality communication between individuals with different knowledge, beliefs, interests, values, and worldviews. The building of a long term relationship between the local communities and the disposal facility is one of the most important contributors to sustainable radioactive waste management solutions. Building such relationships can be facilitated by designing and implementing facilities in ways that reflect the values and interests of local communities [7]. During the siting phase, interest will be focused on the communities located nearest to the proposed site as well as communities which border that location, and those along likely transport routes. In some cases local committees have been established to help in providing inputs to the repository planning process and, subsequently, to monitor implementation of mitigation measures and related repository operations. These committees can also serve as an information source to interested parties.

A variety of ways may be used to make information available to interested organizations, including publications, leaflets, CD-ROMs, video cassettes, press conferences, media releases, panels, presentations and discussions. Also, the worldwide web (Internet) is a very important media to let the public get involve during the life cycle of the Inshas-LILW-Facility. In order to achieve and maintain stakeholder confidence, we have established a visitor centre at Inshas to facilitate greater public access to details. Visitor programmes are prepared periodically for students, local community, press people and other visitors to the Inshas-LILW-Facility.

Newspapers and Open Sky Media (Satellites)

The major objective of the media is to sell their own product to the public. Drama provides the best tool for this. From the media's point view, bad news is the best kind of news. This means that the development of the Inshas-LILW-Facility should be as plain and transparent as possible. Communication must be open and active at all times to maintain the trust of the press and avoid a communication vacuum around the EAEA that might be filled in by somebody else. Clarity on the link between safely managing the waste disposal and the future of nuclear energy, as well as associating the public in the relevant debates, are important contributors to confidence in decisions regarding solutions for long term radioactive waste disposal. The society's character and social values are affected by the independent, opposition newspapers and the satellites. A flow of free news, discussion, and debates are available for most people in Egypt through satellite broadcasting. Many economical, social, political, national problems were discovered and discussed freely on the open media and independent newspapers. This lead to more clarity in the policies and activities related to the development of the Inshas-LILW-Facility. In Egypt we have a link between the EAEA and the mass media to discuss and clarify any misunderstand that may be confusing the public.

5. CONCLUSIONS

Broad potential socioeconomic issues, public involvement practices, independent press, open sky media and other non-radiological impacts are important considerations during the Inshas-LILW-Facility life cycle. Potential factors that have been identified include those relating to the natural environment, social conditions, economic conditions, built environment and land use. Most impacts are likely to occur at the local level. The greatest overall impacts generally occur during the construction, operation and closure phases. Impact management measures can be applied in different ways to eliminate or minimize the potential adverse impacts during

the Inshas-LILW-Facility life cycle. Measures may also be employed to enhance beneficial impacts of the repository development and operation.

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Public acceptance and socioeconomic issues related to site selection of final repository in Finland

T. Seppälä
Posiva Oy, Finland

Abstract

In Finland the waste management obligation rests with the waste producers, the nuclear power companies, who are responsible to cover all the costs related to waste disposal. In addition, construction of any nuclear facility necessitates favourable safety appraisal by the regulator and approval by the siting municipality. Consequently, local level acceptance plays a key role when selecting a site for spent fuel disposal since the municipality has a veto right in the decision making. During the site selection process for the final repository sufficient public acceptance was only gained in two municipalities with nuclear power plants. In two non-nuclear municipalities subjected to site investigations, majority of the local people were opposed to disposal. When considering the differences in public opinion in the candidate municipalities, some practical reasons for stronger support of final disposal in the nuclear municipalities can be observed. First, Finnish power plants have served well during their operation and have thus created trust among local people. Second, people in the nuclear municipalities are accustomed to nuclear installations and have benefited from them. Third, cooperation between the implementer and the municipality has worked out well in identifying the concerns and hopes of local people in regard to the final disposal. It is, however, the municipality's own will and vision for their future that counts in the acceptance in the last place.

1. INTRODUCTION

In general, a licence for a repository for radioactive waste requires a political decision, which to some extent depends on public consent. In gaining acceptance for waste management, public involvement plays a major role before the necessary decisions can be taken and the long term implementation of nuclear waste management activities can proceed. The question is, however, how extensive and large should this public consent be before the necessary decisions can be taken. Therefore, the aim of this presentation is to examine public acceptance during the decision making process for the selection of the site for the final disposal of spent fuel in Finland and the role that socioeconomic issues play in this regard.

2. HISTORICAL BACKGROUND

In Finland nuclear power companies are responsible for the management of the waste they produce. In 1995 the owner companies of the power plants, Teollisuuden Voima Oy, Fortum Power and Heat Oy established Posiva Oy to handle the necessary preparations for the final disposal of spent fuel. Besides the site characterization work, Posiva's task will become the construction, operation, sealing and, when necessary, the decommissioning of the final disposal facility.

The preparations for final disposal of spent nuclear fuel in Finland were started in the late 1970s and early 1980s when the Loviisa (two units) and Olkiluoto (two units) power plants were completed for operation. In 1983, the Government made a decision on the long term strategy for nuclear waste management including the schedule for final disposal of spent fuel. Pursuant to this decision, the site for final disposal of spent nuclear fuel was to be selected by the end of the year 2000 and the plans for the construction of the final disposal facility should

be ready for presentation ten years later, in 2010. The operation of the facility should be started in 2020.

The site selection programme for final disposal was started in 1983 and proceeded to field work in 1987. In the 1990s the investigations were concentrated on four municipalities, including the nuclear power plant sites Loviisa and Eurajoki, as well as two other candidate sites with no nuclear activities.

The Policy Decision Leading to Site Selection

The Nuclear Energy Act stipulates that the selection of the final disposal site requires a policy decision of the Government, ratified by the Parliament. Posiva filed the application for the policy decision with the Government in May 1999, proposing Olkiluoto in the municipality of Eurajoki for the final disposal site. In order for the Government to decide in favour of the policy decision, the Finnish authority on radiation safety (STUK, Radiation and Nuclear Safety Authority) had to support the project and the municipality where the final disposal facility is to be built had to approve it. In other words, the host municipality has an absolute veto right over the site selection and thereby the possibility to stop the deliberations for the nuclear facility.

Favourable statements were acquired from both STUK and the municipality of Eurajoki in January 2000. The Government decided in favour of the policy decision towards the end of 2000 and the Parliament ratified the decision in May 2001. This decision applies only to spent fuel from the existing four nuclear power plants. An additional policy decision on the final disposal of the spent fuel generated by the planned fifth reactor during its estimated 60-year service life was ratified by the parliament in May 2002. In total, the amount of spent fuel that can be disposed of in Finland is 6500 uranium tons.

3. ELEMENTARY STRUCTURES IN GAINING ACCEPTANCE

The development leading to the policy decision was influenced by several factors, many of which are not only related to public consultation, but to the general organization and control of nuclear waste management in Finland. The final disposal plans were drawn up at a very early stage and in this context the significance of the Government's decision on waste management strategy in 1983 cannot be over-emphasized. This has also created the necessary basis for various communication measures.

The nuclear waste management programme and the public approval of final disposal have also been supported by legislation. The legislation has incorporated the values of the society and the prevailing attitude to the existing nuclear waste management programme and has bound the state organizations to this programme. The 1987 Nuclear Energy Act, or rather the preamble of the Act, defines final disposal in Finnish bedrock as an alternative to the export of nuclear waste to another country. When the Nuclear Energy Act was amended in 1994, the central issue was the prohibition of the export and import of nuclear waste. The possibility of exporting nuclear waste was excluded, whereby the Parliament "officially" opted for final disposal as the Finnish nuclear waste management strategy.

4. LOCAL ACCEPTANCE

When considering public acceptance in relation to decision making, the local level is emphasized. This comes from the fact that the municipality has a legal veto during the site selection process, which in turn has facilitated the gaining of local acceptance for final

disposal. In this respect it has been important to include the existing nuclear power plant sites of Olkiluoto in Eurajoki and Hästholmen in Loviisa in the site selection programme.

In the municipalities included in the site characterization programme, Posiva's information activities have included, among other things, presentations for specific groups, open houses, visits to the existing nuclear waste facilities and power plants, tabloids delivered by post to all the households in the area as well as ads in both local and national newspapers. In order to deepen the discussions with the municipalities, cooperation groups consisting of municipal representatives and Posiva staff members were established in each municipality during the site investigation phase. The public has had a personal opportunity to obtain additional information about the investigations and the final disposal project from Posiva's local offices on each candidate site.

The environmental impact assessment procedure, which took place in all candidate municipalities in 1997-1999, was an important tool for communication. It also provided a means for local people to voice their concerns, and actually balanced the discussion bringing up not only the disadvantages but also the advantages of the project. Although participation remained limited, different views and opinions were presented on a broad spectrum during the assessment.

When the EIA procedure was completed, the results clearly indicated that worries related to safety of disposal and to image and living conditions of a municipality were considered smallest in Eurajoki. In addition, one of the conclusions of the EIA was that direct and indirect economic effects of the project would be relatively small for Eurajoki municipality compared to other candidate sites.

When considering the differences in public opinion in the candidate municipalities, some practical reasons for stronger support of final disposal in the nuclear municipalities can be observed. First, Finnish power plants and the adjacent final repositories for low and intermediate level waste have served well during their operation and have created trust among local people in nuclear installations. In addition, the employees of the power plants have played a role as advocates of nuclear technology at the local level. Second, the final disposal facility brings inland revenue and employment opportunities to the site municipality. Third, cooperation between the implementer and the municipality has worked out well in identifying the concerns and hopes of local people in regard to the final disposal facility.

Finally, it is the Municipality's own will and vision of the future that counts in the acceptance. For instance, referring to Eurajoki, the municipality hired a consultant to perform a competitiveness analysis to chart the municipality's relative strengths and weaknesses compared with other municipalities. Following this, the municipality and local entrepreneur association performed a SWOT/ 4-field analysis charting strengths, weaknesses, opportunities and threats. Then "the scenario of possibilities" and "the catastrophe scenario" were compared which resulted in the main strategy of Eurajoki 2000. This strategy included the so-called "Olkiluoto" vision with a spent fuel repository as a part of municipal infrastructure. All these scenarios and visions were openly discussed and accepted by the municipality council and finally led, after a win-win agreement made by the municipality and Posiva, to the approval for the repository.

Nationwide Acceptance

During the site investigation phase, Posiva and the final disposal project were well known in the candidate municipalities, while a great deal of work was required to improve the company's national penetration and the general public's knowledge about the final disposal project. In order to raise the company's profile and to increase the knowledge of nuclear waste at the national level, Posiva realized several advertisement campaigns would be needed before the deliberations on the policy decision took place in the Government and in the Parliament. The central theme throughout the successive campaigns was the justification of the significance of the policy decision. It was emphasized that it is better to proceed with the preparations for final disposal than to just continue the interim storage of spent nuclear fuel. In this connection it was also considered important to get the message about retrievability through to people, which was actually introduced in the decision making at a quite late stage. In fact, it was the EIA procedure that first introduced the term retrievability to the discussion.

In the spring of 1999, before Posiva submitted the application for the Policy decision, the Government decided upon the safety requirements for final disposal, including the clause of retrievability as a prerequisite for the concept. In practice, the spent nuclear fuel must be retrievable to above ground at any stage of final disposal. This ensures that the future generations can re-evaluate the sensibility of the final disposal solution. The argument of retrievability was later brought up by several MPs when the project was discussed in the Parliament.

Follow-up research carried out to study the reception of the advertisements showed that although they were recognized well among the decision-makers, they had not reached the general public too well. The same conclusion can also be drawn from the results of the Finnish Energy Attitudes survey that has been performed annually since the early 1980s. Although the attitudes towards final disposal have become more positive among the whole population just like in the power plant municipalities, the majority of Finns still seem to question final disposal. Almost half of the Finns consider geological disposal unsafe and one third have the opposite opinion. It must be emphasized, however, that poll results should not be relied on too strongly when examining public opinion. The result seems to depend to a large extent on how a certain question or statement is constructed in a poll.

5. CONCLUSIONS

In Finnish experience, local level acceptance plays a key role when selecting the site for spent fuel disposal. This is due to the fact that the municipality has a veto right in the decision making process and a possibility to stop the site selection process. In order to proceed with the final disposal preparations, local acceptance is required, but it cannot be created within a short period of time. Public consultation has a role of convincing people about the safety of waste disposal, but there are also other factors that build up confidence. In this respect the Government's early commitment to final disposal has been the primary driver of the project. Another milestone shifting Finnish society gradually towards final disposal was reached in 1994 when the amendment prohibiting the import and export of nuclear waste was ratified by the Parliament. Since then, it has been easier for local people to accept final disposal, partly because of the fact that other alternatives for waste management were practically ruled out. It is also important to see that the decision of the Eurajoki municipality reversing the earlier rejection of the final disposal facility took place just after the amendment was given.

Although sufficient acceptance for final disposal was gained in the power plant municipalities, in the two other candidate sites public opinion rejected the project. Yet, similar

efforts were focused on public consultation in each of the municipalities. This only shows how difficult it is to gain approval for final disposal in municipalities that do not have any previous experience with nuclear installations.

At the national level public involvement appears to be much more problematic than in the municipalities. It became evident that people in general do not have very much interest in nuclear waste management as long as somebody will handle and accept the waste. In other words, without a relevant connection to either the benefits or drawbacks of the project, for example at the local level, people are not interested in the issue and their involvement will remain low.

Despite the fact that public opinion has become more favourable towards nuclear waste in Finland, the majority of people still seem to question the concept of geological disposal, hoping that the future will bring better solutions. This inevitably brings up the question of the level of consent that is needed in order to proceed with the decisions. In an issue as controversial as nuclear waste, it seems that there will always be dissension irrespective of the extent of public consultation. Consequently, much more emphasis should be placed on listening to people and valuing different opinions, in order to create proper dialogue between the implementer and the public. In the Finnish experience, listening to people was one of the lessons learnt and it actually introduced retrievability to decision making. This gives us an ideal of public consultation that aims not at gaining unrealistic consent but at creating diverse discussion with different views for the use by the decision-makers. After all, the necessary decisions can and must be made to advance the preparations for final disposal in spite of the obvious lack of public consent.

Past and recent activities in public communication on L/ILW disposal — Hungarian experience

P. Ormai
Public Agency for Radioactive Waste Management

P. Szanto
Noguchi Porter Novelli

Hungary

Abstract

There are four main priorities for the coming years in the field of the nuclear waste management: safety upgrading of the near surface L/ILW repository; construction a new repository for L/ILW of NPP origin; expanding the interim storage capacity for spent fuel, and identifying a site for a high–level waste repository. In Hungary, the L/ILW siting rounds to date reflect a gradual realization of the realities of public acceptability problems. When implementing these programmes one of the prerequisites is to ensure transparency with adequate communication. Past experience has taught us that when developing siting strategy, understanding of people‘s values is paramount of importance, and should be articulated as early as possible. Regarding the local public relations activities, the fundamental aim of all actions, events and programmes has been to establish a long term relationship between the local communities that are willing to cooperate, and to continuously keep the local residents interested and confident in the development. The lessons we learnt during some previous abortive projects are: public support depends upon the continued provision of non-nuclear benefits for the community, and that a win-win situation should be offered with emphasis on maximising joint gains which leaves them better off. In short, our strategy has been: to turn NIMBY into FLIMBY (*F*or as *L*ong as it *I*mproves *M*y *B*ack *Y*ard). That is the base fore cooperation. But we never compromise the fundamental principle that is safety first. Consequently volunteerism is searched for after identifying potential suitable areas. The paper spells out the approach to volunteerism and openness being followed in the new siting project.

1. INTRODUCTION

What makes the problem of radioactive waste disposal so controversial is the fact that although it does not seem technically difficult to design and construct a scientifically correct, economically feasible, practically implementable and technically sound disposal facility, this is not the perception of the general public. In Central and East European countries most decisions regarding siting of nuclear facilities were in the past made by centralized executive bodies and rarely publicly identified. Moreover to add strength to the unsolved waste problem, anti-nuclear groups systematically seek to discredit waste management projects.

The paper presents the programme followed by Hungary for the disposal of nuclear waste, to come to a decision on the establishment of a site for disposal of low and intermediate-level radioactive waste (LILW). The paper spells out the approach to volunteerism and openness being followed in the new siting project. As the new LILW project has still been progressing, it is too early to tell if the approaches used and described in detail in this paper can solve the problem.

The author would like to state clearly that he is far from being an impartial bystander and firmly believes in the feasibility of the safe disposal of radioactive waste. The organization that the author represents also shares this view.

2. SETTING THE SCENE

Nuclear power plants produce radioactive wastes as unavoidable by-products of electricity generation. Hungary does not have either significant fossil fuel deposits or renewable energy supplies. The contribution of nuclear electricity is crucial to the national economy. Currently about 40 % of the electricity generated in Hungary is produced at the four units of the Paks Nuclear Power Plant (NPP). The electricity is being generated in the national interest. Unfortunately, one cannot expect to enjoy the benefits of nuclear power without also having to cope with some problems. Perhaps the most significant of them is the disposal of radioactive waste. The wastes already exist and sooner or later they will have to be disposed of somewhere. The real question is where to site this repository.

The challenges of radioactive waste management are not unique to Hungary; all countries with such wastes are facing these challenges. Nuclear power plants produce two kinds of radioactive waste: low and intermediate-level waste (LILW) and high-level waste (HLW). In Hungary the disposal capacity currently available ensures disposal of institutional wastes (medicine, industry, and research), but a new facility should be built for the LILW from nuclear power plants.

Nuclear fuel for Hungarian NPP, just as for all other East European nuclear power plants, was in the past supplied by the Soviet Union. As a part of Hungary's agreement on fuel supply the Soviet Union took back all spent fuel (SF). In 1995, the likely interruptions of the SF re-shipment lead to a fairly immediate problem in Hungary. The SF pools became totally full by the end of the 1995 refuelling. With storage space in its SF pools running low, and future acceptance of SF by Russia uncertain, the Paks NPP awarded a contract for the construction of a modular vault dry interim storage system. The Hungarian Atomic Energy Commission issued a licence in 1995 for its construction and in 1997 for the commissioning of the facility.

As insurance against the waste remaining in Hungary or being returned after reprocessing, it was highly desirable to proceed by planning for possible disposal of SF some 50 years or more in the future. The investigation of potential host rock for SF/HLW disposal first started in 1993.

This paper sets out the public involvement aspects mostly focusing on the siting of LILW repository.

3. SITING ACTIVITIES TO DATE IN HUNGARY

3.1. Lessons learned from the abortive L/ILW repository siting project

In order to reveal the hidden connections between the events and understand the real significance of the whole repository issue, one must have a look at the political conditions and developments of the time.

It must be pointed out that the licensing of the Ófalu radioactive waste repository coincided with the peaceful decline of communism in Hungary. Although the siting of the planned

facility started back in the quiet seventies, it was just before the first democratic elections of 1990 when the Minister of Health and Social Affairs of the last communist government announced that she would not give the go-ahead for the construction of the repository.

The political dictatorship, the elimination of traditional civil societies and the severe restrictions on the self-organizing of communities were also the reasons why no significant Western-like environmental movements evolved during the sixties and the seventies.

No information was allowed to become public about the questions relating to the utilization of nuclear energy. Siting of nuclear facilities was regarded as a purely technical matter. Questions of public acceptability were never paid attention to. The local communities had no choice but to accept the decisions made by the competent authorities. The civil society was not sufficiently organized to articulate local interests and had absolutely no influence on the decision making process. Any protest would have been drastically responded to with administrative measures.

In the late seventies the significance of environmental problems became depressing. This was the time when the first real environmental movements were formed. These movements were already very much motivated by wider political determinations. The bureaucratic central power considered them as a challenge to the whole of the current political system – not completely without good grounds. Many figures of the political opposition also looked on environmental issues as a good starting point for future political confrontations since they could not directly question the political autocracy of the ruling communist party.

The local authorities functioned as the subordinates of the central authorities and were only allowed to execute the central commands. Generally, not much importance was attributed to informing the public since everyone shared the view that the siting of the repository is a purely technical matter and the decision made by the experts must be accepted.

Although Ófalu was recommended as a potential site in 1983 and research works started in 1985, the representatives of the Paks NPP held a presentation about the proposed radioactive waste disposal facility in Mecseknádasd (a neighbouring village of Ófalu), only in1987. On the invitation of the local adult education centre experts of the nuclear power plant explained the design, construction and operation of the repository in detail. This event was followed by similar presentations in the other villages around the site. These presentations were educational lectures about the technical and scientific aspects of the project.

However, some of the audience was simply not willing to accept the technical arguments. Their point was that if the facility is so safe, then why they had not been informed in the very beginning. They protested against the repository simply because of the nature of the decision making process.

Another problem was that the simple folk were not able to comprehend the dimensions of the project and got frightened by the facts they could not relate to their everyday experience. One of the lessons to be learned from this story is that it is very difficult, if not impossible, to convince people about the safety of a hazardous waste repository. They either trust the experts and then they might accept the development or they do not trust them and in this case they will never believe them. Trust is the key word and it was badly missing in this particular situation.

Of course the "Not In My Back Yard" (NIMBY) argument also occurred. The locals did not want any health hazard in their environment and the idea of hosting a radioactive waste

repository sounded particularly dangerous to them. Radiation is for most people inexplicable, useable, untouchable, and almost mystically evil in its association with the great twentieth century fear - cancer. Most frightening of all are the unknown effects, the genetic changes which might pass on to future generations.

Some of the locals complained that why should they accept all these risks without benefiting from them at all. Why should the repository be placed near their very villages?

But most importantly, this matter was more than just a question of protecting the environment for the new political leaders of the villages. They also intended to prove that it was finally possible to represent the local interests effectively under the new political conditions. The President of the Council hoped that with this waste issue he could rouse the citizens from the political lethargy of the past decades and consequently his future initiatives will receive more support as well.

First, the organizers of protest tried to use their informal connections to impede the final decision on the construction of the facility. But at the same time they were working hard on activating the local residents and persuading the principals of the other settlements to support the protest officially. Meanwhile they realized that no drastic measures would be taken against them by the central authorities. It turned out that the decision making procedure for the disposal of radioactive waste had not been elaborated yet. It was not clear which authorities were responsible for making the final decision and on what grounds since the relevant regulations had not entered into power yet.

The developer, however, did not seriously reckon with the possibility that the protest that was beginning to take shape could seriously endanger the realization of the project. They were quite self-confident since they had prepared all the required documentation for the submission of the licensing application and some expert authority approvals had already been given by that time. They believed that eventually all the problems would be solved and they went on with the technical arrangements for the construction. The technical experts did not see that human protest was fundamentally different from the technical difficulties they encountered in their work. They did not expect any emotional reactions and did not know how to deal with them.

All their experience from the construction of the nuclear power plant itself suggested that the actual licensing will only be a formality since they had carried out all the prescribed investigations and the results were satisfactory. The realization of the waste disposal facility only represented a technical problem to them.

The investor believed that they were acting in the public interest because it seemed to be obvious that the waste had to be disposed of somewhere and they wanted to construct the repository on the site which was considered the most suitable site available. They did not pay attention to the local opposition, as in their understanding, the national interest prevailed over any individual interest. So far the state had never hesitated to enforce the fulfilment of what was declared to be the interest of the society.

All in all, the story was often presented as the struggle of a small ethnic community against the unseeable evil which was the danger of radiation in the first reading but could also be interpreted as the absolute power of the central authorities. The President of the Mecseknádasd Council who started the protest became a well known person all over the country and was looked upon as a hero by many. In February 1988 the villages concerned set

up a so-called Social Committee to represent their opinion on the issue, and the President of the Council was elected to chair the committee.

The Social Committee decided to invite a group of experts (the Independent Expert Committee-IEC) to form an opinion about the suitability of the proposed site. The IEC found the proposed site unsuitable to host the repository. Their negative opinion provided clear arguments for the opposition of the project. The residents of the villages expressed their fears in a petition that was signed by thousands.

The authorities did not know how to deal with the protest. It would have required a united effort to break it but such a solution was not possible any more since the movement had its supporters in both the state and the communist party apparatus. Those who were against it did not want to act upon their own responsibility since it would have endangered their political future. Some party officials even tried to interpret the matter for the Central Committee as an example of the blossoming out of local democracy under the communist system.

The insufficiencies of the regulations also came to light. The decision-makers got confused, and they did not want to take sides either for or against the project. They hoped that the negotiations between the representatives of the developer and the independent experts would be successful. However, no agreement was reached during these negotiations.

Another lesson to be learned from this case is that it must be defined in advance by whom and by what criterion the decision on siting of radioactive waste repositories will be made. Of course the different opinions and the variety of interests have to be taken into consideration, but someone must bear the responsibility for the decision (or the lack of the decision). No authority was willing to take the unpopular job of making that decision under the circumstances described previously.

Eventually, the most prestigious scientific body in the country, the Hungarian Academy of Sciences was invited to express its opinion on the question. Both sides expected that the Academic statement would be in their favour. The developer also hoped that the pause would pour oil on troubled waters. This was not the case, however. Since 1989 was the year of radical political changes, the protest movement against the repository became a precedent for the opposition of the political regime.

The local residents became more determined. With both the media and the public opinion on their side, they were not willing to withdraw any more. It was only at this stage that the company started considering how the locals could be won over. They called on the President of the Council with an offer of compensation. The timing could not have been worse since he was already looking forward to the Academic statement which, he suspected, would decide the question in their favour anyway. Moreover, the offer was not specific enough; it was not clear what they offered exactly and what they wanted to compensate for. Such a compensation offer only intensifies the sense of danger among those concerned. No wonder the answer was plain rejection.

Then the developer made another late attempt to gain public acceptance. They assumed that since the whole protest movement had originally been started by a few persons, the majority of the locals were not actually against the project. They repeated the offer of compensation through the media and direct mail to each local resident. But it was already too late; the locals were united. Those who would have accepted the development did not dare to express their opinion any more. The village assembly approved unanimously an open letter to the power plant which was published in the newspapers. In this letter they refused the offer as "an

unmistakable attempt of bribery". Of course, the outcome of such a proposal could have been entirely different if the investor had come up with it at a fairly early stage.

The Academy of Sciences realized how delicate the situation was and the statement they eventually issued was quite equivocal. They declared that the site was not unsuitable. They did not oppose the construction of the facility on technical grounds but added, however, "the scientific debate is of a minor importance comparing to the fundamental frustration of the local residents".

In the meantime the political development was accelerating. The declaration of the first free elections became the focus of the public attention. The media coverage was concentrated on the preparations for the elections. The President of the Mecseknádasd Council was already working on the establishment of an organization that would represent the common interests of small settlements.

In this situation the last communist government had to demonstrate its commitment to the continuity of reforms and democracy. They simply could not take the responsibility for forcing the acceptance of the repository upon the locals by administrative measures. The final negative decision of the Minister of Health and Social Affairs came at the culmination of the election campaign.

The president of the Mecseknádasd council, who led the protest against the planned repository, made it to the Parliament. He was elected to be the MP of the area. His slogan was: "Vote for the one who won at Ófalu because he can surely represent your interests as well." His expectations of activating the local residents did prove true. The participation rate on the first free elections was much higher in these villages than the national average. An opinion poll showed that the successful protest against the radioactive waste disposal facility aroused their interest in the democratic elections because they saw that there was a chance to change things for better.

3.2 New I/LLW siting project

The key feature of the new siting process was voluntary participation of communities. The public relations campaign was planned to be carried out on three levels such as general public, special groups (government, media, environmentalists, anti-nuclear activists), and the population of the areas found suitable for the construction of the disposal facility. Since real professionals were wanted to conduct the public relation activities an acknowledged PR company (Noguchi and Peters) was chosen to do the job. With the general public, the opinion is generally unfavourable about nuclear waste. Since the rejection of the proposed solution of the radioactive waste disposal was based on ignorance, the national media was utilized at the earliest possible stage to inform the public about the project. A national information programme was carried out to clear up the misconceptions about nuclear energy in general, and the disposal of radioactive waste in particular.

Being for, or at least not objected to, by the special groups can be of vital importance to the success of the project. It was a basic requirement to win the support of the politicians and other decision-makers through the consistent implementation of an open information policy. If they are not fully aware of the significance of the matter, it can easily result in the failure of the project in a tense political atmosphere (such as at election time). The media always has a major influence on the development of public opinion. Regarding the local public relations activities, the fundamental aim of all actions, events and programmes was to establish a long

term relationship between the local communities and the nuclear power plant and to continuously keep the local residents interested and confident in the development.

After the preliminary investigations, 32 geological objects were found suitable for further investigations concerning near surface disposal of L/ILW and 49 for geological disposal.

The next step to be taken was much less obvious. The new stage of the investigations consisted of a more precise study of the available data on a limited amount of potential geological objects. Once the exact location of the suitable geological objects was known, a decision had to be made on which of them to study in detail. There were three independent factors to be considered. The first is the geological characteristics, the second is the technical feasibility (site access and constructability) and the third is the public acceptance. The performance of each site could be scored in respect to these factors. The ideal situation would have been if the same site was found the best on the basis of each consideration, but this was not the case. Thus the factors had to be weighted and this could not be done on a scientific basis; a political decision was required.

The concept adopted by the National Project was that public acceptability had to prevail over the other two considerations. In-situ investigations were to be only started in case of voluntary acceptance by the communities concerned. A letter was sent to each community in the regions concerned to offer them the opportunity of participating in the project. The first letter was only introductory and informed the mayors about the Project, nothing had to be decided. Great emphasis was put on explaining to them that the repository unit will only be built in a village where most of the residents agree to it.

Those, who formally expressed interest, were involved in the next phase of the Project. Information sessions were held for learning more about the L/ILW disposal Project and the siting process. Through a consultative process, attempts were made to ensure that all interested and potentially affected people were fully informed and were given the opportunity to express their views and have their concerns addressed. In addition, the experts informed the people of the technology options available and the possible benefits. Later information sessions were conducted to describe the major elements of the process. The emphasis at these information sessions was on explaining the nature of the radioactive materials to be disposed of, the potential risks, and the role of the community in the process.

Perhaps the most important thing was to establish personal contacts between the management of the nuclear power plants and the local residents in order to diminish the apparent dimensional differences between the huge company and the small communities and to create and atmosphere of mutual confidence. As the process went ahead, the organizational, institutional and legal frameworks of the cooperation were developed as well.

Visits were planned at the nuclear power plant and the existing waste disposal facility to show the residents how the wastes are produced and how they are managed. The visit had a privileged place among public relations activities. It is certainly more effective than any talk or theoretical demonstration since it represents a physical experience, a direct contact with the reality of nuclear power. The visitors could also meet the men and women working in these facilities, and they could see that they were ordinary people, just like themselves. This experience might be able to turn the mystery that nuclear technology represents to most people into a rational mental image.

The visit was also a voluntary act that involved the visitor actively. Involvement and mental image were important components in getting people to psychologically accept an idea. The

organization of cultural events that had nothing directly to do with the repository project also had positive results in so far as they contributed to the development of a feeling of togetherness of the local communities and improved the general feeling of the individuals. Of course, a gradual approach had to be taken in realizing these objectives, otherwise the appearance of the representatives of the nuclear industry in these communities could be seen by the local residents as an intrusion into their everyday life and might lead to unwanted reactions.

Finally, public approval was given to just a few dozen of the potential areas. Based on the first series of investigations, a granite formation in the village of Bátaapáti (in the Üveghuta area) in South-western Hungary was selected as a potential site for an underground repository. The geological site characterization started at this location in the second phase of the Project.

After its establishment in 1998, the Public Agency for Radioactive Waste Management (PURAM) has taken over the management of the siting project from Paks NPP. PURAM has committed to continue to perform and enhance the public relation activities.

4. ECONOMIC INCENTIVES

In April 1997, six municipalities located in the immediate vicinity of the potential site founded a Social Oversight and Information Association, under the TETT acronym. Since its establishment, this Association regularly follows the investigations with close attention and provides information to the public. Also, the villages that were against the siting of the repository set up an Association with the non-concealed aim of preventing the project. A few years later, this opposition Association terminated its activities.

It must be recognized that when a community volunteers itself as a candidate site for the proposed facility, a neighbouring community may also be affected. This is more likely to occur if the proposed site for the facility is situated near a municipal boundary. From the Hungarian developer's standpoint, compensation will only be provided to communities that might be affected according to the Environmental Impact Assessment. However, they would probably be willing to voluntarily extend that scientifically determined distance if required for public acceptance and the demand for compensation is reasonable.

It is essential, as pointed out by many authors, that the attitude that radioactive waste disposal is merely a technical problem to be solved by experts, must be abandoned. A repository has social and economic dimensions that will seriously affect the quality of life in the adjacent communities. It has the potential to stigmatize communities, making them less attractive to residents, businesses, visitors, etc.

These are of course what are referred to as 'volunteer incentives' and while these are sometimes called "bribes" by opponents of facility siting, it is generally thought to be essential that volunteer and potential-volunteer communities are as fully aware of the possibilities at as early stage as possible. Indeed, it is considered by many people that these could, and should, merely be opening offers, and that benefits should be adapted to suit the particular local situation. Of course financial incentives are not the answer in every situation. Any agreements regarding incentives, whether financial or otherwise, must be entered into in good faith by all parties. This of course depends on the issue of mutual trust already discussed.

In 1996 the Hungarian Parliament enacted the law on atomic energy. It stipulates that in order to regularly provide information to the population of the communities in the vicinity of the

facilities, the licensee of a nuclear power plant as well as that of a radioactive waste disposal facility shall promote the establishment of a public control and information association and can grant assistance to its activities. Consequently, the law established the legal basis of providing financial incentives for the supportive group of municipalities.

5. RECENT PR ACTIVITIES

The PURAM strategy has remained the same, as defined early in the siting project that is promotion of voluntary participation of the potential host communities, open dialogue and providing incentives. Implementation of the repository is for the sake of the whole country, based on sovereign parties' cooperation, and shall mean a mutually advantageous, so-called win-win solution without compelling anybody to do anything.

Correct relations are kept with the Social Oversight and Information Association. Currently a majority of the local public around the candidate L/ILW site is supporting the project, and this support appears to be durable since we approached them some 10 years ago.

A good link has been built up with technical journalists working in the national media. Consequently, PURAM's news has gotten regular and exact publicity in the nation-wide press. Experts of PURAM are regarded as trustworthy and authentic sources of information.

It is important to be continuously present in the partner's area. One must find the balance of not to interfering with their everyday life, but making them feel that the implementer is a stable, reliable partner. To this end several activities have been carried out including: exhibitions, open day, cultural and information programmes, professional visits, etc.

6. CONCLUSION

In Hungary, the L/ILW siting efforts to date reflect a gradual realization of public acceptability problems and their importance.

The first attempt was based on a purely technical approach with complete ignorance of public acceptability. Although the research activities and scientific investigations carried out during the confirmation of the selected site were in accordance with the international practice of the time, the locals fiercely protested against the construction of the facility. The majority of the competent experts still maintain their opinion that the formerly planned repository site at Ófalu would have been safe if it had been constructed.

The second attempt would have been a concentrated effort to have the facility accepted by one of a limited number of communities without getting the problem into a national perspective. The question of public acceptance was already regarded as a priority without the suitability criterion being compromised. Although there was a good chance of success, this process was suspended in 1992 to facilitate the thorough preparation of the National Project.

In 1993, the next round, called the National Project, was launched with an understanding that the solution of the radioactive waste disposal problem is in the national interest and is not looked upon as a nuclear power plant problem. However, there is still no guarantee that the Project will succeed this time.

Fuelling local resistance to the conventional siting approach is the public's perception that social issues such as perceived risks, inequities, stigma, loss of control, and lack of trust are not being adequately considered. The basic question has been how to overcome this resistance

by means other than administrative constraint. First of all, proponents must build trust and confidence with communities. The creation of public confidence is the first step towards public acceptance. The recent past experience indicates that by using a fair, open and patient process, NIMBY can overcome. Voluntary acceptance must be adopted as the basic procedural principle for the process of siting the radioactive waste management facility.

Effective public interaction is two-way. It is not enough to provide the affected communities with all the necessary information. Attention must be paid to what they think of the issue and their opinion and preferences must be taken into account as much as possible for the sake of the project. The lay opinion represented by the local residents does matter since it must be remembered that they who will have to live with the wastes not the experts.

The local communities must be assured that there is a long term commitment to interaction. Otherwise, they might fear that once the repository has been filled up, they will be left to themselves with the wastes.

The emphasis given to technical assessment of management options and their potential impacts must be counter-balanced by the legitimization of an active, joint decision making role for potentially affected residents. The residents must be regarded as full partners in the process.

The siting process should also ensure that the community accepting the facility is compensated in a way that offsets all costs, and that it leaves the community better off than it was previously. There must also be acknowledgement of the service that the community is providing.

These are the basic principles of a potentially more efficient siting process. However, universally applicable solutions do not exist to the siting problems since the circumstances differ from country to country and sometimes even within one country. Political culture, traditions, and general attitudes of people have a great influence on the extent to which these principles can be applied.

In Hungary there are four main priorities for the coming years in the field of the nuclear waste management:

- safety upgrading the near surface L/ILW repository
- construction a new repository for L/ILW of NPP origin
- expanding the interim storage capacity for spent fuel, and
- to identify a site for a high–level waste repository.

When implementing these programmes one of the prerequisites is to ensure transparency with adequate communication. Past experience has taught us that when developing siting strategy, the understanding of people‘s values is of paramount importance, and this should be articulated as early as possible.

The fundamental aim of all local public relations activities, actions, events and programmes has been to establish a long term relationship between the local communities that are willing to cooperate, and to continuously keep the local residents interested and confident in the development.

The lessons we have learned during the previous abortive projects are: public support depends upon the continued provision of non-nuclear benefits for the community, and that a win-win situation should be offered with emphasis on maximizing joint gains which leaves them better off. In short, our strategy has been: to turn NIMBY into FLIMBY (For as Long as it Improves My Back Yard). That is the basis for cooperation. But we never compromise the fundamental principle that safety is first. Consequently volunteerism is sought out after identifying potential suitable areas.

Currently we have two siting projects in progress where the basic approach for public involvement is the same. The key messages are conveyed differently according to the waste type. The two main stages, namely to build and then maintain confidence with the stakeholders, requires different PR strategy and tools.

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Socioeconomic issues and public involvement practices for near surface disposal of low and intermediate level radioactive waste — Indian approach

S.K. Munshi
Nuclear Recycle Group,
Bhabha Atomic Research Centre, India

Abstract

Currently there are seven operating Near Surface Disposal Facilities (NSDFs) for low and intermediate level radioactive waste in India designed and constructed to address widely varying geological and climatic conditions. It is recognized that a broad range of socioeconomic and environmental issues arise during the repository life cycle. During the various stages of approval, committees representing a range of local community interests and the stakeholders (e.g. local government, schools, business, environmental groups, media etc) are involved. In view of the vastness of the country and the fact that nuclear reactors in India are located all over the country, the logistics for the safe transportation of radioactive waste dictates that the NSDFs are co-located with the reactor sites. In Indian context, the following aspects are considered for public acceptance: association, exhibitions, interaction with educational institutions, media relations, public awareness, printed information, and political influence. The reasons for the successful Indian experience are provided.

1. INTRODUCTION:

Due to growing energy requirements of the country, there is good acceptance of nuclear power in India. India has currently fifteen nuclear power reactors in operation, catering to a demand of 3310 MWe. Additionally seven power reactors are under various stages of construction. These reactor sites are located at different locations across the country.

Over the years, the safe management of radioactive waste including its disposal has been given utmost importance right from the inception of the nuclear power programme. This has helped in acceptance of our policies by the public at large. Currently there are seven operating Near Surface Disposal Facilities (NSDFs) for low and intermediate level radioactive waste in India designed and constructed to address widely varying geological and climatic conditions. Apart from continuous monitoring and surveillance of these repositories, due care is taken to address the basic socioeconomic and public acceptance aspects related to them.

NSDFs have a number of technical and ethical arguments in their favour, subject to the fact that due attention is given towards their safe operations and also ensuring continued financial resources and documentation into the future. Also, it has to be ensured that thorough, simple and transparent information is provided to the public and good public relations are maintained.

Technical and ethical arguments are debated over the long term safety of radioactive waste disposal. A variety of motivations influence social acceptability. Some of them are of ethical nature, while others concern public opinion, trends, economy, etc. A broad range of socioeconomic and environmental issues arise during the repository life cycle. The significance of these issues depends on considerations such as the existing land use, the location of the repository, the types and amounts of waste to be accepted, the specific repository technology selected, the number of workers employed and the proximity to populated areas. It is the role of decision-makers to consider all these issues, including ethics and public acceptability, and to arrive at a balanced appreciation. Environmental

consciousness among the general public continues to evolve and will play an increasingly important role in technological decision making.

During the various stages of approval, committees representing a range of local community interests and the stakeholders (e.g. local government, schools, business, environmental groups, media etc) are involved in different stages of the repository life cycle. An important element in developing public acceptance is the level of public trust in the institutions involved in the NSDF development process, particularly in the development organization and the regulatory agencies.

2. MANAGEMENT OF SOCIOECONOMIC AND ENVIRONMENTAL IMPACTS-INDIAN APPROACH

NSDFs have an impact in the following areas:

- Natural environment (e.g. ecologically sensitive areas);
- The built environment (e.g. the transportation network);
- Social conditions (e.g. the community character);
- Economic conditions (e.g. employment and labour supply);
- Land use (e.g. park and recreational lands).

Potential positive impacts include increased economic activity in the region. Development of nuclear reactors and waste disposal facility increases requirements for services. Due to the deployment of additional workers from outside the proposed site, it is necessary to develop additional infrastructure and services such as additional housing, educational and associated services. These aspects require attention in the development of the impact management programme. A continued close liaison between local authorities and the Department of Atomic Energy (DAE) is maintained so that such factors are addressed satisfactorily. Impact management measures may be applied at different stages of the repository planning, siting and project approval phases.

The development of nuclear power stations and Near Surface Disposal Facility involves a number of sequential steps as discussed, occurring over a time frame of several decades. For many of these steps, explicit approvals are required from national authorities, including regulators, before proceeding to the next step. Selection of a preferred site for development is subjected to consent by the authorities responsible for land use planning. The approval of selected sites is usually subject to appropriate subsequent approvals being obtained from the authorities responsible for nuclear safety and environmental protection.

In view of the vastness of the country and the fact that nuclear reactors in India are located all over the country, the logistics for the safe transportation of radioactive waste dictates that the NSDFs are co-located with the reactor sites. This avoids transportation of radioactive waste over long distances through densely populated areas. Thus the concern for acquisition of additional land for repositories is addressed along with the reactors siting requirements. These sites are located far away from major towns and populated areas, thereby ensuring that the number of affected persons is minimal. The affected persons, after due rehabilitations and compensations, are able to lead better quality life due to improved infrastructure, employment and health care facilities. This factor greatly enhances the acceptability of the nuclear power programme in general and co-locating of NSDFs in particular.

2.1 Public Involvement

In Indian context, the following aspects are considered for public acceptance.

2.2 Association

Our communication activity is aimed mainly at establishing, maintaining and enhancing the confidence and the support of the local population. The objective of all these actions, events and programmes is to establish a long term relationship between the operators and the local communities. The basis of the partnership is the trust of the local community.

It is a practice of the DAE to provide employment at various levels to the families whose land has been acquired for siting of the nuclear complex. These people serve as a good link between DAE and the local community in promoting and providing the factual information pertaining to engineered safety features and safe practices adopted during the construction and operation of Near Surface Disposal Facilities.

2.3 Exhibitions

As a policy of DAE, different groups from various sections of the community (school teachers, students, village leaders etc) are provided broad overview on safe practices related to radioactive waste storage and disposal. Exhibition are held at reactor sites where, apart from exhibiting the advantages of nuclear power, emphasis is also given on the safe waste management practices and measures taken to ensure minimum impact on the environment. As a part of information, tours to the surrounding areas, are also undertaken to keep the public abreast with the programmes and policies of the DAE.

2.4 Interaction with educational institutions

Regular meetings and interactions are held with teachers and students as a target audience. Elementary introduction to the nuclear waste management and disposal is discussed and debated. These target audiences, especially the teachers, are motivated to propagate this information to other students in their respective schools. Routine visits are also conducted for the students and the teachers to various disposal sites. Technical and financial support is given to the teachers for taking up topics on waste management as projects in their curriculum. Essay competitions are also organized among the students to create awareness among the student community. The students from all over the country participate in these competitions, which are held in the national language- Hindi, English and all regional languages. The selected student candidates are invited to Mumbai, the headquarters of DAE, for oral presentation and these students also visit various nuclear research laboratories, isotopic application centres and NSDFs.

The DAE established the Board of Research in Nuclear Science (BRNS), which is an independent body to promote the research in nuclear sciences. Substantial project funding is provided towards assessing and evaluating the issues pertaining to waste management safety by national institutions and universities. Preference is given to the institutions located within the vicinity of reactors and repository sites for evaluation and study of environmental impacts. These studies help in establishing independent safety assessment by the professional bodies. This in turn also convinces the local public. BRNS also provides financial assistance to seminars/workshops conducted by professional organizations on various topics of relevance to nuclear power and radioactive waste management.

The regulatory authorities also carry out independent R&D activities to reconfirm and validate the safety assessments. This helps in building public confidence and acceptance. A Safety Research Institute at Kalpakkam conducts research on all aspects of environmental safety with emphasis on safety assessment of NSDFs and related subjects.

2.5 Media relations

A good relationship is also established with the professional journalists working in the media. The bi-annual journalists meeting is a regular feature where seminars are conducted highlighting the technology developments and safe practices for the disposal of radioactive waste. Thus, regular and correct publicity is ensured through the media. The media not only covers information at national level but also at the regional level. Popular programmes for the general public are telecast on various topics relevant to nuclear energy including the efforts of DAE toward societal development.

2.6 Public Awareness Programme

The Indian Nuclear Society (INS) conducts a full day workshop at various locations all over the country for professionals, society leaders, media, state officials and other prominent persons, who help in creating social image building. These workshops highlight the positive impact of nuclear energy in medicine and agriculture, in addition to emphasizing safe management of radioactive waste.

2.7 Printed Information

A great deal of printed information such as annual reports, newsletters, brochures, papers and publications are made available both on the national and local level.

2.8 Political influence

In certain cases, local political influence is used to promote the acceptance of the repository, keeping in mind the economic development of the region promoted by these local political leaders. In certain cases political opposition is countered by use of persuasion, education and promoting awareness among various sections of the regional society, which helps in eventually changing the attitudes of the local public and helps in countering the political opposition. Regular visits by parliamentarians and members of state legislatures are conducted to the nuclear power and NSDF sites.

3. CONCLUSION

The major reasons for the satisfactory situation in India related to NSDF are early siting, co-location with the nuclear power plants, and avoiding build-up of waste inventory. Research and development activities in all aspects of design and safety assessment of NSDFs also started along with inception of nuclear energy programme.

In India, it is recognized that radioactive waste management involves both technical and societal dimensions, which are linked very closely and cannot be dissociated. It is a policy of DAE to discuss the nuclear power and radioactive waste management programmes and policies with the public to enhance the public confidence, trust and acceptability.

Developing and operating of Baldone repository "radons"

A. Abramenkovs
Ministry of Environment, Hazardous Wastes Management State Agency,
Salaspils, Latvia

Abstract

In 1959, the Soviet government decided to construct the near surface radioactive waste repository "Radons" near the Baldone city. It was put in operation in 1962. Changes in the development of the repository were induced by the necessity to upgrade it for disposal of radioactive wastes from the decommissioning of the Salaspils Research Reactor (SRR). The safety assessment for the necessary upgrades of the repository was performed during 2000-2001 under the PHARE project. The outline design for new vaults and interim storage for long lived radioactive wastes was elaborated during 2003-2004. The Environmental Impact Assessment (EIA) for upgrade of Baldone repository was performed during 2004-2005. It was determined that additional effort would be required to solve local social issues in order to continue with the operation and upgrade of repository. It was shown by EIA, that the local population has a negative opinion against the upgrade of the repository in Latvia. The main recommendations for upgrades were connected with increasing of the safety of the repository, increasing of PR activities for education of the society, and developing compensation mechanisms for the local municipality.

1. INTRODUCTION

The national radioactive waste repository "Radons" is located in the Baldone site near the capital of Latvia – Riga. It was put into operation in 1962. The repository was originally built according to former USSR design as a near surface "Radons" –type repository with common vaults.

Since 1995, after introduction of new technology providing the possibility of retrieval of the radioactive waste containers, the new seventh vault was put into operation.

On 16 May 1995, the Cabinet of Ministers made Order No. 263 to shut down the Salaspils Research Reactor, and the SRR was shutdown on 19 June 1998. According to Order No. 57 of the Cabinet of Ministers in 26 October 1999, which accepts the option to direct dismantling of SRR to "green field", the upgrade of the national radioactive waste repository was initiated.

The national strategy for radioactive waste management was developed and comprises a series of 13 actions (together with budgetary implications) that should guarantee safe management of radioactive waste in Latvia up to 2010, hence up to the complete dismantling of the Salaspils research reactor. This strategy largely relies on the recommendations of the EC-funded study that was completed in 2001 [1], as well as, several studies for decommissioning of Salaspils research reactor [2-4] The Government of Latvia on 26 June 2003 decided to start the upgrade of the Baldone repository.

The outline design for additional vaults and interim storage for long lived radioactive waste was elaborated during 2003–2004 under an EC-funded project. To meet all the requirements of the national regulations, the EIA studies were performed during 2004-2005.

2. THE SHORT DESCRIPTION OF REPOSITORY

The “Radons” Radioactive wastes repository occupies a 7 ha territory and consists of 2 parts – “A” supervision part and “B” – control area with the vaults (Fig. 1). The environmental laboratory, decontamination building, and garage building are located within the territory of the repository. The emergency group of the hazardous wastes management state agency is based on the infrastructure of the repository. There are 7 vaults in the control area of the Baldone repository. Three of them are concrete, underground 200 m^3 vaults (1, 3, 6), 2 are concrete underground 40 m^3 vaults (4, 5) and one vault is a 200 m3 stainless steel underground tank used for liquid waste (2), but now the waste has been removed and the tank was cleaned up. As vaults for solid waste were filled, a new 1200 m^3 vault was constructed (7) and maintenance was started at the end of 1995.

3. DEVELOPMENT OF REPOSITORY DURING 2000- 2005 YEARS

It was shown [1-6], that the decommissioning of Salaspils research reactor causes significant changes in radioactive waste management system of Latvia. The following upgrades were performed at the repository:

- Security systems (2002-2004);
- Radiation protection upgrades (2003-2004);
- Upgrade of the 7th vault;
- Transport systems upgrades (2003-2005);
- Radioactive wastes packages upgrade, including tests (2000-2004);
- Emergency group upgrade (2004-2005).

The following studies were performed for improving of radioactive waste management system in Latvia and hazardous wastes management agency:

- Safety assessment for planned upgrades of capacity of repository – PHARE project (2000-2001);
- Preparation of outline design for additional vaults and interim storage of long lived radioactive wastes- PHARE project (2003-2005);
- Environmental Impact Assessment studies for upgrade of repository (2004-2005) [5].

4. INTERACTIONS WITH THE LOCAL MUNICIPALITY

Operational activities at the repository are connected with the interactions with the local municipality of Baldone. The opinion of the Baldone population related to the impacts from the repository is shown in Fig. 2. The main problems of the population are summarized in the Table 1.

Table 1 The main problems for the population of Baldone municipality (public opinion).

Factor	Value %
Impact on health	51
Unclear impact of radiation	31
Psychological discomfort	18
Impact on nature and animals	12
Lack of information on repository	10
Impact on economy	8

According to the EIA studies, about 62% of the population is against the upgrade of the repository. The main reasons for this opinion are connected with "fear factor", leak of information and the previous problems in communication with the Government. Main recommendations of the EIA studies are:

- Increase safety of repository;
- Develop PR activities for education of society;
- Develop the compensation mechanism for local municipality.

To develop the positive cooperation between the local municipality and repository, the following measures are being performed:

- Preparation and submission of quarterly activities report for the local municipality;
- Preparation and submission of annual environment monitoring report;
- Participation in the renovation activities of the middle school of Baldone;
- Support of different projects of the Baldone municipality;
- Development of a waste minimization programme for the decommissioning of the Salaspils research reactor.The last issue includes, not only the protection of the population of the Baldone municipality, but also measures for protection of the environment by using modern technologies for conditioning the radioactive wastes at the Salaspils site.

5. CONCLUSIONS

The following conclusions are provided for the Lativan experiences in managing radioactive waste in the country.

- The national near surface disposal site for radioactive wastes exist in Latvia.
- The decommissioning of Salaspils research reactor has caused upgrades to the Baldone repository.
- Additional efforts must be performed to develop cooperation with the local municipality to support the radioactive wastes management system in Latvia.

— The education of society is necessary for further development of radioactive wastes management system in Latvia.

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Local municipality and public involvement into site selection process of near surface repository for low and intermediate level radioactive waste in Lithuania

D. Janėnas
Radioactive Waste Management Agency (RATA), Vilnius, Lithuania

Abstract

Radioactive waste management agency (RATA) being responsible for radioactive waste disposal in Lithuania currently is searching a site for construction of near surface repository (NSR) for low and intermediate level radioactive waste (LILW). Approximately 100 000 m³ of LILW from Ignalina NPP (INPP) should be disposed of in the near future since decision was taken by Lithuanian Government to shut-down power plant by year 2009 and to start immediate dismantling. Essential factor in the site selection for NSR is public acceptance. According to Lithuanian legislation design of NSR can't be started without approval of local municipality. Two candidate sites for NSR were identified close to the main source of waste – INPP. This paper presents results how general public and municipality of Ignalina were informed about planned activity and safety aspects of NSR. A number of benefits and socioeconomical measures were asked by municipality to compensate long term negative psychological impact of NSR to the region. INPP was constructed close to borders between Latvia and Belarus. Those countries expressed concern about the Lithuania's plans to construct NSR close to their borders. Consultations with neighbouring countries are described in this paper as well.

1. INTRODUCTION

Lithuania has accumulated large quantities of LILW from operation of INPP. Since the beginning of INPP operation in 1984 all radioactive wastes are stored in storage facilities at INPP site. In the Strategy on Radioactive Waste Management approved by the Government of the Republic of Lithuania in 2002 [1] it is envisaged to construct new repositories for radioactive waste and to retrieve, characterize and condition the short lived radioactive waste accumulated at INPP storage facilities. The Strategy also emphasizes the necessity of getting ready for the management of radioactive waste which will result from INPP decommissioning. A capacity of about 100 000 m^3 is needed for the disposal of both the operational and decommissioning wastes. In order to implement provisions of the Strategy, RATA started to prospect for a site suitable for NSR. An area survey and preliminary site characterization were performed in 2003. The objectives of these studies were to analyze Lithuanian legal requirements, to summarize the international experience, to exclude areas which are not acceptable in terms of multiple ecological, land-use and technical criteria, to determine regions most suitable for NSR, and to select and preliminarily characterize several candidate sites.

2. CONCEPTUAL DESIGN OF THE REPOSITORY

A generic conceptual reference design to be applied in Lithuania was developed after scrutinizing the design and operational experience of the existing NSR worldwide [2]. Two options were considered. In the first option disposal vaults are to be located above the ground water table, in the second option they are to be located below it. In both options barriers of low permeability are to be used to prevent water from entering into the repository. The first option was eventually chosen for the reference design. This reference design is applicable to the needs in Lithuania, considering its geological, climatic, hydrogeological and other

environmental conditions. After filling with waste packages, the concrete vaults will be covered with concrete roofs. The vaults and the clay liners will be adequately protected from harmful atmospheric impact until the final closure of the repository.

3. CHARACTERIZATION OF INPP REGION AND SELECTION OF CANDIDATE SITES

The INPP region consists of Visaginas, Zarasai and Ignalina districts. The choice of the repository's area in the immediate vicinity of INPP is restricted by its proximity to the state border, Visaginas town, Lake Drūkšiai and protected areas. Due to the existing socio-psychological stereotypes, the most favourable environment for the search of sites suitable for the repository is in the territory of Visaginas municipality or the territory within a 30-km radius of INPP.

The region's social importance is characterized by very sharp contrasts in social development of the population. The area of INPP can be described as that of a deep, long demographic crisis and the lowest income of the population in the country (if Visaginas and INPP are not to be taken into consideration), and at the same time as the area of the most favourable natural demographic processes and the highest level of income in Visaginas and at the INPP. It should be noted that the region is of great importance in terms of multicultural development as a place where different cultures meet and interact.

The economic importance of the area is viewed ambiguously due to incompatible lines of economic development that was formed during the Soviet times. On the one hand, the region has energy potential of extremely great national (and trans-national) importance. On the other hand, the region is of negligible importance in the country's economy in terms of industry and traditional bioproduction (with the exception of forestry): it provides only 0.5% of the country's industrial production, 1-2% of agricultural production, and attracts only 1.4% of investments. However, the region has immense potential of tourism and recreational resources. It has been for quite a while one of the most important areas of Lithuania's recreation industry and used to enjoy international fame that it is regaining again.

Three potential sites, Galilaukė, Apvardai and Visaginas (Fig. 3.1), were selected after the integration of the results of negative screening.

After the comparison of available information it was preliminary concluded that the ridge in Galilaukė village has the most favourable conditions for the repository and hills northwest of Lake Apvardai is the second-best potential candidate. Both sites are located in Ignalina district. The last site, that at Visaginas, was later rejected because it is already occupied by other waste management facilities.

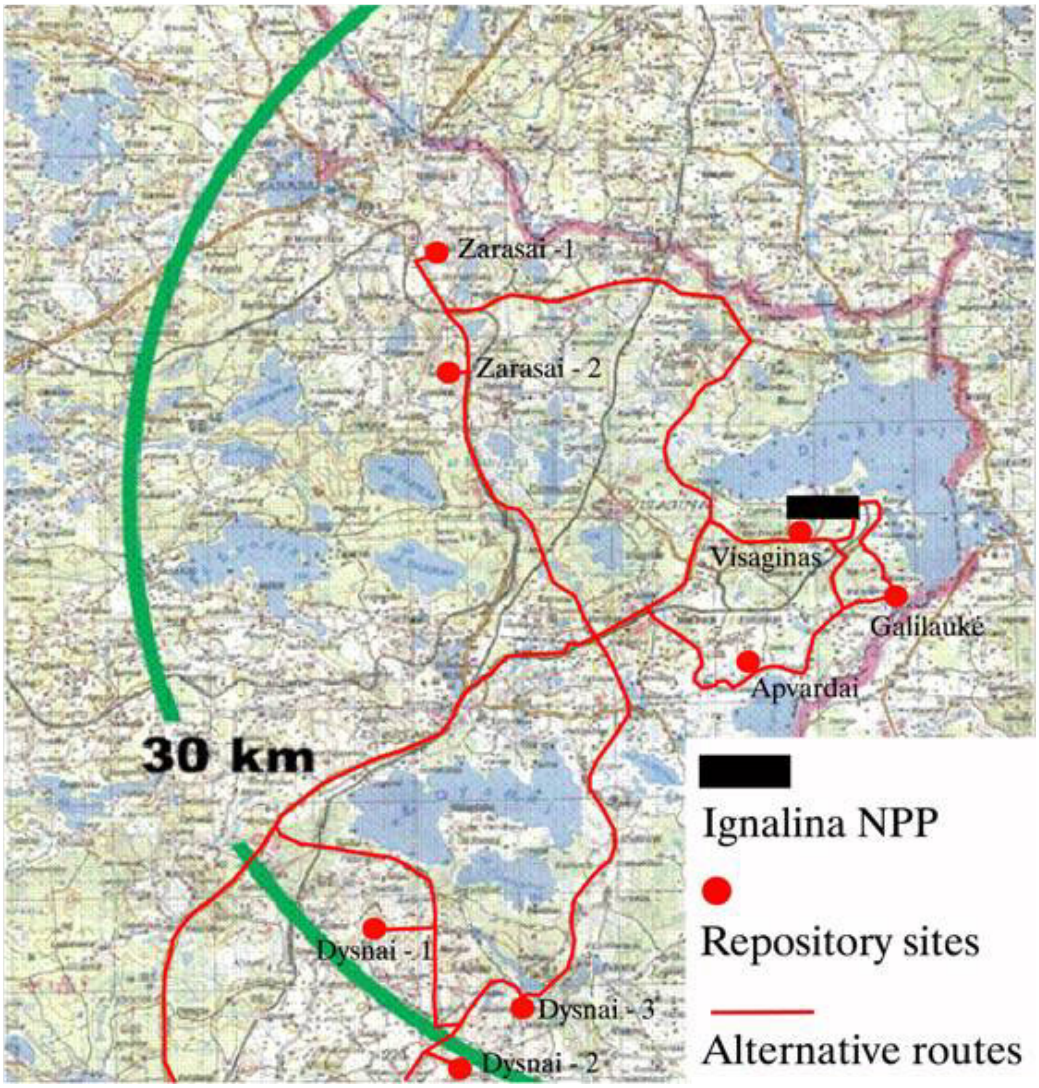

Fig. 3.1. Preliminarily investigated candidate sites and communication routes [3]

4. CHARACTERISTICS OF GALILAUKĖ SITE

It was preliminary concluded that Galilaukė in Ignalina district is candidate No. 1 to host the repository [3]. The potential site is located on a large ridge with a sloping earth surface and excellent water run-off conditions for rain- and melt-water. Galilaukė site comprises an elongated, 10-15-m-high, flat-topped hill, underlain by a 50-odd-m-thick layer of sandy till. The high soil density indicated by the general geotechnical survey suggests good slope stability, and the area will probably remain stable for a long time. Tributaries to Lake Drūkšiai and the lake itself ensure fast surface run-off and good dilution conditions.

Galilaukė site is situated 4 km southeast of INPP, 9 km east of Visaginas, 11 km northeast of Rimšė and 2.5 km northeast of Gaidė village. The site is 0.6 km away from Lake Drūkšiai, 0.7 km west of the Drūkša River and the national border with Belarus.

The distances to the nearest larger settlements of Belarus are as follows: 4 km to Drisviaty, 3-4 km to Grytuny and Gireyshi, 18 km to Vidzy, and 26 km to Braslav. The distance to the nearest protected territories in Lithuania is 8-10 km, and some 20 km to the Braslav National

Park in Belarus. The distance to the nearest Lithuanian–Latvian border crossing point is 11.5 km. There are no major settlements in the vicinity of the border on the Latvian side.

The social importance of the area is negligible due to small population density and its demographic condition. The area is also of little importance in terms of economy, as it is used for extensive agriculture of natural type. The recreational value of the area is very low owing to the lack of conditions and resources, although favourable possibilities exist for recreational activities on a local scale in the adjacent areas.

After consideration of possible environmental impact it was concluded [4] that the NSR could be built at Galilaukė. If the repository were constructed at Galilaukė site, the neighbouring countries would not be affected [4]. Galilaukė site is deemed to be preferable to Apvardai site.

Also, Galilaukė, being not too far from and not too close to Ignalina NPP and a short distance away from the existing railway, is a particularly favourable place for the repository. Galilaukė is remote enough from the INPP and leaves space for other activities related with decommissioning or possible construction of new reactors. The proximity to the railway gives possibility to transport building materials. The railway could be considered as an alternative for waste transportation on roads.

5. IGNALINA MUNICIPALITY INVOLVEMENT DURING ENVIRONMENTAL IMPACT ASSESSMENT OF GALILAUKĖ AND APVARDAI SITES

According to the national legal requirements, the site for a radioactive waste repository has to be selected in compliance with the provisions of the Law on Environmental Impact Assessment. The decision on suitability of the sites has to be taken after a comprehensive analysis of economic, social, technical and safety-related aspects. In 2004 RATA contracted the Lithuanian Energy Institute (LEI) and the Institute of Geology and Geography (GGI) to perform the environmental impact assessment (EIA) for construction of NSR. The main goal of the EIA was to assess the suitability of the two, Galilaukė and Apvardai, sites identified in the previous studies. The results of integrated investigations are presented in Report [4]. It was concluded in the EIA Report that the NSR could be constructed at any of the candidate sites [4]. Due to better hydrological, hydrogeological, and geological conditions, as well as more favourable social economic environment Galilaukė site is preferable. In both cases expected individual doses would be below the dose limits, and the population of Lithuania and the neighbouring countries would not be affected.

A public hearing was organized to discuss the draft EIA Report. Local population in principle was not against construction of NSR. The draft Report was agreed by all responsible state and municipal institutions. The Council of Ignalina district stated that of the two construction sites proposed in the EIA Report, the one at Galilaukė is preferable. However, the Council also indicated that construction of new nuclear facilities, no matter how indispensable, would have a negative impact on the overall social and economic environment throughout Ignalina district. It would also result in psychological discomfort, deterioration of real estate values and investment potential; it would also negatively affect recreation and tourism, the main businesses in the region, and will increase the need for human and financial resources for social healthcare. Therefore, before beginning to implement other activities related to the NSR, a compensation package has to be prepared. Ignalina Municipality Council asked to implement various socioeconomical development measures for the region which worth more than 90 MUSD. Those measures related to improvement of infrastructure, like building roads, but some of them are not relevant to the NSR at all.

6. CONSULTATIONS WITH NEIGHBOURING COUNTRIES

While implementing requirements of the ESPOO Convention and the Joint Convention on safety of spent fuel management and safety of radioactive waste management, the Lithuanian Ministry of Environment sent preliminary information to Latvia and Belarus about environmental impact assessment of construction of NSR at Galilaukė and Apvardai sites. Several meetings were held in Latvia and Lithuania to discuss NSR construction plans. In July 2005 meeting in Daugavpils was held with the minister of environment of Latvia and officials of Daugavpils municipality. This city has more than 100 thousands inhabitants and is located less than 30 km from INPP. Later in September 2005 in Kraslava city of Latvia another one meeting was held with representatives of association "Euroregion Country of lakes". The closest municipalities of three countries Lithuania, Latvia and Belarus formed an association with a name of "Euroregion Country of lakes". Issues related with Ignalina NPP are of interest to this association as well. Despite that information on safety aspects of NSR was provided with the conclusion that neighbouring countries would not be affected, official reaction from the politicians of Latvia and Belarus was negative. In the articles in the press of those countries appeared information that in response to Lithuania's plans to construct NSR, Latvia and Belarus will consider possibility to construct other dangerous objects also close to the borders. Parliament of Belarus officially addressed Lithuanian parliament with request not to construct NSR close to the state border. In order to provide more information on safety features of NSR Ministry of Foreign Affairs of Lithuania invited observers from both countries to take part in the peer review mission of the NSR site evaluation programme which is being organized by IAEA under the request of Lithuania. This mission will be held on 12-16 December 2005. The objective of this peer review is to provide - on the basis of international safety standards and applicable national standards - an independent assessment of the safety of the considered sites and feasibility of the proposed reference design and its adequacy to the local conditions. This peer review should inform RATA whether its programme is consistent with international standards and consistent with good practice from other national disposal programmes. The final decision on the NSR site will be done by Lithuanian Government in 2006 taking into account recommendation of this peer review mission as well as social and political considerations.

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Developing and operating repositories for low and intermediate level waste in Norway

T.E. Bøe
Radioactive Waste,
Institute for Energy Technology, Norway

Abstract

Norway has only one nuclear power plant and a few other radioactive waste generators. The lessons learned from the development, use, and retrieval of a near surface repository is summarized. Also, the planning, assessment, public acceptance, licensing, construction, and operation of the current geologic repository are described. The conclusions derived from comparing both projects are provided.

1. RETRIEVAL OF A NEAR SURFACE LILW REPOSITORY AT KJELLER - 2001

Old repositories – lessons learned

In the late 1960's, the radioactive waste storage capacity was becoming a challenge all over Europe. European experts, including Norwegians, investigated the possibility of dumping radioactive waste in Biscaya (ocean disposal). The conclusion was that this was safe and acceptable.

Preparation to ship waste from Norway was started, but the plan was not accepted by public opinion and in the end the Ministry of Fishing stopped the process, by saying it was not acceptable for a fishing nation to drop waste in the ocean.

Still Norway had problems with radioactive waste storage capacity and applied for and got a license for a shallow landfill close to the waste treatment plant at Institute for Energiteknikk (IFE), the only owner of research reactors. Shortly after the license was granted, about 1000 drums were buried in the repository. Safety calculations were based on corrosion of the drums in 10 years and the content would disintegrate and leak to the nearby river in 30 years. The exposure to locals was expected to be less than 1μSv/y.

No leaks from the repository were ever detected, but the local community was not convinced and started to push for removal of the waste. When the preparation for a new repository started, public opinion demanded removal of the old repository and transfer of the waste to the new facility. Figure 1 shows the condition of the drums at the time of removal.

Once again the public opinion had overruled the experts. It is important to get acceptance both from experts and the public when making plans for waste repositories.

Fig. 1 Removing of old repositories

2. HISTORY – THE WAY TO THE NEW REPOSITORY

In 1989, the Kveseth Committee was appointed to: prepare plans and methods for deposition of radioactive waste in Norway. By 1991, the Kveseth Committee recommended the Killingdal Mines in Sør- Trøndelag County and the construction of a new facility built in rock near IFE, Kjeller. Out of the original 52 possible sites identified near IFE, thirteen possible sites were sited by map and air photography studies. These were further reduced to three suitable sites:

- Kukollen Mines in Sørum municipality in Akershus county
- Killingdal Mines in Sør-Trøndelag county
- Himdalen in Aurskog-Høland municipality in Akershus county

During the meetings with local communities, plans were presented for a new national repository and explanations were given on what impact this would have to a local community. No financial or economic support or jobs to the local community were promised. No taxes or compensation will be paid to the region or the local community. In Norway a repository is looked upon as a matter of national interest. The location is decided by the government and this cannot be opposed by local authorities.

A consequence analysis report completed in 1992 recommended the construction of a new facility in Himdalen. On 28 April 1994, the Norwegian Parliament passed a resolution to build a Combined Storage and Repository for Low- and Intermediate Level Radioactive Waste in Himdalen. The IAEA Waste Management and Technical Review Programme (WATRAP) team wee sent in 1995 to evaluate politics and facilities related to management and treatment.

3. OWNER

The owner of the repository is the Directorate of Public construction and Property (Statsbygg). The technical basis for the license for construction is based on:

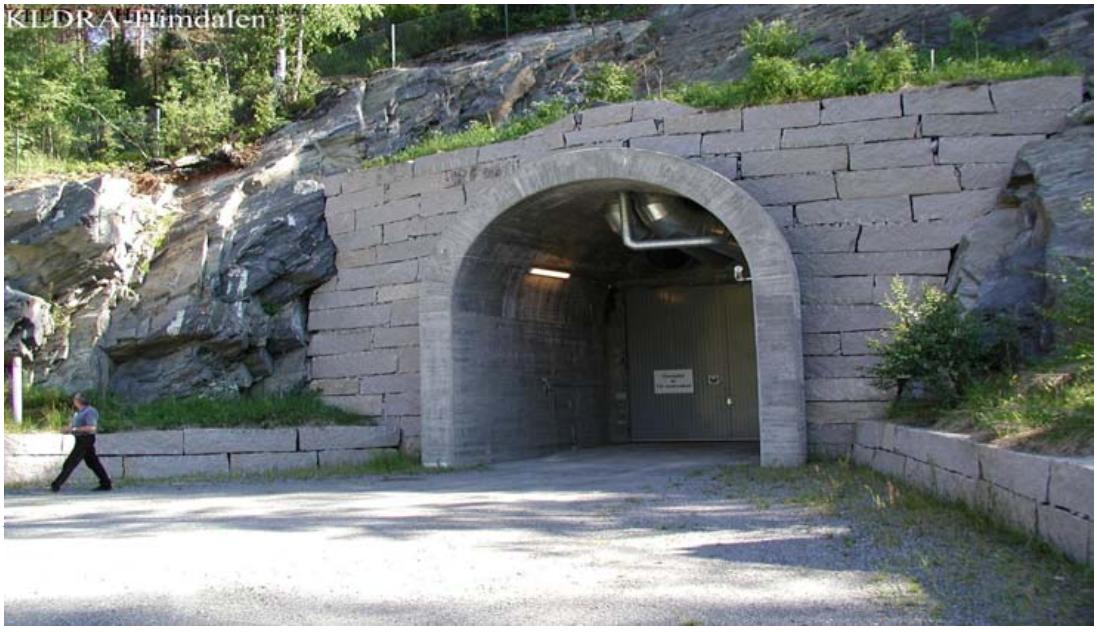
- Technical design of the facility
- Geology at the location
- Hydrology and water flow in the rock masses
- Earth quakes, frequency and loading
- Safety assessment based on scenarios for ”probable” and ”improbable” events.

4. CONSTRUCTION

The construction of the repository was completed in about one year. The key events during this portion of the project are as follows:

- **28 February 1997**: Licence for construction was given
- **April 1997**: Construction work was started
- **9 Mai 1997**: Start of construction of the rock cavers
- **30 April 1998**: Licence for operation of KLDRA-Himdalen was given
- **24 Sept. 1998**: Presentation ceremony
- **Price tag**: (approximately) 9 000 000 €

The entrance to the new facility is shown in Figure 2, below.

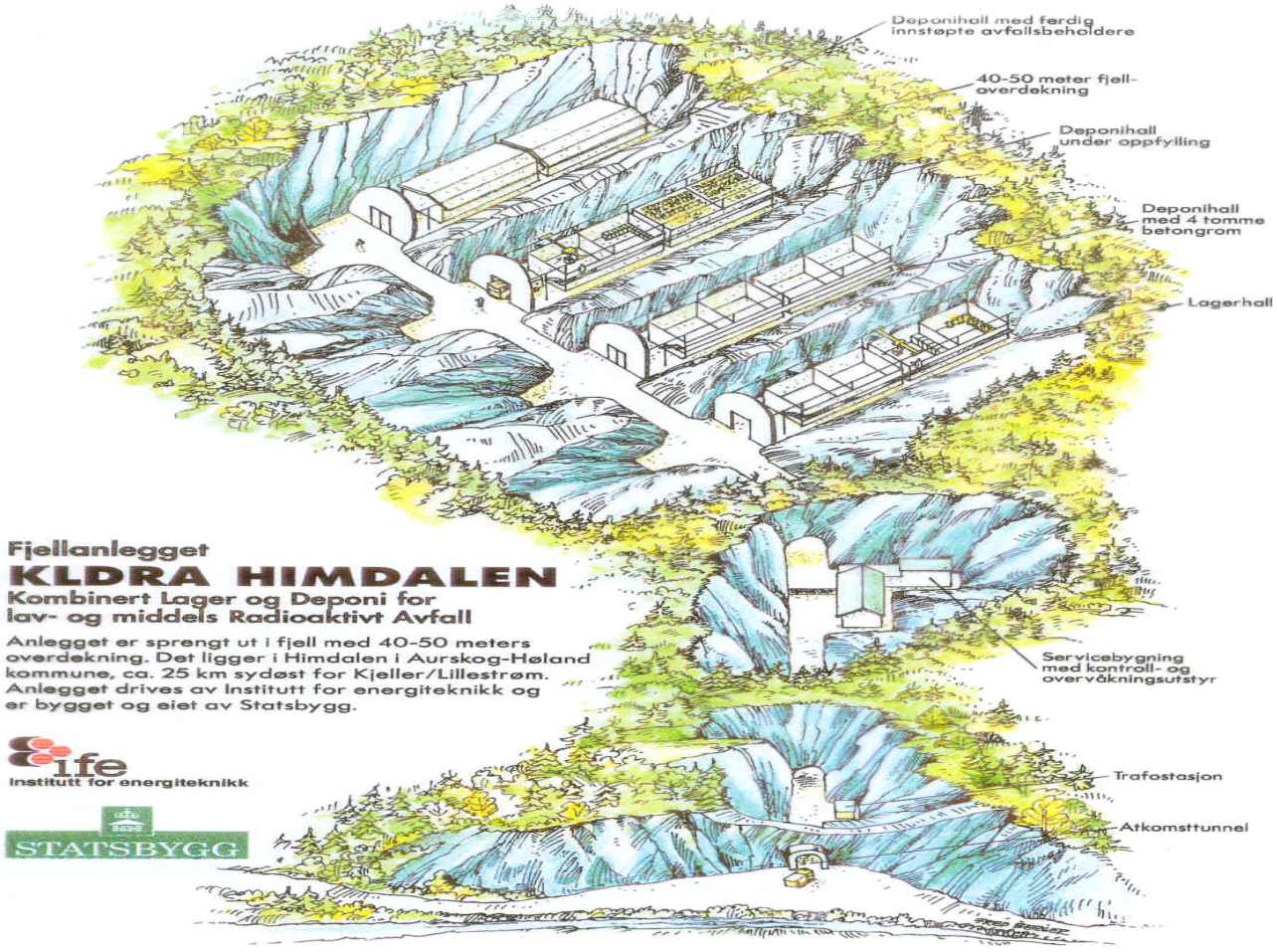


5. OPERATOR - IFE

The Institute for Energiteknikk (IFE) was designated as the operator of the repository. The license for operation is based on the following features:

- Description of waste treatment at IFE
- Estimates of waste volumes and activity levels
- Transport procedures
- Operation processes and safety
- Radiation protection

An architectural rendering of the facility is shown in Figure 3 below.



Please note that the repository inclines upwards - into the mountain – not down. Any water would naturally be drain from the repository.

6. WASTE VOLUME AND ACTIVITY LEVEL

The Himdalen repository has a capacity of 10 000 units (drums) with low- and intermediate level radioactive waste. The repository can hold 7500 drums and the storage area sized for 2500 drums. The operational period is expected to continue up to 2030. At the time of closure the estimated radioactivity content will be about 520 TBq. After closing the installation will be subjected to surveillance in a time period of 300-500 years.

7. CONCLUSION

The Himdalen site in combination with the chosen engineering concept is suitable for storage and disposal of the relative small amount of Norwegian low and intermediate level waste.

The Himdalen repository is open for the public and is visited by schools and local social organizations. Normally they combine a regular meeting with a visit to the facilities. People are allowed to walk into the repository and see where the waste is put and at the same time the precautions taken to avoid leakages of activity to the surroundings is explained. "**Seeing is believing" is the best way to convince people!**

Socioeconomic aspects in the development and operation of the national radioactive waste repository — Rozan

W. Tomczak
Radioactive Waste Management Plant,
Otwock, Swierk, Poland

Abstract

The National Radioactive Waste Repository in Rozan (NRWR) has been operated since 1961. It is located on the territory of a former military fort, which was built in the years 1905-1908. The waste repository consists of four concrete constructions of the fort and a section of a dry moat adopted for the purpose of disposal. The NRWR is a near surface type repository assigned for disposal of short lived low and intermediate level waste and for temporary storage of long lived waste. The operation of the repository is conducted by the Radioactive Waste Management Plant (RWMP) which is a state public utility established by provision of Atomic Law in 2002. The access of the local community to information on the siting of the repository, performed during 1957 to 1960, as well as information about the assignment and construction of this facility was very limited. Also during its operation from 1961 to 1988, the information about the repository, including the results of the radiological monitoring and the impact of the repository on the environment reached the local community and the Rozan authorities only occasionally and in a limited scope. The situation was considerably changed in 1988, when a group of IAEA and other experts, invited by the Polish government, visited Poland to estimate the safety of the NRWR operation as part of the WAMAP Mission. Documents prepared for IAEA experts, including an up-dated safety report became accessible for the local authorities and the community of Rozan. On one hand this improved the cold relations of the local public and the Rozan authorities with the operator of the repository. And on the other hand, it made the local community realize that the information had been hidden from them, and it deepened the mistrust of the people and regarding the location and operation of the repository. Actions aiming at confidence building focused on the conclusion of an agreement with authorities of the community of Rozan, including the involvement of the local people in the decision making processes related to conditions and period of repository operation and in the process of environmental impact assessment. Honest information was provided to the media and the local population about matters related to the repository and a broad information campaign was run, mainly among the school youth. The agreement also included economic aspects related to the existence of the repository on the Rozan community territory, such as estimation of profits lost by the commune due to reluctance of investors to invest in this area, drop of tourist attractiveness in the regions of Rozan. There were multiple forms of compensation including financing of investments and then fees, sanctioned by law, to the commune from the state budget. Due to the undertaken actions and as a result of negotiations the relations of the operator and the body supervising its activity with local authority and public have been successfully regulated. The RWMP has received a permission to develop the repository and to continue its operation further, i.e. to 2020.

1. INTRODUCTION

The National Radioactive Waste Repository (NRWR) is located at Rozan on the Narew River, at the distance of 90 km northeast of Warsaw. To the north side of the fort there are houses, which were at the distance of 800 m at the time the repository was established. Currently there are houses at the distance of approximately 400m away. To the northeast at the distance of 800m is the Narew River. The territory surrounding the repository consists of agricultural land. The population of the Rozan community amounts to about 5000 inhabitants. The location of the repository is shown in Fig.1.

NRWR has been operated since 1961. It is constructed on site of an ex-military fort, which was built in the years 1905-1908. The waste repository consists of 4 concrete structures, partially covered with soil. A section of a dry moat surrounding this fort has also been

adopted for the purpose of disposal. The NRWR is a near surface type repository assigned for disposal of short lived low and intermediate level waste and for storage of long lived waste. The repository is operated by the Radioactive Waste Management Plant (RWMP) which is a state public utility established by the provision of Atomic Law in 2002. The layout of the storage/disposal facilities is shown in Fig.2.

2. SITING HISTORY

In Poland, the development of the nuclear technique and isotope applications started in the early 1950s. There was no organization at that time that would deal with the radioactive waste. The radioactive waste resulting from the nuclear technique and isotope applications in research, medicine and industry was collected and stored in the place of generation. Therefore, in the late 1950s, there were hundreds of tons of solid waste and used sealed radioactive sources stored in different places around the country. It presented an urgent need to solve the problem of radioactive waste management.

The disposal facility was an essential issue, and it was decided to select one central repository. Many ideas of underground disposal (in shelters, in decommissioned mine shafts, particularly salt mines and also in existing military fortifications) were taken into consideration.

Having in mind the nature of the waste to be disposed, as well as the requirements related to the location of a repository defined by the Authorized Plenipotentiary of the Government for Nuclear Energy Applications, the appointed Committee of Experts selected military fort located in Rozan on the Narew River out of many possible locations. Upon additional engineering and geological surveys, the Presidium of the Provincial Council of Warsaw issued a decision on the location of the Central Repository of Radioactive Waste in Rozan.

3. PUBLIC INVOLVEMENT IN THE DEVELOPMENT AND OPERATION OF THE ROZAN REPOSITORY

The access of the local community to information on the siting, assignment and construction of the facility was very limited during the years 1957-1960. Also in the period of its operation from 1961 to 1988, information about the repository, including the results of the radiological monitoring and the impact of the repository on the environment reached the local community and the Rozan authorities only occasionally and in a limited scope. The situation changed considerably in 1988, when a group of IAEA experts as part of the WAMAP Mission and others were invited by the Polish government to visit Poland and estimate the safety of the NRWR operation.

Documents prepared for IAEA experts, including a description of the repository siting process, as well as the updated operational safety report, became accessible to the local authorities and the community of Rozan. On one hand it improved the cold relationships of the local public and the Rozan authorities with the operator of the repository. On the other hand, it made the local community realize that the information had been hidden from them, and it deepened the mistrust of the people in matters related to the location and operation of the repository.

3.1 Public involvement practices

Actions aiming at building the public confidence focused on conclusion of an agreement between the former operator of the NRWR, the Institute of Atomic Energy (IAE), and the

local authorities. The first agreement in the history of contacts between these two partners was signed in July 1988.

The agreement defined principles of mutual communication, access of the local public and authorities to the results of radiological monitoring, safety documentation including EIA documents, and periodic visits to the Rozan repository by representatives of the local authorities for a general survey.

Following the access of representatives of the Rozan community to information on the NRWR's operational safety, provisions about the responsibilities of the operator and the principles and scope of cooperation between representatives of the community and the operator of the repository were more precise and considerably increased. Theses provisions were reflected in the next agreement concluded in September 1994. The most important aspects of this agreement included:

- expression of the consent by the Municipality to further operation of the repository,
- appointment of the Committee of Radiological Protection of the Rozan Commune
- by the Municipality to co-operate with the operator in reference to conditions of the repository operation, including dosimetric control of the delivered waste,
- providing fair information by the Municipality to the community of Rozan and the media about problems related to the repository operation and its impact on the environment,
- prohibition to store in the NRWR other waste except that produced by national users of radioactive sources or from production and applications of isotopes in medicine, research and industry,
- providing information to the Municipality about dates of waste delivery to the repository and enabling representatives of the Municipality to observe the unloading actions as well as giving them access to shipment documents,
- making the equipment available to members of the Committee of Radiological Protection, and upon appropriate training, enabling them to make independent measurements of the dose rate,
- at the request of the Municipality, preparation and delivering of lectures for inhabitants of the community about radiation, its properties and influence on the living organisms, as well as, enabling citizens to visit the repository and the Radioactive Waste Management Plant.

The above specified provisions have been implemented by establishing regular meetings with the Rozan Council members, and with the members of the Committee of Radiological Protection of Rozan Commune. Information about the facility is provided and discussed during public meetings, public hearings, lectures, seminars, open door days, and through international cooperation. Public information is also distributed in brochures, newspaper articles, annual environmental reports, films presented on television, and exhibitions at the Information Centre, Swierk.

The meeting with the Rozan Council Members is held once a year. Usually there is a Session of the Council fully devoted to the safety of the repository operation. The session is opened for everyone who wants to attend, including media both local and nationwide. Meetings with the member of the Committee of Radiological Protection are organized quarterly and on the request of each side. These meetings are devoted to the current issues of repository operation.

The last public hearing took place in 2004 in connection with the planned development of Rozan facility. According to the Act of Parliament (No 62, 2001) on the protection of environmental, it is required to involve the public in the EIA process.

3.2 Socioeconomic issue

The radioactive waste collected in the repository in the years 1961 -1988 and the manner of its disposal, especially the used sealed radioactive sources and waste placed in the moat with use of concrete as a backfill material, made the claim to remove all waste and transfer it to another repository practically unfeasible. And although the claims "take the waste to places where people do not live" were raised, they never were the factor that caused the conclusion of the agreement. Moreover, since the waste stored in the Rozan repository is produced in all regions of the country (hospitals, scientific centres, and industrial plants) another frequently raised argument was avoided, i.e. "store the waste in places, where it is produced".

Apart from safety aspects, another important factor that had an influence on cooperation of the repository operator in Rozan with its community and authorities is the socioeconomic issue. From the very beginning of cooperation with the operator, the authorities of the Rozan community stressed that losses had been incurred by the commune due to reluctance of investors to invest in the territory and the lack of tourists visiting where a radioactive waste repository is located. The authorities of the commune demanded a financial compensation for the lost profits, and lack of the possibility to fulfil the claims of the commune. This led to a serious crisis in relationships between the operator and the municipality of the commune, culminating in a blockade of the access road to the repository and preventing the waste shipments.

In the years 1988 – 1992, the Rozan community started receiving financial support from the state budget. This was understood as support to the community accepting waste generated in the benefit of the whole country, and as a compensation of inconvenience from the repository operation. The support had indirect form and was used for improvement of the municipal infrastructure. With the lack of possibility to receive additional means for investments in Rozan, and at the same time lack of appropriate legal regulations requiring the payment of compensations to the commune, resulted in the blockade crisis in 1996. The crisis lasted for about six months. It was agreed that the National Atomic Energy Agency supervising the repository operator would include a provision in the new Atomic Law about payments to the commune on whose territory the National Radioactive Waste Repository was located.

Since 2000 by the provision of Article 57 of the new Atomic Law, the Rozan community has been receiving an annual payment from the national budget. The value of this payment is ca. 2 120 000 EUR which makes up about 50% of the total annual budget of the Rozan community.

4. CURRENT SITUATION IN PUBLIC INVOLVEMENT AND THE COOPERATION WITH THE AUTHORITIES OF THE ROZAN COMMUNE

Due to the undertaken actions and as a result of negotiations, the relationships of the operator of the Radioactive Waste Management Plant and the body supervising its activity, the Ministry of Economy and Labour, with the local authorities and the public have been successfully regulated. The RWMP has received the permission of the local authorities to develop the repository by adapting a section of the south moat for disposal purposes and at the same time to increase the capacity of the whole site. The approval to operate the repository until 2020 has been granted by the Rozan authorities.

It should be also stressed that the results of the international cooperation (WAMAP Mission), and the results of the PHARE project "Improvement of Storage Conditions at the National Radioactive Waste Repository", implemented in 2003 – 2004, were significant in obtaining the approval for development of the repository and its further operation.

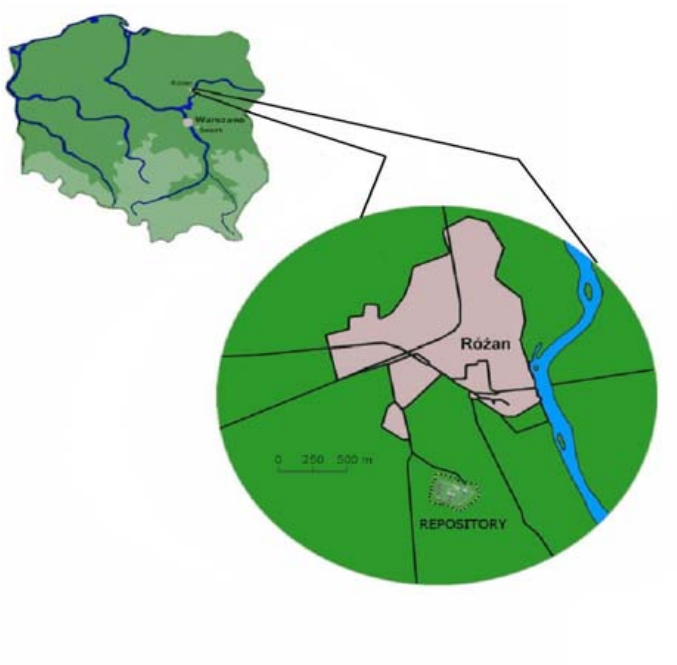


Fig.1. Location of the Rozan repository

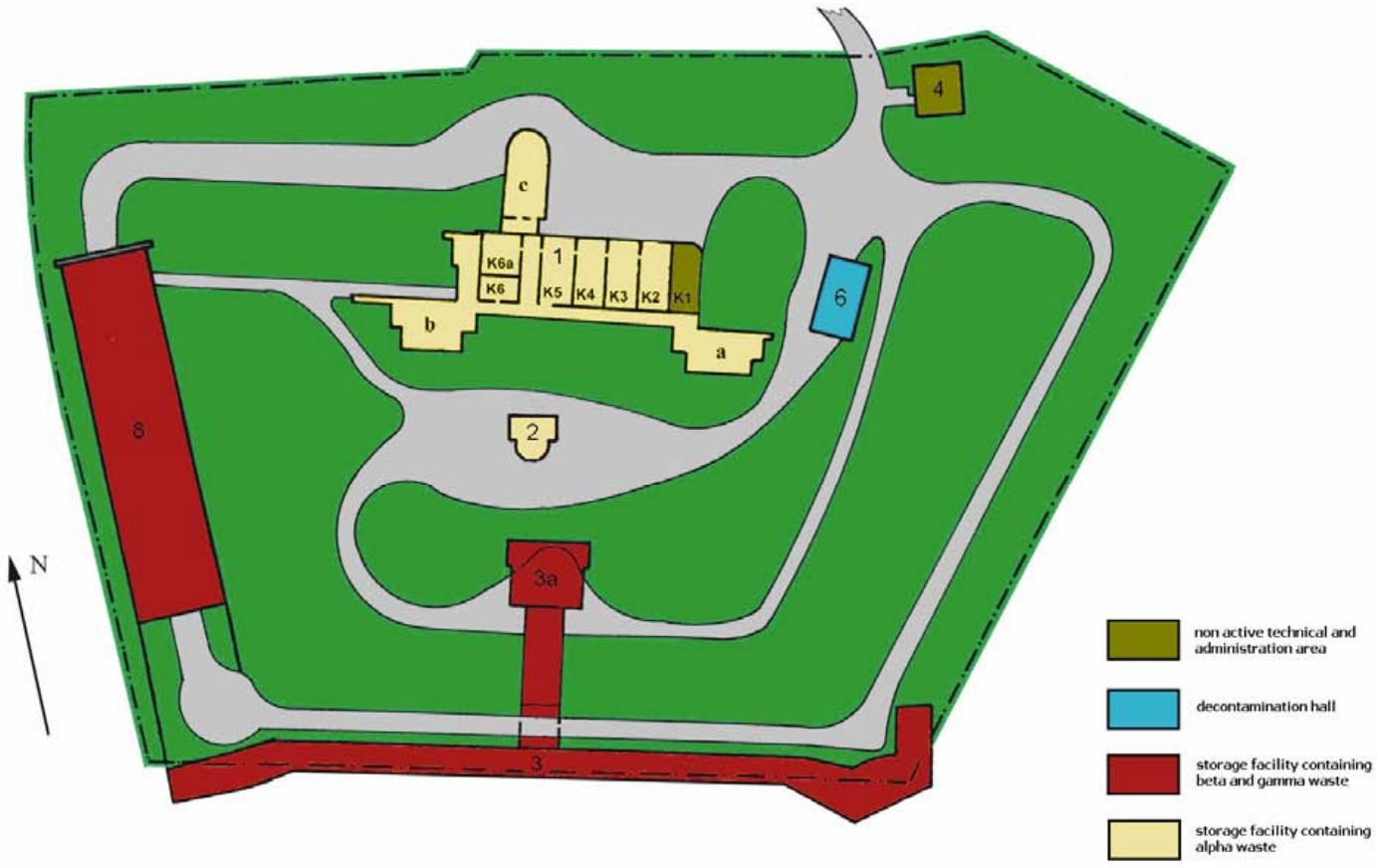


Fig.2. Layout of the storage disposal facilities

Socioeconomic issues and public involvement practices and approaches for developing and operating repositories for low and intermediate level waste

I.L. Tuturici
ANDRAD Agentia Nationala pentru Deseuri Radioactive, Romania

Abstract

The national radioactive waste management agency, ANDRAD, is by law responsible for disposal of all radioactive waste arising in Romania. It operates the subsurface repository Baitha Bihor used exclusively for institutional waste and has recently taken over the development of a near surface repository: a potential site has been identified within the municipality of Saligny, near to the Cernavoda NPP. Public involvement and other non-technical matters have been included in the repository development. Social, economic and environmental impacts at local and regional levels have been considered to be a significant part of the preparatory stages of facility operation. Corresponding measures have been identified to reach public acceptability of the repository, but they will be extended for the whole facility lifetime from the initial planning phase through siting, construction, operation, and closure, to the post-closure institutional control. As a supportive argument collocation of the disposal facility with the Cernavoda NPP represents the most important factor for promoting the repository site selection. It accelerates the repository development process, while minimizing project costs and the non-radiological impacts.

1. INTRODUCTION

Low and intermediate level wastes (LILW) are currently produced in Romania by nuclear power generation and nuclear research as well as by radioisotope applications in medicine, industry, agriculture and other socioeconomic fields. The responsible organization for coordination of the safe management of spent nuclear fuel and radioactive waste in Romania and especially for the development and administration of the waste disposal facilities is ANDRAD (National Agency for Radioactive Waste). ANDRAD is subordinated to Ministry of Economy and Commerce and started its operation in September 2004. The option selected by ANDRAD for the long term management of LILW is disposal in a near-surface facility.

By observing the varying stages of repository development and implementation at the international scale and understanding the characteristic needs for the planning stages of disposal facilities, ANDRAD has determined that it should start to develop and implement technical procedures dealing with specific issues relevant to repository development, safety assessment and environmental impact assessment. Also, ANDRAD determined that many non-radiological factors and issues are important for repository development and operation. From the initial planning stage; such considerations should be addressed as part of environmental impact assessment and approvals process for the repository.

2. OBJECTIVE, SCOPE AND STRUCURE

The objective of this paper is to introduce, in a generic sense, the elements that could comprise the socioeconomic and non-radiological environmental impact assessment for ANDRAD's LILW repository. The scope of the paper includes the necessary discussion of some of the social, economic and non-radiological environmental impacts relevant for development of ANDRAD's near surface disposal facility and illustrates some impact management measures. The paper does not include a description of specific assessment methods.

Section 1 represents the introduction. Section 2 describes, in a short form the objective, scope and structure of the paper. Section 3 discusses briefly the repository concept and establishes the phases of its life cycle. Section 4 presents the basic elements of the national policy, public involvement and cost considerations. Section 5 describes briefly the potential impact on the natural and human environment at the level of local and regional community. Section 6 refers to possible impact management measures. The main conclusions of the paper are presented in Section 7.

3. REPOSITORY CONCEPT AND LIFE CYCLE

The "near-surface" disposal of LILW produced by operation of the power units at Cernavoda Nuclear Power Plant (NPP) and by the nuclear research activities at Nuclear Research Institute (NRI) Pitesti refers to a facility to be emplaced in the exclusion area of the NPP. The selected site for emplacement of the repository is situated on a flat surface on the top of a hill at an altitude of +60 m above sea level. The near surface LILW repository will consist of a number of disposal units located below the original ground surface. The repository should provide sufficient capacity for all the LILW-SL generated by the NPP and by NRI Pitesti. The planed surface of the repository enclosure represents about 7 ha.

The estimated volumes of packaged wastes generated by one CANDU 6 unit to be disposed of are:

- Operational wastes: 2000 - 3000 m^3 / unit
- Decommissioning wastes: 6000 - 7000 m^3 / unit
- TOTAL: 8000 – 10 000 m^3 / unit

The average specific activity of alpha emitters for all the waste packages to be included in the disposal facility, estimated at the end of the institutional control, should not exceed 370 MBq/t. In addition, the maximum specific activity of alpha emitters for each waste package will be limited to 3.7 GBq/t, and in no circumstances shall exceed 18.5 GBq/t.

The repository concept is based on fully engineered barriers arranged in the host rock. The conditioned waste form is the first barrier system of the repository. The second barrier system is formed by repository's structures, namely the disposal cell, drainage systems and rainfall protection cap. The third barrier system consists of the clayey geological strata.

The concept itself includes two principal facilities, namely the waste treatment and conditioning plant and the disposal facility (see Fig.1). The treatment and conditioning plant is designed to process all incoming LILW using two verified methods for solid radioactive wastes, i.e. treatment by super-compaction (force, 10-20 MN) and conditioning by cementation.

The disposal facility will consist of 24 to 36 cells, divided into two or three groups, each of 12 cells. One group of 12 cells will contain 2 rows of 6 cells, each having a capacity of 216 concrete modules (2.25x2.25x2.20 m) arranged in 3 layers. The concrete modules will contain, for example, the pellets produced by the super-compaction of 218 L drums, embedded in concrete.

Actually the works for the development of the repository are in the siting phase and the following results were obtained. The planning work included facility conceptual design and studies of waste form and packaging, waste emplacement methodology with possible

retrievability option, transportation access options, closure, and institutional control after closure and project financing arrangements as well as the examination of alternative disposal options. Repository siting work has encompassed the process of identifying more candidate sites for repository development. During this phase, a broad range of criteria were used to identify suitable sites potentially capable of meeting national policy objectives and specific project approval criteria and requirements, as well as, scientific and technical requirements; the range of criteria employed included aspects of both the natural and human environment. At the end of the process, the Saligny site was selected as the candidate site.

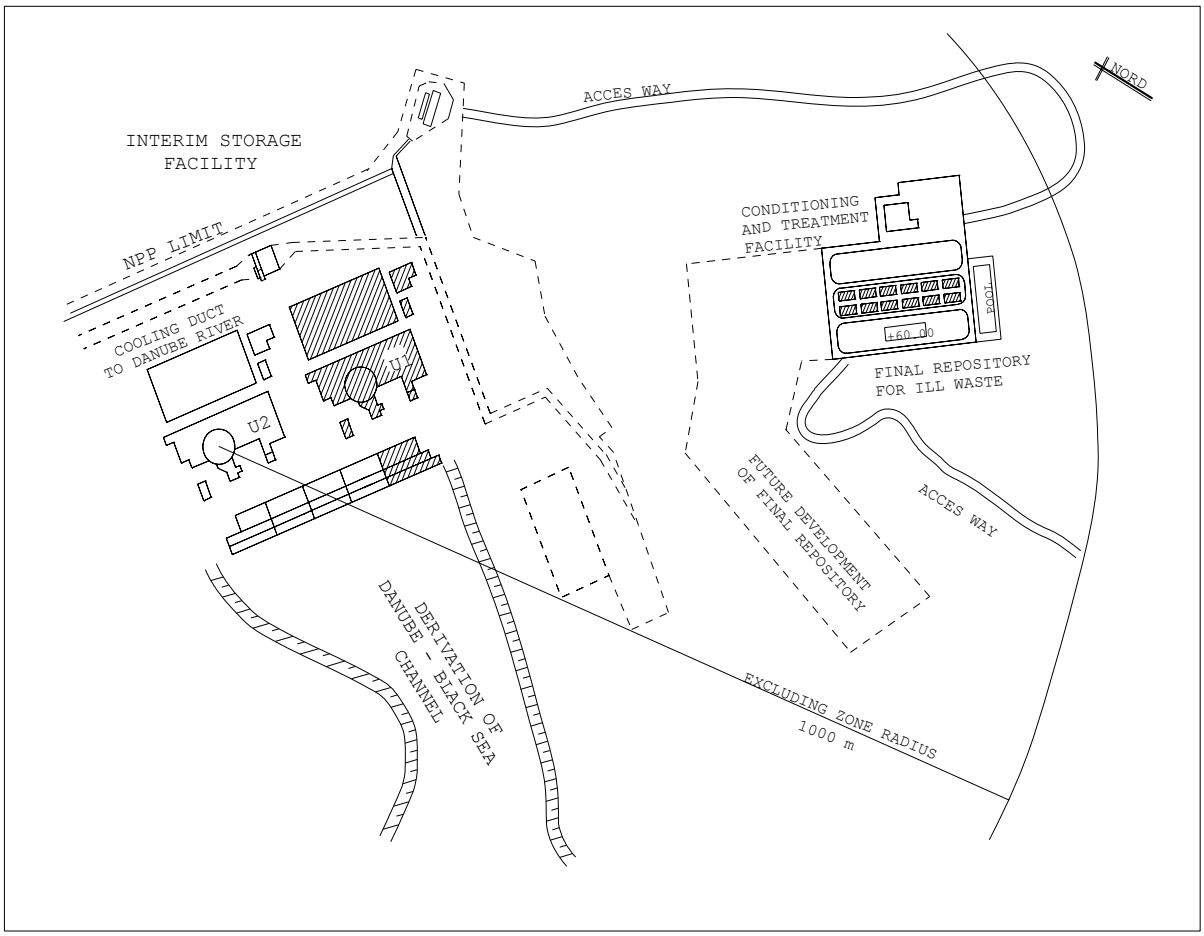


Fig.1. General layout of Cernavoda NPP and Saligny Repository

As recommended by the specific safety documents of the IAEA and recently established by the national specific legislation and regulations, the life phases of the Saligny repository are:

- Planning and sitting phase: repository conceptual design, sitting and process planning, public involvement, environmental impact studies and impact management planning.
- Review and approval phase: repository engineering design, environmental impact assessment, safety analysis for the purposes of approval and licensing, and adoption of impact management plan.
- Construction phase: repository and related infrastructure construction and impact management implementation, including community liaison.
- Operation phase: waste acceptance and emplacement in the repository and impact management implementation, including community liaison.

— Closure phase: final repository sealing and removal of disposal support structures.
— Post-closure institutional control phase**:** environmental monitoring, surveillance and site maintenance with restricted access to the site.

4. POLICY, PUBLIC INVOLVEMENT AND COST CONSIDERATIONS

The national policy in the area of radioactive waste disposal stems from the responsibility to isolate radioactive wastes from the human and natural environment, in a safe and effective manner, both now and in the future. The general principles of radioactive waste management, recommended by the IAEA, are presently included in the specific national legislation and regulatory documents. This is helping ANDRAD in developing an adequate specific legal framework regarding the development and implementation of radioactive waste disposal.

The nature and extent of public involvement and participation in near-surface disposal of LILW at Saligny depends actually upon the existing national legal and political framework and the existing cultural context. ANDRAD should organize in the near future audiences for public involvement activities and include representatives from local communities and administrative units (local, regional and national), government officials, regulatory authorities, scientific community, public interest groups, environmental organizations, industry and trade groups and the news media.

Cost refers to direct expenditures during all repository life phases and is an important provision in the existing draft of the law for the *Fund for radioactive waste and decommissioning.* This draft will be promoted to the Parliament for approval. Evaluation of the costs for siting, development, operating, closure and post closure is a very important matter and should include applicable costs for public involvement, non-radiological impact assessment and impact management. It is very clear that financial issues will strongly influence the timing of repository development as well as the possible need to rely on short- or long term storage as an on-going management option.

5. POTENTIAL IMPACTS DURING THE REPOSITORY LIFE CYCLE

A broad range of socioeconomic and other non-radiological impacts could arise during the repository life cycle. The type and magnitude of these impacts will be strongly influenced by the size and location of the repository, types and amounts of waste to be disposed, selected repository technology, number of workers employed, local community characteristics, proximity of the populated areas in the region, existing and future land uses, as well as other specific project requirements and circumstances. All this impact assessment will be considered in establishing ANDRAD’s communication strategy and programme, for the near future.

The elements composing the impact assessment, other than the radiological ones, includes discussions on social, economic and environmental impacts, at least at local and regional levels, and should be associated with the life cycle of the Saligny. Accurate information, establishing the baseline setting, will form the basis for identifying and assessing potential repository life cycle impacts. Different important factors such as natural environment (land resources, air quality, groundwater resources, surface water resources, etc.) social conditions (demographic, social structure, community health, etc.), economic conditions (local economic activity, employment and labour supply), built environment (housing, education, community services, and utility availability) and land use should be used to characterize the natural and human environment.

6. IMPACT MANAGEMENT

By definition, impact management means the coordinated application of measures designed to mitigate (avoid or reduce the impact), enhance, compensate, monitor and to ensure continuing liaison. Impact management planning means development and application of the appropriate measures for all the factors considered above and begins during the impact management process.

Once potential changes in the natural environment are identified, impact management planning should be focused on meeting requirements of existing legislation, standards and specific regulatory requirements. In the human environment, once potential socioeconomic changes are identified, the initial consideration is the amenability to impact management measures. Impacts that cannot be avoided or reduced through changes in the design of the repository should be addressed through comprehensive impact management measures. These could be developed in negotiation with the potentially affected community.

7. CONCLUSIONS

Possible socioeconomic and other non-radiological impacts are important considerations during the life cycle of the Saligny near surface disposal facility, covering the period from initial planning phase through siting, construction, operation, and closure, to the post-closure institutional control phase. Socioeconomic and non-radiological impact management measures should be established and implemented to eliminate or reduce the potential adverse impacts during the repository life cycle. Measures may also be planned and employed to enhance beneficial impacts of repository development and operation.

Cost considerations should represent an important national policy matter with regard to repository development, operation and closure. Waste disposal funding issues could have a strong impact on timing of the implementation of the selected option. Funding requirements may be significantly higher if the repository pre-construction process is delayed.

Public involvement in impact assessment and impact management planning should be an important consideration for ANDRAD. This involvement and input, through appropriate mechanisms such as local committees, is particularly important in the project development and operation of the repository.

Finally, it is important to note that familiarity of the members of the local community with nuclear operations at the existing Cernavoda NPP represented the most important factor used in promoting the siting of the Saligny near-surface repository. This co-location option was intentionally selected in order to accelerate the repository development process, while minimizing project costs and the non-radiological impacts.

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Long term storage of institutional radioactive waste: Ecological and social issues

S.A. Dmitriev
SIA RADON, Moscow, Russian Federation

Abstract

A State Unitary Enterprise Scientific & Industrial Association RADON, Moscow, Russia has been collecting, transporting, treating and long term storing LILRW generated in scientific and social institutions and in some industrial enterprises of Moscow and 11 regions of the Central Russia abutting the Moscow region for about 45 years. For treating the radioactive waste, RADON applies incineration, compaction, cementation and vitrification. The main aim of such treatment is waste reduction with obtaining monolith (chemically resistant) products being fit for long term storage. According to the IAEA's basic principles of the radioactive waste management, RADON carries out activities on environmental, personnel and nearby living public health protection. Due to proper measures for environmental protection, the release of radionuclides is less than $8 \cdot 10^{-6}$ % of the maximum permissible annual emission into the air and summary discharge of radionuclides into sewage of 14 % of the maximum permissible annual discharge. Effective dose rates in the radiation-control area do not exceed natural ionizing radiation background. Levels of man-made contamination of grounds and air in the radiation-control area are caused by global fallout. The report will present data describing social aspects of the RADON's personnel and public living in the radiation-control area nearby the disposal site. There will be given estimations of the personality structure and age-specific maturity. Long term observation has resulted in evidence that the RADON's disposal site operation does not affect the nearby environment or the public health.

1. BACKGROUND

A State Unitary Enterprise Scientific & Industrial Association RADON, Moscow, Russia conducts the following activities: collecting, transporting, treating and long term storing LILRW generated in scientific and social institutions and in some industrial enterprises of Moscow and 11 regions of the Central Russia abutting the Moscow region. During 45 years, the technological methods applied for the institutional radioactive waste treatment have gradually been improved from traditional cementing or just on-site-storage up to more complicated ones of creating chemically stable forms by vitrification and obtaining metal or ceramic matrices by melting. Currently, the institutional radioactive waste treatment and long term storage in RADON include nearly 18 technological processes (cementing, incineration, plasma chemical treatment, ash residue melting, ion-exchange resin thermochemical treatment and etc.).

RADON carries out activities on environmental, personnel and nearby living public health protection according to the IAEA's basic principles of the radioactive waste management. The RADON's authority has always understood the importance of a comprehensive approach to solving the issues of waste management. The comprehensive approach means solving not only technical issues but taking in consideration socioeconomic aspects. The socioeconomic aspects are many-sided and can include the following: environmental protection, public healthcare and rehabilitation, public relations, taxation, investments, financing and sponsoring social programmes, etc. All these features predetermine the attitude of the public in the area near the disposal site.

2. ENVIRONMENTAL ASPECT

The Environmental Protection System includes features for every aspect of protection. Modern technologies are used for radioactive waste treatment and long term storage. Gaseous emission and sewage disposal purification is done to remove radionuclides. The system also includes the set up of sanitary protective and radiation-control areas and state environmental control posts.

The sanitary protective and radiation-control areas of the RADON disposal site make 2.5 km and 7 km accordingly. In these areas there are two urban-type settlements (Novy and Remmash) and several villages. What is more important is that the Novy settlement foundation was financed by RADON. The population of this urban-type settlement, consisting mainly of the RADON's personnel, is about 5000.

As it can be seen from data in Table 1, the air pollution with radioactive substances was insignificant regarding the maximum permissible emission (MPE). As for sewage disposal, its annual contamination did not exceed 14 % of the maximum permissible discharge (MPD).

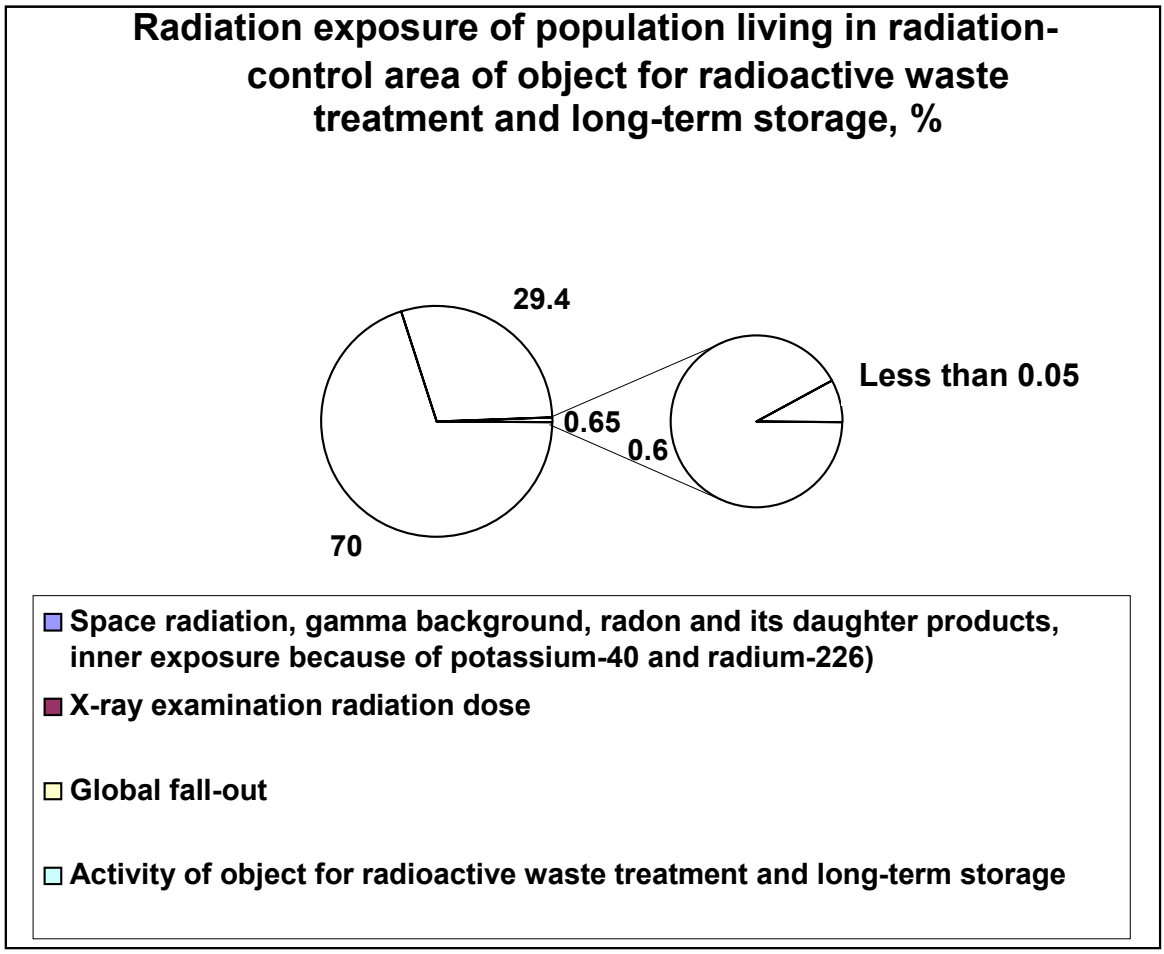
Table 1 Environmental Conditions

Factor	Average Value
Total air pollution within 2000 - 2004	8.35 MBq/year ($7.88 \cdot 10^{-6}$% of MPE)
Total sewage contamination within 2000 - 2004	455.5 MBq/year (14.03 % of MPD)
γ-emission dose rate in the urban-type settlements, μSv/h	
Novy –	0.1 – 0.12
Remmash –	0.08 – 0.1
Bogorodskoe –	0.08 – 0.1
Fall-out density, MBq/(km^2·day)	
Novy –	0.47
Average value over the radiation-control area –	0.43
Checkpoint (Yaryguino village) –	0.3
Absorbed dose within 2002 - 2004, mGr/year	
Radiation-control area –	0.75
Checkpoint Yaryguino –	0.75
Forest area–	0.81

It should be noted that the fall-out, γ-emission dose rate and absorbed dose in the radiation-control area did not differ from ones of the controlled area and the average values of the Moscow region. Figure 1 represents a radiation exposure structure of population living in the radiation-control area (Novy settlement).

The additional exposure from the treatment of radioactive waste makes up less than 0.1 % of the summary exposure dose caused by natural radiation background and X-ray examinations (Figure 1). As to air pollution with harmful substances including dust and chemicals, it did not exceed the permissible hygienic regulations for air in the populated areas and drinking water quality conformed to current sanitary requirements. Thus in the whole, hygiene and sanitary conditions of the population living in the settlements can be considered as good enough.

Fig. 1



3. PERSONNEL AND NEARBY LIVING PUBLIC HEALTH AND SOCIAL ASPECTS

It is obvious that the public health conditions directly reflect a level of protective measures being undertaken by authorities of hazardous productions in the area. The great majority of the RADON personnel are people living nearby the radiation-control area of the disposal site. Therefore, the survey and analysis of all the nearby living public groups health condition are an essential social activity of the RADON authorities.

A community health division was set up and equipped with modern medical facilities for the purpose of monitoring the personnel, members of their families, as well as the local community population, living in the radiation-control area. RADON finances all the healthcare programmes (annual, semi-annual and other examinations) and the medical

personnel (more than 30 doctors and medical specialists – paediatricians, therapeutics, surgeons, specialists on laboratory diagnostics, etc.) and maintains improving the medical facilities for raising the level of health services in the community health division. The community health division provides free of charge services to the public living in the radiation-control area.

The personnel undergo annual medical examinations taking into consideration harmful and hazardous work conditions and individual radiation doses. During 45 years, the radiation doses have decreased considerably, and in the time span from 1995 to 2005 the individual radiation dose has ranged from 1 – 1.5 mSv/year. These figures were obtained by implementing the Long term Programme of Protective Measures. Tables 2 through 4 give processed results of parent's survey.

Table 2 Family Constitution (%)

Family description	Urban-type settlements		
	Novy	Bogorodskoe	Remmash
Perfect families	78.8	80	71.3*
Divorced parents	11.1	12.6	20.7*
Single-parent families	11.1	7.4	8.0

Note: Hereinafter the sign «» indicates actual discrepancies between the settlements.*

Table 3 Living Conditions (%)

Dwelling conditions	Novy	Bogorodskoe	Remmash
Separate apartment	94.4	96.8	85.1*
Communal flat	5.6	1.1	11.5*
Hostel	0	2.1	3.4*

Table 4 Family Welfare Standards (%)

Family welfare standards	Novy	Bogorodskoe	Remmash
Good	30.0	27.3	19.5*
Satisfactory	67.8	67.4	77.0*
Unsatisfactory	2.2	5.3	3.5

As it can be seen from Table 2, the constitution of families is more perfect in Novy than in Remmash. This situation is similar for both the living conditions and welfare standards. At the same time, it is obvious that the discrepancies are not significant for most parameters for Novy and Bogorodskoe.

Children and teenagers are indicative of the good ecological and social environment. Therefore, in RADON, the divisions and services responsible for monitoring, managing and solving socio-medical issues permanently perform assessments on various factors influencing the young people living in the radiation-control area. Table 5 shows the nourishment structure of children living in the abovementioned settlements.

The data in the tables above definitely show that a greater percentage of parents from Novy settlement estimate their children's nourishment is as good when compared with ones of the other settlements. Besides, the daily ration of the growing generation is more frequently rich in meat and dairy produce, green vegetables and fruit. The socioeconomic situation according to the majority of parameters (living conditions, welfare, family constitution, nourishment structure, etc.) is on the whole better.

Table 5 Nourishment Structure of Children and Teenagers

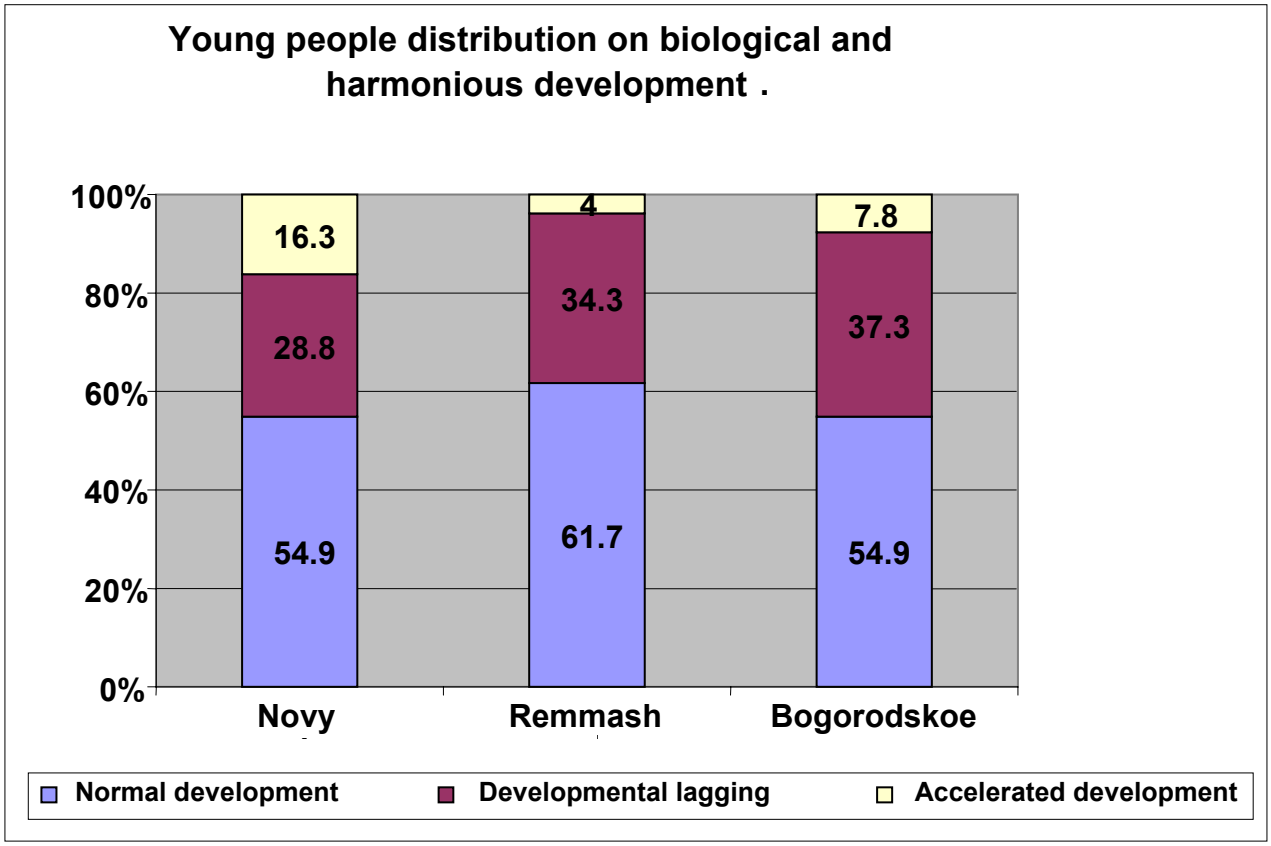
Parameter	Estimation	Urban-type settlements		
		Novy	Bogorodskoe	Remmash
Nourishment quality – parent estimation	Good	76.7	65.3*	70.1*
	Satisfactory	22.2	33.7*	29.9*
	Unsatisfactory	1.1	1	0
Frequency of Consumption: meat, fish, poultry	Regularly	54.4	40.0*	47.1*
	3-6 times a week	30	47.4*	41.4*
	1-2 times a week	13.4	12.6	10.3
	Rarely	2.2	0	1.2
Frequency of Consumption: milk and dairy produce	Regularly	56.7	44.2*	52.9
	3-6 times a week	34.4	43.2*	31.0
	1-2 times a week	6.7	10.5	9.2
	Rarely	2.2	2.1	6.9
Frequency of Consumption: green vegetables and fruit	Regularly	43.3	29.5*	37.9
	3-6 times a week	44.4	48.4	47.2
	1-2 times a week	10.0	20.0*	14.9
	Rarely	2.2	2.1	0

The maturity assessment, being carried out according to a complex scheme to take into account the biological age and harmonious development, has revealed a common tendency to decreasing the portion of young people not corresponding to their biological age (Figure 2). The pointed tendency is observed in other regions of Russian Federation. It means that the presence of disposal site for radioactive waste treatment and storage does not noticeably affect the local population.

The young people of Novy settlement are characterized by a higher level of maturity in comparison with those of Remmash and Bogorodskoe, as it can be seen from charts in Figure 2. The RADON's authority focuses attention on the young generation development and undertakes measures to support its leisure. The company finances the needs of infant and secondary schools and sponsors gyms and swimming pools. Parameters of the youth mental and intellectual development of all the examined settlements do not differ. The personal profiles of teenagers had no essential deviation from norms and did not have personal accents. Thus, the examinations allowed the estimation of the physical and psychological states of development of young people living in the area nearby the disposal site for the radioactive

waste treatment and long term storage. It showed the absence of hygienic living condition influence on mentioned parameters.

Fig. 2



Note: The collected statistics were obtained from the examination survey of young respondents aged up to 16.

Another social aspect considered is the earnings of the RADON's personnel which are above the average of the Russian Federation. There are fringe benefits apart from standard ones applied at hazardous productions in Russia. The personnel have a prolonged vacation and a lot of social compensations. Personnel and members of their families are provided with any desirable sanatorium-and-spa treatment and medication acquisition partially paid by RADON.

4. PROSPECT

The RADON disposal site activity information began in 1990 with the first appearance of information in the Russian Mass Media about its existence and operation. In that time a division on public relations was set up with its primary aim of preparing and delivering articles to popular publishing houses and reports for radio and television. Specialists of the division on public relations carry out explanatory activities by means of technical tours to the disposal site facilities, organizing public discourses to decrease radiophobia and unawareness among local community and stakeholders.

The RADON Company also sponsors the publication of a radioecological magazine "Safety Barrier", which is officially supported by Federal Agency on Atomic Energy of Russian Federation and State Trust Gosenergoatom of Russian Science Academy. Besides leading experts of the RADON Company, there are editorial board members of well-known medico-

ecological magazines of Russia («Radioecology and Radiobiology», «Hygiene and Sanitary», «Labour Medicine and Industrial Ecology», «ANRI», etc.) which publish information on its scientific and practical activities.

Due to comprehensive programmes including social factors, public relations, permanent publications in Mass Media, reports on radio and television, the RADON authorities cope with proving the safety of their technologies and harmlessness to the local community and environment from radioactive waste storage.

Public involvement issues of radioactive waste management in Slovakia

J. Prítrský
DECOM Slovakia, Ltd, Slovakia

Abstract

The Slovak Republic has not established a radioactive waste management agency yet in spite of its intensive nuclear programme. Thus, informing the public about waste matters has been incorporated in the activities of NPP information centres. The methods applied include, for example, excursions, distribution of informative documents, meetings and seminars, hearings and public opinion surveys. Generally proved approaches have been found as affective tools for communicating with the public, such as openness, transparency, respect to all interested groups and a political will to find a solution. A stable regulatory framework, including a well established and independent regulatory body, has been an important condition for getting public acceptance.

1. INTRODUCTION

Public information is an integral part of radioactive waste management in our country. At the moment, RAW management agency is not established in the Slovak Republic, which is why PR activities are performed by Information Centres in Bohunice NPP, Mochovce NPP and SE-VYZ (organization responsible for RAW management). Concerning the general public, these activities are aimed more or less at NPP operations, nevertheless the issues of RAW management are integrated in the programme as well. Special presentations and visits oriented toward RAW management are organized mainly by SE-VYZ, which operates the disposal facility at the Mochovce site, RAW treatment facilities and SNF storage facility in the Bohunice site.

2. SCOPE OF PRESENTATION

This presentation provides information about the status of radioactive waste management in the Slovak Republic. Current PR activities and techniques used in the nuclear sector are described, and the main features of public involvement programme are included. Recommendations and conclusions are given as we work toward successful PR programmes.

3. SITUATION IN RAW DISPOSAL IN SLOVAKIA

There is one operating disposal facility in Slovak Republic nowadays. The Mochovce near surface repository is used for final disposal of low and intermediate level radioactive wastes resulting from the operation and decommissioning of nuclear power plants situated in the territory of the Slovak Republic. This facility is intended also for disposal of institutional RAW from research institutes, laboratories, hospitals and other institutions involved in activities during which radwastes are produced. Prior to disposal RAW has to be processed and treated into its final form, the waste package, which is the fibre reinforced concrete container (FCC). Volume capacity of the FCC is 3.1 cubic metres, total current capacity of the repository is 22 320 cubic metres (7200 FCC containers). Siting for this repository was performed in 1975-78, construction 1986-92, completion 1996-99, final safety report in 1999 and operation from 2000. More than 1000 FCC containers have been disposed since operations began.

4. CURRENT PR ACTIVITIES AND TECHNIQUES

The main PR activities and techniques of Information Centres in Bohunice NPP, Mochovce NPP and SE-VYZ are as follows:

- Site visits (transport up to 30 km from IC is free of charge)
- Public information materials
- Video/computer presentations
- Models, simulations
- Public meetings
- Public hearings
- Conferences, workshops, seminars
- Key persons interviews
- Public opinion surveys
- Open door days
- Journals, periodicals,
- Internet, Intranet
- Annual environmental reports
- International cooperation (IAEA, OECD-NEA)

The sections below discuss the key aspects of these PR activities.

4.1 Presentations

Probably the most important activity of the Information Centre (IC) is organizing the presentations and visits to nuclear sites. Site visits help people understand how plans are transformed into reality. They help get people to participate who normally would not be involved. Site visits are valuable as a basis for repeated discussions and to show how details are developed. Frequently, site visits are the best way to demonstrate a physical fact to either the community or nuclear facility personnel. They are used by local people to show engineers and planners details and conditions they might have missed. During visits the participants are given the various information materials, which can be studied in more details at home. Visitors have the possibility to see interesting video and computer presentations, models and simulations. There is also possibility to see the ILW/LLW repository, the RAW treatment facility, the SNF storage facility and the turbine hall of the NPP. We pay great attention to young people from elementary, secondary schools and universities, which create the majority of the visitors. Special attention is given, of course, to the youngest children. They participate in various games and competitions, which help to increase their knowledge about energy. Transport of groups can be organized by the IC and is free of charge up to 30 km distance.

4.2 Public information materials

Public information materials are one of the essential forms of communication in any public involvement process. Essentially, they provide basic information about a process, project, or document in a fast, comprehensible and clear way. They are widely distributed to many people for maximum effect. Public information materials increase the chances that people actually get the information. We use the following types of information materials:

- advertisements
- billboards, posters
- brochures
- display boards
- electronic media, on-line home page
- models
- news articles, newsletters, newspaper inserts and articles
- progress bulletins
- public service announcements (paper, video, radio)
- slides and overheads
- videotapes

4.3 Public meetings and hearings

Another important aspect of public involvement is public meetings and hearings; they have these basic features:

- anyone may attend, as either an individual or a representative of specific interests;
- meetings may be held at appropriate intervals; hearings are held near the end of a process or sub-process before a decision;
- hearings require an official hearing officer; meetings do not;
- hearings usually have a time period during which written comments may be received;
- community comments are recorded in written form.

Special kind of public meetings known as the "Citizens information commission" is held regularly two times a year for mayors of cities and villages nearby the NPPs. The participants are informed about news in the nuclear sector. Meetings have also been organized for citizens of cities and villages on the route from the Bohunice RAW Treatment Centre to the Mochovce repository. This route is used for transportation of RAW packages from the place of its processing to the repository. These meetings were really successful, and no protests occurred due to these shipments.

Public hearings are organized for each nuclear facility, which is planned to be constructed or significantly reconstructed. These activities are performed according to the Act 127/1994 on environmental impact assessment (EIA). This legislative document requires direct public involvement within the EIA process. Recently this kind of public involvement was organized for following nuclear installations:

- Spent nuclear fuel storage facility in Mochovce
- NPP A-1 decommissioning - 1st stage
- Integral storage facility of long lived waste in Bohunice

4.4 Conferences and seminars

A number of conferences and seminars oriented toward nuclear issues are held annually in Slovakia. This has helped to spread new approaches and build a friendly atmosphere within the nuclear sector. A conference is usually a highly-structured programme of presentations

and discussions, and it will usually have panel discussions followed by questions. Top officials or panels of recognized experts help boost interest in attendance. Conferences often have plenary sessions attended by all participants, followed by breakout sessions. Elected officials or VIP persons add credibility to the process by being on the programme to discuss their hopes for the project. Most conferences are organized together with Slovak Nuclear Society and Slovak Nuclear Forum (member of EURATOM). Conferences and seminars have several common characteristics:

- are special events, publicized separately from other events;
- highlight specific aspects of issues;
- are applied in either planning or project development;
- set the stage for plans or projects;
- showcase and refine specific aspects of plans or projects;
- provide focus and direction to participants; and
- often require advance registration or are invitational.

4.5 Public opinion surveys

Public opinion surveys assess widespread public opinion via a written questionnaire or through interviews in personal contact, by phone, or by electronic media. The limited sample of people is considered representative of a larger group. Survey results show public positions or reactions to certain actions and gather information for use in the process. Surveys can test whether opinions are changing, if repeated after an interval of time. Several surveys of this type have been performed in Slovakia recently. They clearly showed that people are interested in getting more details about RAW, and independent experts including IAEA are the most reliable source of this information.

5. MAIN FEATURES OF PUBLIC INVOLVEMENT

The following chapter comprises lessons learned and recommendations on how to perform successful public involvement programmes for a RAW disposal facility.

5.1 Information

Opinion surveys about the public attitude to nuclear power indicate that people feel that there is both a lack of information and a need to receive more. The transfer of information plays an essential part in the establishment of public trust in any new development. However, it is not sufficient, and indeed it may be contra-productive, to saturate the public with large amounts of material which is not properly focused and which they have no knowledge or the education to understand.

5.2 Communication

Contact between representatives of the waste management organization and the public is the next most essential component of the process. This contact should be ideally through informal, small group meetings. There is evidence that formal presentations and large open meetings are not particularly good methods of communicating because they tend to discourage interaction with the majority of the public and, in the case of open meetings, are generally monopolized by committed opponents. An effective communication can be

described as bilateral flow of information. One issue is important – watch the responses from the public and adapt the speech to these responses.

5.3 Participation

Research in many areas of risk acceptance has shown that people are more willing to accept risk if it is controllable. This means that they have a choice to be, or not to be, engaged in the risk activities, or they have some power to modify, reduce or eliminate the risk. It means that a community is more likely to accept the construction of a new facility if the people in that community have some influence and control over the process of introducing it. In several countries, communities have a right to reject proposals for the siting of new radioactive waste management facilities, either through a requirement for such communities to be volunteers or through a right of veto. Increasingly in the field of radioactive waste management, participation extends beyond simple involvement into the decision making process.

As mentioned earlier, in several countries local communities have a right to reject proposals for the siting of new facilities. At first sight, such a policy may appear likely to fail because that right will always be used against the construction of the facility. However, that assumption fails to recognize that one of the main reasons for opposing a development is the inability to control it. If the risk can be accepted voluntarily, and on terms to be agreed by those who feel worry, then the likelihood of acceptance is enhanced. There is evidence that public involvement is more likely to be successful where either the community has volunteered or the people have the right to reject the facility.

5.4 Compensation

The issue of compensation to host communities is a complex and sensitive one. The concept of compensation can include support to local schools, improvement of infrastructure etc. However, as for the siting of radioactive waste facilities, great care is needed. The main danger lies in an offer of compensation being viewed as a confirmation of a risk. For this reason, the issue of benefits to the local community should be given a lower importance in comparison with information and consultation activities. Indeed, the local public will likely wish to consider the question of compensation after they are satisfied:

- that there are valid reasons for choosing their locality;
- that all safety issues are under adequate control;
- that the environmental impact will be minimized; and
- that they will have a reasonable degree of control in the affairs of the facility.

Most importantly, financial and other benefits should be seen as reasonable re-compensation to the community for loss of comfort, in line with common business practice, but not for accepting a risk. This is a very reasonable baseline for providing compensation, since there may be real local losses associated with reductions in property values, in agricultural efficiency and, in some areas, in tourist routes.

6. CONCLUSIONS

Successful PR programmes for RAW disposal facilities can be characterized by three particular features:

— an open and transparent decision making process,
— participation of various interested groups at both the local and national level,
— a consistent political will to find a solution and make necessary decisions.

The waste agencies have a very important role to play here. That is why the establishment of the radioactive waste agency in our country is considered to be helpful from this point of view. The works mentioned earlier showed, that getting public acceptance in RAW management is necessarily a long process. It is much longer than the typical term of office of most decision makers. A stable regulatory framework, including a well established and independent regulatory body, is an important source of continuity in these circumstances and an important condition for getting public acceptance.

Integral communication activities in support of the repository site selection in Slovenia

N. Železnik, M. Kralj
Agency for Radwaste Management ARAO,
Ljubljana, Slovenia

Abstract

The siting and licensing of a radioactive waste repository requires a complete public consensus that is very difficult to obtain. The main reasons for the public reluctance to accept the radioactive waste repository are the feeling of being ignored in the decision making process and inadequate understanding of radioactivity. Therefore communication and information activities, as early as possible in the siting process, are very important for reducing the potential conflicts of interests between the local community and the investor of the radioactive waste repository on the potential repository sites. ARAO communication activities are based on research on public opinion and public knowledge about radioactive waste management. Communication strategies that provide two-way communication channels, such as interactive web pages, workshops, study circles, visitors' centre, are preferred. Different educational materials (leaflets, CD-ROMs, articles in the local newspapers, yearly magazine, and posters) are also being produced. Collaboration with nongovernmental environmental organizations has also proved to be helpful in confidence building, as well as in informing the public. It is also very important for establishing competent public participation in the decision making process.

1. INTRODUCTION

Slovenia is one of the rare countries in the world that does not have a disposal facility for any type of radioactive waste. At present the operational waste from the only nuclear power plant (NPP) in Krško is stored in storage facilities at the NPP site, while low and intermediate level waste (LILW) from all other producers (medicine, industry and research activities) is stored at the Research Reactor Centre near Ljubljana in the Central Interim Storage (CIS) facility. The current storage capacities are limited and will soon run out, which is especially true for the LILW storage at Krško.

In 1991 the Agency for Radwaste Management (ARAO) was founded by the Slovenian Government to provide conditions for final disposal of all radioactive waste. The first site selection for the LILW repository, performed in 1990 – 1993 using a technical approach with 43 obligatory criteria, failed. The detailed analysis showed that the main reason for the failure of the siting project was inadequate public participation [1].

In the new site selection procedure a so called “mixed mode” approach to the site selection was chosen and was issued in Strategy of Spatial Development in 2004 (Off.Gaz. RS 76/2004). This approach is a combination of technical screening and volunteer siting. In addition to the cabinet investigations and rough technical screening of the territory in the pre-selection phase, in later stages the mixed mode approach incorporates strong public involvement and the negotiations with the local communities identified in the previous stage [2]. Only if the negotiations are successful, and further steps agreed with the local community, can the first phase be followed by more detailed research including field investigations to assess the suitability of the potential location.

2. ACTIVITIES ON THE SITE SELECTION

Repository siting is taking place according to the mixed mode procedure which follows the IAEA recommendations [5]. It combines the expert assessments and local initiatives and proposals. The mixed mode procedure is divided into four stages:

(1) *Conceptual and planning stage:* this was concluded in 1999; the siting procedure incorporating public participation was defined;
(2) *Area survey stage:* identification of potentially suitable areas was concluded in 2001 and a map was presented to the public; identification of potentially suitable sites was concluded in 2005, and the sites were agreed upon with the local communities after their volunteering to the site selection process;
(3) *Site characterization stage:* this will be concluded in 2007; maximum three potential locations will be studied, additional cabinet and field research will provide the necessary data for the site confirmation, and the research will be carried out with the local community consensus;
(4) *Site confirmation stage:* this will run in parallel with the previous stage; the suitability of the potential locations will be evaluated and additional data for safety analysis and environmental impact assessment will be provided by further research with consensus of the local community.

In 2001, the area survey stage was performed by cabinet investigations using the multi-criteria decision making evaluation programme within a Geographic Information System. The most important were related to the integrity and safety of the repository, which were then evaluated through study of the geological properties of an area. The results showed that about 15% of Slovenian territory is potentially suitable for underground disposal and almost 45% for surface disposal [3].

The most difficult step is the identification of potentially suitable sites, which requires extensive communication and negotiations with the local communities at the area of interest. In February 2002, ARAO has decided to invite the local communities to participate through an independent mediator, representing a link between the two parties and thus facilitating the communication and negotiations between the investor and the local community. The mediator represents the connection between public interests in local environmental protection and the governmental interests to safely dispose of the radioactive waste.

The real negotiations with the local communities have started with the legal basis for financial compensations to the hosting community, which were accepted through the Decree on criteria for the determination of the compensation level due to the limited land-use on the site of a nuclear facility in December 2003 (Off.Gaz. RS 134/2003). The decree defines the fixed compensation of 2.3 million EUR due to the limited land-use to the local community who would host the LILW repository during its operation, and 1/10 of that amount for field investigations and the repository construction.

In November 2004, the official administrative procedure for the siting of the repository was set. The Ministry of Environment and Spatial Planning together with ARAO carried out the First Spatial Planning conference. The Programme for the preparation of the national location plan for the LILW repository was accepted, and ARAO invited all local communities in Slovenia to volunteer a site or area for further investigation. Applications had to be signed by mayors only.

By the beginning of April 2005, ARAO finished the bidding process with eight applications from local communities. Within the next two months three local communities had decided to withdraw their applications. Only one of the remaining five local communities proposed an appointed potential site for further investigation. In the others, the potential sites were defined by cabinet studies and presented to local communities for confirmation. Only the potentially suitable sites confirmed by local communities were further assessed in the pre-feasibility study [5]. This provided the assessment of all sites based on public acceptability, passive safety, technical functionality, economics, environmental and spatial aspects.

The methodology for the assessment of public acceptability included factors that could influence social aspects of the life of individuals (subjective parameters) and the people's attitudes in the whole local community (objective parameters). The only exclusion parameter in public acceptability was the eventual rejection of participation in the siting procedure by a local referendum.

The assessment of technical aspects followed the selection of potentially suitable sites approved by local communities. In the communities not proposing the site themselves, the areas were analyzed using environmental, spatial and safety arguments. Water protection areas, catastrophic flooding regions, areas inside Natura 2000, areas inside 500 metres from continuously populated areas, community or national borders, were excluded from further assessment. ARAO defined 11 potentially suitable sites in 4 local communities, and a fifth community proposed another site.

The proposed 12 sites were assessed from the point of view of passive safety, technical functionality, economics, environmental and spatial aspects. The methodology, criteria and evaluation approach were prepared for each of these aspects, and assessment parameters were defined. The results of the expert assessments based on cabinet data and field visits were used for the comparison and evaluation of proposed potentially suitable sites. The sites were classified first by ranking local communities by the public acceptability criterion. In the second step, all other aspects were considered equally and the sites were ranked again. If the potential site was excluded only because of one aspect it was excluded from further evaluation. In this way selection of the three most promising ones for further field investigations was performed. The pre-feasibility study was finished just recently and was given to the Ministry for environment and spatial planning for final decision.

The next step in repository siting will be through the establishment of local partnership. Together with the help of the mediator it will serve as an umbrella for all activities during site characterization and confirmation and will also be the platform for cooperation and for decision making of local stakeholders. The local partnership will consider the characteristics and expectations of the individual local community but will have to include form and mode of work, decision making contents, mode of independent studies, consultations and verification, time dependence and results of cooperation on individual steps. This will enable the process to continue with public consensus and without interruptions.

3. OPERATIONAL COMMUNICATION ACTIVITIES RELATED TO CONFIDENCE BUILDING IN REPOSITORY SITING

ARAO implements a variety of communication activities that are targeting different interest groups and audiences. They are supporting the site selection process in order to assure an informed and rational dialogue with the public [4]. Table 1 summarizes the main stages and major activities related to each stage. It takes into account the social issues parallel to the technological ones in the stages of technical screening and volunteer siting. The communication activities of ARAO have two main aspects:

Table 1 Schematic representation of the combined site selection process with description of technical and communication activities

STAGE OF THE SITE SELECTION PROCESS	ACTIVITY DESCRIPTION		RESULT RESULT
	Technical issues in site evaluation	**Gaining of consensus of local community**	
1. Selection of approach, development of procedure	plan of the site selection procedure specifying the safety, technical and administration issues specifying the method of community involvement	participatory workshops for professional public	Site selection procedure defined
2. Area survey stage	determination of potentially suitable areas for LILW repository	invitation to local communities collecting local community applications for participation in the site selection process	Potentially suitable sites, applications of potentially suitable sites
3. Site characterization stage	pre-comparative studies in the case of greater number of applicants selection of potential sites by preliminary site characterization of maximum 3 locations preliminary field survey	participatory workshops for local communities building of local partnerships signing the agreement on local community participation	Potential sites (up to 3)
4. Site confirmation stage	detailed field survey safety assessment preliminary work environmental impact assessment preliminary work	continuation of local partnership harmonization of interests of local community and interested public	Site selected

— cognitive aspect: to improve a general understanding of the principles of radioactive waste management,

— opinion making aspect: to assure the public acceptance of a radioactive waste repository by the general public.

The first group of activities consists mainly of information and education activities for different stakeholders, while typical two-way communication activities are applied to achieve the second goal. The independent mediator represents a direct link with the local communities

and fosters the community involvement in the communication activities. Both groups of activities are being applied synchronously, but activities that influence opinion making are emphasized towards the final stages of the siting process.

The information and communication activities are generally not focused on a specific community or stakeholder group, but some of them are concentrated in the communities having the natural potential for hosting an LILW repository or are already hosting a nuclear facility.

3.1 Types of information and education activities

The information activities are based on the »right to know« concept as introduced in the Aarhus Convention, and the concept of informed decision making. In the first stage of the process ARAO produced a variety of information and learning materials on radioactivity and radioactive waste management:

- leaflets,
- books,
- ARAO magazine
- posters,
- CD-ROMs and videocassettes,
- web pages,
- articles in popular science and educational magazines,
- articles in local newspapers and magazines,
- radio and television broadcasts.

All the materials are free of charge and are distributed to primary and secondary schools and to public libraries. They can be also obtained upon request from ARAO. They are well accepted by the youngsters and also by the adult population who wish to learn more about LILW disposal and related topics.

3.2 Types of two-way communication activities

The target public for two-way communication activities are identified stakeholders, e.g. competent local authorities, technical and general public, ministries and governmental personnel, nongovernmental environmental organizations, journalists, and educators. The activities are meant to reduce the potential conflicts in the LILW repository siting process; therefore they have become more important since the year 2001, when potentially suitable areas in Slovenia were defined by technical criteria. Most of the communication activities organized by ARAO are targeting specific portions of the public:

- workshops for environmental organizations
- presentations for representatives of local authorities,
- direct communication by the publicly available e-mail address,
- study circles,
- special presentations for journalists,
- participation in e-forum on LILW repository siting,
- open door day at the Central Interim Storage Facility for Radioactive Waste,
- visits and presentations by an independent mediator.

The Visitors' Centre was also established to promote knowledge and communication about radioactivity, nuclear technology and radioactive waste management. It is situated near the Central Interim Storage Facility for LILW and the Research Reactor Centre.

Participation of local communities and individuals in communication activities is based on free decision. The activities provide a free and safe environment for open discussion on all conflicting issues. The participation of nuclear professionals in these discussions is very important to resolve the emerging problems and objections. ARAO tries to be proactive in all communication situations, while the participants can withdraw at any time.

The procedure for the LILW repository site gaining is proceeding step-by-step with the help of two-way communication activities. No further step is undertaken before the previous one has been completely agreed upon between all parties involved.

4. CONCLUSIONS

Public perception of LILW repositories as being risky objects and therefore unacceptable by local communities comes from bad information, the feeling of being sidelined from the decision process and fear of being abused for the interests of local authorities. The integration of different communication approaches and the wide range of addressed public applied by ARAO have proved to be successful. The integral communication approach helps in confidence building and provides conditions for future negotiating with the local communities that might be appropriate for accepting the LILW repository. Implemented governmental assistance such as compensation mechanisms for limited land-use on the site of a nuclear facility and also some strategic documents on radioactive waste management policy provide necessary support for the site selection process.

In November 2004, ARAO invited all local communities in Slovenia to take part in the siting procedure for an LILW repository. Some of them notified us that they were not willing to participate, but ARAO also gained several positive answers. Feasibility studies will show if ARAO can continue with site evaluation and establish a local partnership in three local communities at most. The repository siting has to be finished by 2008, and the construction of a repository by 2013.

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Public involvement in the establishment and operation of the low and intermediate level waste repository at Vaalputs in South Africa

P.J. Bredell
Necsa, Pretoria, South Africa

Abstract

The National Radioactive Waste Disposal Facility at Vaalputs is owned and operated by the South African Nuclear Energy Corporation (Necsa) on behalf of the South African Government. Vaalputs currently only accepts the operational waste from the Koeberg Nuclear Power Plant (KNPP) situated near Cape Town approximately 550 km to the South of Vaalputs. Plans are also underway to dispose of Necsa's low and intermediate level waste at Vaalputs in the future. In this paper a brief overview is given of the impact of repository site selection and operation on public perceptions. The consequences of media coverage of certain historical events relating to the safety of the repository are discussed. The outcome of Necsa's efforts at communicating with its stakeholders at Vaalputs is evaluated in terms of the effect on local, regional and national perceptions. The benefits derived from the creation of a Vaalputs Communication Forum (VCF) are considered against the background of the activities of environmental NGO's aimed at opposing Vaalputs' efforts to establish effective public relations. The VCF was replaced in 2003 by the statutory Public Safety Information Forum (PSIF) established in terms of government regulations. The experience gained over the last 20 years on public communication is briefly assessed using an internationally accepted model for public transparency.

1. INTRODUCTION

The National Radioactive Waste Disposal Facility at Vaalputs has been in operation since 1986. This facility is owned and operated by Necsa on behalf of the South African Government. Vaalputs currently only accepts the operational waste from the Koeberg Nuclear Power Plant (KNPP) situated near Cape Town approximately 550 km to the South of Vaalputs. KNPP is operated by the national electricity utility, Eskom, and comprises two 980 MW PWR's of French design commissioned in 1986. The operational waste from the power station is packaged at the reactor site and transported to Vaalputs by truck using public roads. KNPP is responsible for all aspects of the transportation of the waste to the Vaalputs site. Concrete drums are used for intermediate level waste and metal drums for low level waste.

Vaalputs accepts the waste packages on the basis of the waste acceptance criteria agreed with Eskom. The waste packages are disposed of in a near surface disposal facility, consisting of earthen trenches measuring approximately 6m wide, 6m deep and of variable length depending of the disposal strategy. The low level metal drums and the concrete intermediate level drums are emplaced into separate trenches back-filled and capped with clay to prevent water ingress into the repository. To date 10 300 metal drums and 2850 concrete drums have been disposed of at Vaalputs.

The Vaalputs site is situated in an arid and very sparsely populated western region of South Africa. In the vicinity of Vaalputs there is little agricultural and mining activity and the land is mostly utilized for sheep farming purposes. Apart from the few farmers in the surrounding area there are also a number of small low-income communities living under difficult socioeconomic circumstances.

2. HISTORICAL OVERVIEW

Site selection for the national radioactive waste repository commenced in the early 1980's with a view to establishing a low and intermediate level repository for Eskom's operational waste. In this investigation the disposal of high level radioactive waste/spent fuel was also taken into consideration as a possible future requirement. Site selection was carried out on a purely technical and economic basis without involving the stakeholders. The site selection process covered various potential areas within South Africa, but focused primarily on the sparsely populated, seismically stable and arid western part of the country as being the most promising area.

Once the site selection process was finalized it was decided to expropriate the properties involved. The disposal site, subsequently referred to as Vaalputs, consisted of three consolidated privately owned ranches covering an area of 10 000 hectares. The expropriation of these ranches by the State was done without the consent of the owners and unfortunately gave rise to much resentment and antagonism on the part of the dispossessed owners. The local communities living in the vicinity of Vaalputs were also not consulted about the matter.

The facilities established at Vaalputs comprised a waste reception building with an adjacent administration block and a waste disposal area situated some kilometres away. The Vaalputs facility was licensed and commissioned in 1986. The disposal area was originally planned to accommodate operational waste from three nuclear power stations the size of Koeberg, but due to the curtailment of the Eskom nuclear power programme, only a small part of the area originally set aside for the low and intermediate level waste repository has been utilized to date.

3. STAKEHOLDER INVOLVEMENT

The initial establishment of a radioactive waste repository in the rural areas of the Bushmanland was for several reasons not favoured by the hosting communities. The small-scale operations at the repository did not provide the benefit of employment opportunities as initially expected. Promises made with regards to the upgrading and further development of local infrastructure and electricity supply to rural areas also did not realize as it was initially expected. The radioactive waste in the repository is further seen to affect the local image and potentially affecting the sale of local sheep farming products. Although the repository does contribute to the local economy in terms of direct purchasing of materials, supplies, vehicles, fuel, contracted services, etc., the impact of these contributions are negligible when compared to the real needs for growth in this area. All these aspects have from the onset aided in cultivating negative attitudes towards the radioactive waste repository in the public arena as there seemed to have been no significant social or economic benefits for the communities hosting the repository.

In the early 1990's Necsa established a trust fund which Necsa used to assist small developing communities in the vicinity of Vaalputs. Necsa thus became involved in a number of socioeconomic projects for the benefit of the local communities. This initiative included educational and health support programmes and other forms of social assistance. The involvement in socioeconomic projects generally proved to be difficult due to Necsa's limited financial resources as well as a lack of coordination with other private sector community social projects launched in these remote areas. The socioeconomic needs of these communities were of such a magnitude that Necsa could not possibly satisfy them. Unfortunately Necsa's involvement gave rise to unrealistic expectations on the part of the

communities, inevitably leading to a certain amount of disappointment and resentment. Necsa's involvement with assistance to primary and secondary schools was more successful, since the assistance was limited to the provision of stationary, books and other educational aids.

In 1996 the Vaalputs Communication Forum (VCF) was established on a voluntary basis involving Necsa, farmers' associations and Trust members representing rural communities living in the vicinity of Vaalputs. Since its inception the VCF was reasonably successful in addressing non-nuclear related stakeholder issues like vermin control, maintenance of fences and general assistance with infrastructure needs. Despite the limited success achieved with community projects, the forum nevertheless ensured effective communication between Necsa and its stakeholders. Attendance of VCF meetings was at times relatively poor and largely depended on the prevalent level of concern with Vaalputs' safety. Many issues raised at this forum were non-nuclear related but were nevertheless of major concern to the communities, such as the condition of the gravel roads and the distribution of electricity to the farmers and the communities in the area. Vaalputs also shared in some of these concerns and was therefore regarded as an integral part of the social system of the area rather than a mere intruder.

Since the adoption of a new constitution for the Republic of South Africa and the subsequent democratization of South African public institutions, the environmental pressure groups in the Vaalputs area increased their anti-nuclear activities. These NGO's launched a programme aimed at tarnishing Vaalputs' public image as a responsible nuclear operator. In effect their activities complicated Necsa's efforts to reach out to the general public. Necsa's response was to invite these environmentalist NGO's to VCF meetings, but these efforts were met with limited success.

Necsa made a concerted effort to maintain good relations with the local municipality and regularly reported to them on the status of safety at Vaalputs. This relationship was crucial to Necsa's standing as a responsible operator of Vaalputs and helped to contain public concerns orchestrated by the environmental pressure groups. At the regional level, the Northern Cape Provincial Administration also showed a keen interest in Vaalputs' activities. There were several visits to Vaalputs from Provincial representatives responsible for Environmental Affairs. Central government, through the Department of Minerals and Energy, also focused on the activities taking place at Vaalputs from the point of view of the national policy and strategy on radioactive waste. The National Nuclear Regulator responsible for Vaalputs reports to the Department of Mineral and Energy.

4. MEDIA COVERAGE OF CERTAIN EVENTS

During 1997 an incident occurred at Vaalputs that attracted the attention of the media and led to negative publicity for Necsa. This incident involved the concrete drums containing intermediate level waste disposed of in the trenches at Vaalputs. Some of these concrete drums developed hairline cracks that were visible from the outside and through which very limited amounts of radioactive waste leaked. This event also came to the attention of the media, which gave extensive coverage to this matter. There was consequently much media speculation about the safety of the Vaalputs repository. This negative publicity unfortunately reached the public before Necsa had the opportunity to inform the stakeholders of the occurrence. Necsa subsequently attempted to allay public fears in a retrospective manner by pointing out the limited nature of the leakage as well as the fact that no radioactivity had escaped into the environment outside the disposal trenches. The leakage thus fell within the boundary conditions of the Vaalputs safety case. These counter arguments unfortunately fell on deaf ears. The National Nuclear Regulator, however, was satisfied that repository safety

requirements were still being met by the Vaalputs operator. Necsa's negative media exposure was unfortunately further aggravated by the fact that the waste generator claimed that the waste packages were fully compliant upon delivery.

In order to bring the whole matter to finality, Necsa called for an expert mission from the IAEA to investigate the situation at Vaalputs. The IAEA expert team published their report in 1998 indicating that the repository was indeed safe, but that there were certain issues that required attention, such as better communication between Necsa and Eskom. Subsequent to this report, further technical investigations into the cause of the cracking were performed. These investigations indicated a need for improving the quality of the concrete drums and covering the concrete drums with back-filling material as soon as possible after emplacement in the trenches. The latter was necessary in order to prevent temperature cycling, causing the drums to crack. Eventually the media controversy subsided and things returned to normal. However, a very dear lesson was learned from this incident, namely that public perceptions of safety were of paramount importance despite technical arguments to the contrary, and that the public perception of repository safety appears to be largely based on the quality of the engineered barrier system, i.e., the quality of waste packages.

During 2001, a number of seismic events took place in the geographical area where Vaalputs is situated, varying in intensity from 4.3 to 4.5, as measured on the Richter Scale. These events immediately drew the attention of the media and allegations were made that the repository at Vaalputs had been damaged. Media coverage in this regard was generally not serious and the public appeared to accept Necsa's assurances. Despite the relatively short duration of the media interest in these seismic events they nevertheless reflected the potential for serious public concern and should be addressed in a timely manner.

In 2002 there were several allegations from former Necsa employees at Vaalputs that they contracted a diversity of illnesses as a result of exposure to radiation during their period of employment at Vaalputs. These allegations were orchestrated by the environmentalist pressure groups active in the Vaalputs area. They demanded, through the regulatory authority, that the medical records of these former employees be made available for "independent medical scrutiny". Necsa investigated the allegations and submitted the investigation results to the National Nuclear Regulator for further action. The media also gave some coverage to these allegations but the matter has not yet been resolved.

There have also been some incidents involving the transport of waste from Koeberg to Vaalputs. One such incident involved allegations made by farmers that their cattle had died due to the radioactive waste shipments being transported past their properties. The local veterinary was requested to investigate these allegations on an independent basis. The outcome of the investigation showed that the allegations had no substance.

5. THE NEW DISPENSATION WITH REGARD TO RADIOACTIVE WASTE MANAGEMENT IN SOUTH AFRICA

The site selection process followed in the case of Vaalputs clearly belongs to a different era and is quite unimaginable nowadays in South Africa. Since the country became a democracy in 1995, the legal regime governing activities such as site selection for radioactive waste disposal has changed completely. Accordingly, public participation in the decision making process is now an essential requirement of the new legislation. The requirements largely rest on the two main approaches to site selection, firstly, the environmental impact assessment process and secondly, the licensing process. Both these processes require public participation

and therefore need some form of cooperative governance between the responsible regulations in order to streamline the public process.

South Africa is presently in the process of finalizing its policy and strategy on radioactive waste management. This policy aims to establish overall coordinating structures for managing radioactive waste in the country. These structures involve decision making bodies, including a radioactive waste management agency that will be responsible for all aspects of radioactive waste disposal in the country.

As far as the future utilization of Vaalputs is concerned, any change to the current disposal arrangements would have to be approved in accordance with the new legal dispensation. One of Necsa's options is to transfer the low and intermediate level waste presently stored at Pelindaba to Vaalputs, 1300 km from Pretoria. Besides this option, there are also other options for transferring Necsa's wastes to Vaalputs, e.g. for borehole disposal. In Necsa's experience, it would be best if the Vaalputs stakeholders were approached with a complete list of options for future disposal on this site rather than on a piecemeal basis to avoid future misunderstandings.

In 2004 the government issued a regulation, which defined a formal approach to the establishment of the so-called public safety information forums for nuclear sites. Accordingly, the Vaalputs Communication Forum (VCF) had to be changed to meet these new statutory requirements. Since the establishment of this new forum Necsa experienced much stronger Vaalputs stakeholder interest. Attendance levels at the new VCF meetings were significantly higher than before, suggesting a "sense of legitimacy" being experienced about the meetings, something that was lacking in the past. These higher than normal levels of interest may also be attributed to the improvement in stakeholder communication.

6. AN EVALUATION OF PUBLIC PARTICIPATION AT VAALPUTS

In the following section the current status of public participation at Vaalputs is evaluated in terms of the so-called RISCOM Model, developed in Sweden and also successfully applied in other European countries.

The RISCOM Model is based on the three essential requirements for achieving public transparency, namely the need for (1) transferring *factually* correct information regarding a particular proposal to the stakeholders, (2) establishing the *legitimacy* of the process being followed and (3) engendering *trust* between the stakeholders involved in the process. In accordance with the RISCOM Model all three of these requirements need to be satisfied simultaneously in order to achieve transparency in the public domain. The model is diagrammatically depicted below, showing the three role players: i.e. the *Implementer*, *Authorities* and *Stakeholders* with their respective functions. Note that the *Stakeholders* comprise all interested and affected parties, including the implementer and the authorities.

When the RISCOM Model is applied to particular Vaalputs experiences, the extent to which transparency requirements were satisfied can be assessed. The following examples may prove useful for the purposes of this analysis:

6.1 The Historical Site Selection Process

During the Vaalputs site selection process the implementing agency, in this case Necsa, selected the site on the basis of purely techno-economic considerations, without public stakeholder involvement. The implementer submitted to the authorities the relevant *factual*

information pertaining to the site. Once the authorities accepted the proposal, thus lending *legitimacy* to the process, the decision was finalized. The public stakeholders (property owners) were merely informed of the decision to expropriate their properties. This process corresponds to step (c) in the above diagram, thus excluding the public stakeholders. As the public stakeholders were thus not involved in the process at all there could not be any *trust* among the stakeholders. Consequently transparency was completely lacking in this process.

6.2 The Vaalputs Communication Forum

During the early years of the PCF, when functioning on a voluntary basis, the forum rested on a mutual co-operative agreement between Necsa and its Vaalputs stakeholders. This agreement corresponds to step (a) above, indicating the establishment of a *factual* basis for the discussions and the creation of *trust* between the parties. As the authorities were not directly involved in this forum, *legitimacy* in the formal sense did not exist. This lack of legitimacy discouraged certain stakeholders, especially those from the previously disadvantaged communities from attending VCF meetings. VCF participants at that time were mostly the few farmers in the Vaalputs area who were comfortable with the arrangement. With the introduction of the new statutory VCF, the level of interest on the part of these communities dramatically increased. This renewed interest may be attributed to the introduction of legitimacy into the forum. The former VCF was not transparent, but the statutory one is indeed transparent, as all three requirements of the RISCOM Model are being met.

6.3 The Future Utilization of Vaalputs

If Necsa intended to transfer its waste from Pelindaba to Vaalputs in future the procedure would be completely different from the historical one. This procedure has not yet been fully worked out, but the principles have been firmly established. In the following discussion an outline of the procedure is given in order to evaluate it against the RISCOM model.

As a first step, the implementer (Necsa) needs to approach the authorities with a proposal to transfer waste from Pelindaba to Vaalputs. This is done through the formal structures created in terms the national policy and strategy on radioactive waste management. This step corresponds to (c) above, establishing the *facts* and the *legitimacy* for the process. The second step involves feedback from the authorities to the public stakeholders about the implementer's intentions. In step (b), implying the promotion of *trust* among the stakeholders and reaffirmation of the *legitimacy* of the process. The third step requires that the implementer engage in discussions with the public stakeholders on the merits/demerits of the proposal. This corresponds to step (c), reaffirming the *facts* as well as promoting *trust* between the stakeholders. This process would thus basically satisfy the RISCOM requirements of transparency.

How this process is to be taken further would depend on the circumstances, but it is reasonable to expect that the implementer would report back to the authorities on the results of the stakeholder negotiations. Likewise, the stakeholders, for their part, could also be expected to approach the authorities. The ultimate decision would clearly rest with the authorities. The ideal solution would be the achievement of *consensus* amongst the majority of the stakeholders. Whether consensus on this matter is achievable in South Africa within the foreseeable future is debatable.

It should be noted that the disposal of high level waste/spent fuel does not form part of the discussion.

7. CONCLUSIONS

The main conclusions reached from the experience at Vaalputs and the future projections in terms of new processes to be applied at this site are as follows:

(1) The *technocratic* approach followed in the past is no longer applicable and has been replaced by a "*decisionistic*" approach shifting the decision making burden from the implementer onto the shoulders of the authorities.
(2) In South Africa, as in most other countries worldwide, public involvement/ participation is an *integral part* of the approval process for selection of a site for the disposal of low and intermediate level waste and thus needs be factored into the overall project implementation programme.
(3) A major effort needs be made by Necsa, as the implementers of waste disposal programmes, to build up and maintain a position of *trust/confidence* with its stakeholders. Confidence could typically be achieved by means of forums such as the VCF, which are only effective after a long period of sustained efforts at achieving transparency.
(4) Ideally, Necsa as the implementer needs to strive towards *consensus* where possible. This implies that all three requirements for transparency need to be satisfied at the same time: i.e., *facts, legitimacy* and *trust*, the most difficult of which is *trust*. The latter is particularly difficult to achieve in a country like South Africa, which has only recently become a democratic country. Where trust is not achievable, the authorities need to intervene in order to bring finality to the process.

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Public involvement for developing and operating repositories for low and intermediate level radioactive waste — Approaches in Ukraine

T. Kozulko
State Nuclear Regulatory Committee of Ukraine, Ukraine

Abstract

The Ukraine has numerous facilities for managing radioactive waste generated within the country. The main sources include industrial applications, research reactors and operation and planned decommissioning of nuclear power plants. The specific problem of major significance is processing solid and liquid waste from the Chernobyl exclusion zone. To assure all waste arisings are safely managed, a national Energy Strategy is under preparation, which also includes radioactive waste management goals. The Ukrainian laws determine a transparent procedure for the decision making for new facilities of national importance. It requires, among others, that Parliament can decide on siting nuclear facilities if backed by regional authorities. A consultative referendum and public hearings are considered as tools to involve the public in decision making. The indicated approach is helpful in finding a common understanding between the nuclear facility operators and the local public

1. INTRODUCTION

Activity of the Ukrainian society associated with the political events of autumn 2004 has become an additional essential factor for us to realize the special importance of a consistent and transparent policy of the State pertaining to the safety of radioactive waste management in order to ensure public support to the development of nuclear energy in Ukraine. The experience of other States in communicating with local governments and the general public in siting of radioactive waste storage facilities was of particular interest for Ukraine.

According to the authority granted by the President of Ukraine, the Chairman of the State Nuclear Regulatory Committee of Ukraine declared that [Mykolaichuk O., Kyiv, 14 October 2005]:

The underlying principles of the state policy of Ukraine in spent fuel and radioactive waste management are the priority to protect the people and the environment against ionizing radiation, ensure safety at all phases of spent fuel and radioactive waste management, openness and accessibility of information on these aspects, involvement of citizens and public organizations, regional authorities and local governments in making decisions related to siting of radioactive waste and spent fuel storage facilities.

Ukraine has numerous facilities for the storage processing and disposal of radioactive waste generated within the country. Table I below provides a list of the radioactive waste management facilities at Ukrainian Radon and SSE Complex. Tables II - VII provide statistics on the radioactive waste stored and disposed at the various facilities. The methods, processes and facilities for the management of radioactive waste in Ukraine are described below.

1.1 Management of Radioactive Waste from Research Reactors

Solid radioactive waste from research reactors, such as WWR-M (NASU INR, Kyiv) and DR-100 (SUNEI, Sevastopol), is collected in situ, sorted and labelled, transported, accounted for and stored in the temporary storage facilities on the sites of the research reactors and then

transported to the central waste management facility, the UkrDO Radon Kyiv SISP. During 2003-2004, 745 kg of low level solid radioactive waste was transported from the NASU INR to, including 400 kg of cemented concentrate and ion-exchange resin from the liquid radioactive waste processing facility. SUNEI has not got any facilities for radioactive waste processing.

1.2 Radioactive Waste Management at UkrDO Radon SISP

State Interregional Specialized Plants of UkrDO Radon rendered services related to radioactive waste management, such as: decontamination of overalls, provides personal protection means; collects, transports, sorts and temporarily stores solid radioactive waste and disused radiation sources produced at non-nuclear enterprises.

1.3 Radioactive Waste Management at Chernobyl NPP and the Shelter

Liquid radioactive waste, including that from the Shelter, is collected by the ChNPP designed piping system. Low- and intermediate-level solid radioactive waste is collected into storage containers, which are loaded into a specialized vehicle and are transported for disposal to the Buryakivka radioactive waste disposal premises.

1.4 Decommissioning

Three RBMK units are being decommissioned at the ChNPP prior to expiration of their design service life. ChNPP Unit 4 which was destroyed in the beyond design-basis accident and is covered by a temporary Shelter, is being converted into an ecologically safe system. The design service life of the first three power units at the Ukrainian NPPs will expire after 2010 (RNPP-1, WWER-420/213 – December 2010; RNPP-2, WWER-420/213 – December 2011, SUNPP-1, WWER-1000/302 – December 2012). The service life of other 10 WWER-1000 units will expire within 2014-2025. The design service life of two new WWER-1000 units (Khmelnitsky Unit 2 and Rivne Unit 4) will expire in 2034.

2. ENERGY STRATEGY

For the time being a draft *Energy Strategy* for the period till 2030 and for further prospects is under active discussion among scientists, experts, general public and is supposed to be adopted in the near future. The Nuclear Energy Section of this Energy Strategy covers the creation of a modern infrastructure for spent fuel and radioactive waste management. It is planned that after adoption of the Energy Strategy of Ukraine appropriate strategies and state programmes will be prepared and approved for SF and radioactive waste management, taking into account good practices of the Contracting Parties to the Joint Convention.

Basic principles of the state policy for radioactive waste management are set forth in Article 5 of the *Law of Ukraine "On Nuclear Energy Use and Radiation Safety"* and Article 3 of the *Law of Ukraine "On Radioactive Waste Management"*. The Comprehensive Programme for Radioactive Waste Management for the period till 2010 is currently underway. This programme was approved by a CMU Resolution and is intended for implementation of the state policy for radioactive waste management. After determination of the strategy for SF management, the next step would be to develop a strategy for radioactive waste management and a state programme for radioactive waste management for a long term period to replace the Comprehensive Programme for Radioactive waste Management (during 2006-2007).

Several important laws have been enacted by the Ukrainian legislature pertaining to nuclear and radiation safety. For example, the *Law of Ukraine "On Settlement of Nuclear Safety Issues"* establishes legislative and organizational provisions for funding of operation, termination, and decommissioning of nuclear facilities. Another *Law of Ukraine "On Decision Making Procedure for Siting, Design, Construction of Nuclear Facilities and Radioactive Waste Management Objects of National Value"* determines clear and transparent procedure for decision making for new facilities of national importance. Among others, it states that:

- A decision on siting, design, construction of Nuclear Facilities and Radioactive Waste Management Objects of National Value the Parliament of Ukraine takes only in case of the corresponding approval of such siting by regional authorities and local governments (Article 2)
- Regional authorities and local governments take a decision on siting, design, construction of Nuclear Facilities and Radioactive Waste Management Objects of National Value after the carrying out of local advisory pull of citizens (consultative referendum) on the mentioned issue (Article 3).
- The draft Law of Ukraine is enclosed by (Article 5):
  - The results of a consultative referendum;
  - The report on information measures for neighbouring countries on possible transboundary impacts.

3. INFORMING PUBLIC ON FACILITY SAFETY

The main objective of the public hearings on nuclear energy use and radiation safety is to respect the rights of citizens and public organizations for involvement in the discussion on siting, design, construction, operation and decommissioning of nuclear facilities, enterprises for uranium ore mining and milling and facilities for management of radioactive waste, radiation sources etc. During public hearings and public consultations, the main design aspects are subject to a detailed and independent analysis by the interested audience. Taking into account comments of the public, additional measures are identified to protect the public and the environment. This builds confidence in the fact that any potential negative impact on the environment will be minimized.

The public hearings conducted in Energodar, Marganets and Nikopol to fulfil the order of the President of Ukraine *"On Informing the Public on the Spent Fuel Storage Facility"* No. 1-14/1559 of 11 December 2000 and regarding the construction and commissioning of the spent fuel store for Zaporizhya NPP can be set as an example of keeping the public informed and taking into account public opinion in decision making. To inform the public on the storage facility safety articles are systematically issued in regional mass media and regular information is provided on the local TV channel. Lectures and visits are arranged for students and inhabitants of the 30-km zone to the nuclear facilities, etc. Also, a booklet on the spent fuel has been prepared and distributed in the region. Each visitor of the ZNPP information centre receives a booklet and brochure titled *"Zaporizhya NPP and the Environment"*.

4. CONCLUSION

The indicated approach has helped to find common understanding between the nuclear facility operator and local public. This method shall be applied also at other Ukrainian nuclear sites following the legislative requirements.

Table 1 List of radioactive waste management facilities at UkrDO Radon and SSE Complex

Facility	Location	Main purpose	Design capacity of storage facilities	Year of commissioning
Kyiv SISP	Kyiv, 1 Kommunalna St.	Transport, processing, storage of RW	Solid RW – 1800 m^3 Hangar with containers – 219 m^3 Liquid RW – 1000 m^3 DSRS – 4 E+16 Bq	1962
Central operational service of Kyiv SISP	Kyiv, 1 Kommunalna St.	Transport, storage of decontamination RW	Solid RW -36,090 m^3*	1987-1995 (mitigation of ChNPP accident consequences)
Dnipropetrovsk SISP	23 km highway "Dnipropetrovsk – Zaporizhya"	Transport, storage of RW	Solid RW – 450 m^3 Liquid RW – 200 m^3 DSRS – 1.8 E+16 Bq	1961
Odessa SISP	75 km highway "Odessa – Kyiv"	Transport, storage of RW	SRW – 583 m^3 LRW – 400 m^3 DSRS – 1.8 E+16 Bq	1961
Lviv SISP	Buda Village, Yavorivsky District, Lviv Region	Transport, processing, storage of RW	SRW – 1140 m^3 LRW – 200 m^3 DSRS – 3 E+16 Bq	1962
Kharkiv SISP	Dergachiv District, Kharkiv Region	Transport, processing, storage of RW	SRW – 2385 m^3** LRW – 1000 m^3 DSRS – 2.2 E+16 Bq	1962
SSE Complex	Chernobyl NPP exclusion zone	Operation of RW management facilities	Buryakivka RWDP – 690 000 m^3 (Pidlisny; "Stage III ChNPP", RICP)***	1986 (mitigation of ChNPP accident consequences)

* The designed capacity for storages of the Chernigiv Region, data for other storages are absent

** Not taking into account the designed capacity of the building for storage of tubing, which is 650 t

*** Design documentation for these disposal facilities is absent

Table 2 Information on radioactive waste of NNEGC in storage at sites of operating NPPs

Waste stream	Location	Amount, m^3	Activity, Bq	Main radionuclides
Low level solid waste	KhNPP	3126.1	*	*
Intermediate-level solid waste	KhNPP	107.7	*	*
Low level solid waste	ZNPP	6253.9	4.6E+12	^{134}Cs, ^{137}Cs, ^{60}Co, ^{54}Mn
Intermediate-level solid waste	ZNPP	207.2	1.38E+12	^{134}Cs, ^{137}Cs, ^{60}Co, ^{54}Mn
Low level solid waste	SUNPP	15 098.6	2.4E+13**	*
Intermediate-level solid waste	SUNPP	524.3	1.47E+15**	*
Low level solid waste	RNPP	3035.46	4.3E+9**	*
Intermediate-level solid waste	RNPP	251.3	*	*

* activity and radionuclide composition are not determined due to absence of appropriate equipment and facilities

** data are tentative as obtained in calculation

Table 3 Information on radioactive waste in storage on site of ChNPP

Waste stream	Location	Amount, m^3	Activity, Bq	Main radionuclides
Low level solid waste	SRSF	1069.0	1.4E+11	Mixture: Cs, Sr, Co, Pu, Am
Intermediate-level solid waste	SRSF	926.5	4.11E+12	Mixture: Cs, Sr, Co, Pu, Am

Table 4 Information on radioactive waste in storages of research reactors

Waste stream	Location	Amount, M^3	Weight, t	Activity, Bq	Main radionuclides
NASU INR					
Intermediate- and low level solid waste	Solid waste storage No. 10	*	1.47	4.0E+9	*
Intermediate-level solid waste	Solid waste storage No. 11	*	0.25	6.7E+8	^{137}Cs, ^{60}Co, ^{59}Fe
Low level solid waste	Solid waste storage No. 12	*	4.9	1.2E+8	^{137}Cs, ^{60}Co, ^{45}Ca, ^{124}Sb
Low level liquid waste	Tank No. 1	206.2	*	1.92E+10	^{137}Cs,^{134}Cs, ^{60}Co
Low level liquid waste	Tank No. 2	150.1	*	1.47E+10	*
Low level liquid waste	Tank No. 3	104	*	9.7E+9	*
SUNEI					
Intermediate-level solid waste	Storage No. 8	15	2.54	9.7E+10	^{55}Fe, ^{59}Ni, ^{60}Co, ^{14}C, ^{54}Cu, ^{137}Cs, ^{90}Sr, ^{90}Y
Low level solid waste	Storage No. 8	10	1.69	3.7E+7	*
Low level liquid waste	Storage No. 3	8,0	*	2.3E+6	^{137}Cs, $^{90}Sr+$, ^{90}Y

* not measured

Table 5 Information on radioactive waste disposed at Buryakivka RWDP (exclusion zone)

Waste stream	Amount, m^3	Weight, t	Activity, Bq
Low- and intermediate-level short lived solid waste	554`000**	1 0486.00**	2.4 E+15**

Table 6 Information on radioactive waste storage in UkrDO Radon

Waste stream	Location	Amount, m^3	Weight*, t	Activity, Bq
Low- and intermediate level solid waste	Kyiv SISP	1940	2600	7.21 E+15
	Dnipropetrovsk SISP	431	1100	7.06 E+15
	Odessa SISP	496	300	1.50 E+15
	Lviv SISP	571	1490	1.18 E+14
	Kharkiv SISP	1406**	2170***	3.90 E+14
Low- and intermediate level liquid waste	Kyiv SISP	413	****	2.03 E+12
	Dnipropetrovsk SISP	70	″	4.40 E+10
	Odessa SISP	137.5	″	2.50 E+11
	Kharkiv SISP	28	″	3.69 E+10

* taking into account weight of radwaste placed in containers for temporary storage (considering only waste weight)
** not taking into account the volume of tubing
*** taking into account the weight of tubing
**** not measured

Table 7 Information on solid radioactive waste of SSE Complex

Solid waste category	Location	Volume, m^3	Weight, t	Activity, Bq
Low- and intermediate-level and long lived	RWDP "Stage III"	26 200	41 900	3.91 E+14
Low- and intermediate-level and long lived	RWDP "Pidlisny"	7040	14 080	~2.50 E+12
Low- and intermediate-level	RICP "Pischane Plato"	57 300	91 700	6.86 E+12
Low- and intermediate-level	RICP "Naftobaza"	102 000	181 000	4.00 E+13
Low- and intermediate-level	RICP "Yaniv Station"	30 000	15 000	3.70 E+13
Low-, intermediate- and high-level	RICP "Rudy Lis"	500 000	250 000	3.74 E+14
Low- and intermediate-level	RICP "Stara Budbaza"	171 000	316 000	1.01 E+15
Low- and intermediate-level	RICP "Nova Budbaza"	150 000	70 000	1.85 E+14
Low- and intermediate-level	RICP "Kopachi"	110 000	90 000	3.33 E+13
Low- and intermediate-level	RICP "Pripyat"	16 000	11 000	2.59 E+13
Low- and intermediate-level	RICP "Chistogalivka"	160 000	150 000	3.70 E+12

Socioeconomic issues and public involvement practices and approaches for developing and operating repositories for low and intermediate level waste UK perspective

P.M. Booth
Nexia Solutions Ltd, Warrington, United Kingdom

Abstract

The United Kingdom (UK) currently has one national disposal facility for low level radioactive waste (LLW), which is located 6km south of the Sellafield site in Cumbria. The Low Level Waste Repository has been in operation for over 40 years and is operated by British Nuclear Group. LLW is also disposed of at the United Kingdom Atomic Energy Authority (UKAEA) operated Dounreay site in Scotland, but here only waste generated from that particular site is retained. The authorized disposal of intermediate level waste (ILW) took place at Dounreay within a shaft, primarily between the years of 1958 and 1977. The UK does not currently have a national waste repository for ILW, although a siting exercise was conducted by Nirex during the 1990's. This exercise was stopped in 1997 when an application to construct a rock characterization facility was turned down. The successful siting, development and ultimate operation of repositories, whether they be for low or intermediate level waste relies on a sound programme of public involvement and consideration of socioeconomic issues. This paper will focus primarily on the socioeconomic issues and public involvement practices undertaken at the Low Level Waste Repository coupled with the work undertaken by Nirex both during their siting exercise and subsequent to this. Work underpinning the adopted strategies for the LLW and ILW disposal areas at Dounreay will be discussed only briefly since they are not national facilities. Over the last ten years there has been a marked increase in the level of stakeholder engagement and consideration of socioeconomic issues in response to wider societal changes. A wide range of site specific, regional and national dialogues have taken place. The lessons learned from earlier programmes have been incorporated into the more recent and current approaches, especially with an increased emphasis on local benefits.

1. INTRODUCTION

The successful siting, development and ultimate operation of repositories, whether they be for low or intermediate level waste relies on a sound programme of public involvement and consideration of socioeconomic issues. The UK currently has one national disposal facility for low level radioactive waste (LLW), which is located 6km south of the Sellafield site in Cumbria. The Low Level Waste Repository has been in operation for over 40 years and is operated by British Nuclear Group. The UK does not currently have a national waste repository for ILW, although a siting exercise was conducted by Nirex during the 1990's.

This paper will focus primarily on the socioeconomic issues and public involvement practices undertaken at the Low Level Waste Repository during the years it has operated coupled with the work undertaken by Nirex both during their siting exercise and subsequent to this. Work underpinning the adopted strategies for the LLW and ILW disposal areas at the UKAEA operated Dounreay site in Scotland will be highlighted but only briefly discussed as neither are national facilities.

2. THE LOW LEVEL WASTE REPOSITORY

2.1. Setting and Operation

The UK's national Low Level Waste Repository is located 6km south of the Sellafield site in Cumbria and is operated by British Nuclear Group. Originally the site was used for the production of explosives but it was transferred to the UKAEA in 1957 for development as a low level waste repository. BNFL took over ownership of the site in 1971, and this ownership was recently transferred to the Nuclear Decommissioning Authority (NDA) in April 2005.

The site has been operated safely for over 40 years and has evolved in line with international best practice. During the years from 1959 to 1995 waste was tumble tipped into open trenches which were then covered with earth and an interim cap. Since 1995, following a major upgrade of disposal operations, all LLW is now disposed of in engineered concrete vaults. Where possible the waste is compacted, containerized and grouted before placement in the vaults. Disposals at the site are authorized by the UK's Environment Agency and must not exceed 4GBq/te of alpha or 12GBq/te of beta/gamma activity. Waste is transported to the site by both road and rail with the latter via the Sellafield site where any further waste minimization and containerization may be carried out.

2.2. Project Related Stakeholder Engagement

Stakeholder engagement has been undertaken through a wide range of site specific, regional and national dialogues as well as community programmes and a commitment to economic regeneration. Two specific examples of engagement activities are the Retrieval of Plutonium Contaminated Material and the Site Characterization Project.

2.2.1. Retrieval of Plutonium Contaminated Material

Between 1959 and 1967, Plutonium Contaminated Material (PCM) was stored in existing Royal Ordnance Magazines at the Low Level Waste Repository. In 1999 BNFL made a clear commitment to the local community and regulators to retrieve all plutonium contaminated material waste from the site within an agreed timeframe. Communicating the company's intentions and encompassing the local stakeholder view has been the key to the success of the project. Early involvement of the stakeholders through a formalized communications plan has allowed the key concerns to be addressed.

2.2.2. Site Characterization Programme

During the late 1990's an extensive site characterization programme was undertaken with the objective of acquiring the underpinning data for the Environmental Safety Case. Due to the programme's high profile coupled with the fact that some characterization work was required outside of the site boundary, it was necessary to involve a wide range of stakeholders. Because part of the land to be characterized involved different landowners and tenants, and housed protected species, a planning application was also required. Presentations and site visits were arranged for the various local and district councils so that they could inform their respective communities.

2.3. Stakeholder Engagement Practices

Stakeholder engagement practices have occurred during the operation rather than the selection phase of the site. A number of forums and processes have been set up over the years to assist this process.

The Sellafield Local Liaison Committee (now replaced by the West Cumbria Sites Stakeholder Group (WCSSG) is a representational body of local opinion formers including, councillors, health experts, local government officers, fire, police and ambulance personnel. Representatives are elected to the committee which meets four times a year. Members of the public and observers including NGO's attend. As part of the WCSSG there is a dedicated sub-committee for the Low Level Waste Repository.

The management team at the Low Level Waste Repository also undertakes a programme of regular and ad hoc liaison meetings with the local parish council. The parish council is also invited to attend the regular stakeholder meetings along with the regulators, local and borough council representatives and customers.

The Sellafield Talks Service encourages qualified personnel to give talks to schools, clubs and associations. Also information requests and queries are sometimes answered through this forum. Both formal and social meetings with various sectors of the community (i.e., farmers, landowners, church leaders and fishermen) are held and support is provided to local, national and international media inquiries.

The Sellafield Visitors Centre is a major tourist attraction and encompasses a state of the art exhibition.

An active community programme exists which revolves primarily around a socioeconomic plan. The three key areas covered within this programme are:

- Economic Regeneration
- Community/Social Sector projects
- Education

In terms of the community/social sector projects, the establishment of the Westlakes Science and Technology Park has helped acquire over £10million of regional and European investment. Within this is the Westlakes Research Institute which was established to help diversify the economy of west Cumbria through the provision of consultancy and academic programmes in the environmental, health and social sciences fields. Funding has also been provided through a wide range of social sector projects including assistance towards the establishment of new businesses in the region.

While stakeholder engagement has taken place at a range of scales, especially the local scale, the economic assistance components have focused more on providing regional benefit. More recently there has been a drive to determine how the communities most affected by the existence of a repository can be better supported.

3. THE SEARCH FOR AN ILW SOLUTION

Nirex was created in 1982 with an original remit to take forward the UK's policy at the time on the management of low and intermediate level radioactive waste. It was owned and financed by the nuclear industry with the following shareholders:

- BNFL
- UKAEA
- British Energy
- Ministry of Defence
- Department of Trade and Industry (Golden share)

Nirex developed a series of proposals for a combined deep repository for LLW and ILW. They undertook a site selection exercise in line with IAEA principles and embarked on a major public consultation exercise. A technical discussion document entitled "The Way forward" was produced with 50 000 copies widely distributed. This exercise included 60 seminars involving about 2500 people, and Nirex received an equal number of responses to the discussion document. Following this period of consultation, Nirex recommended two of its potential 12 sites (Sellafield and Dounreay) for further site characterization and assessment. However, the full list of potential sites was not made public until June 2005. This further phase of site characterization led to the choice of Sellafield as the preferred site for detailed characterization and assessment.

Nirex then embarked on a public relations programme that had both a national and local focus. The national component included a 24-hour service to the media, production of key documents like "The Way Forward" and "Going Forward", a national public affairs programme and an educational programme. The local component included liaison with local authorities and statutory organizations, arrangement of visits to overseas facilities and the distribution of information packs.

An information office was opened up in the Sellafield area and a mobile exhibition was utilized within the region to explain Nirex's work. A number of local liaison groups were established and a site visits programme ensued. Additionally, Nirex established a sponsorship programme, conducted opinion research and developed a purchasing policy aimed at utilizing local businesses where possible.

In 1994 Nirex submitted a planning application for a rock characterization facility in the vicinity of Sellafield. After the application was rejected at the public inquiry Nirex appealed to the Secretary of State and was turned down by the outgoing government at the time.

After the refusal of the planning permission Nirex talked with stakeholders to identify lessons that could be learned about the decision making process to help in future policy development. A key finding was that the organization needed to be more transparent, so it implemented a Transparency Policy and took steps to engage stakeholders more. Another issue raised by stakeholders was that Nirex was owned and funded by the nuclear industry, since this time Nirex have been made independent of the nuclear industry and their current role includes the following:

- Scientific, engineering and social science research
- Setting specifications and standards for waste packaging

- Maintaining an inventory of radioactive waste
- Communicating with stakeholders on waste issues

In 2001 the UK Government launched the Managing Radioactive Waste Safely (MRWS) programme to help to develop long term radioactive waste management policy in the UK. They set up, as part of Stage 2 of the MRWS programme, the Committee on Radioactive Waste Management (CoRWM), as an independent body to oversee the consultation on long term options for the management of ILW and HLW in 2003. CoRWM has been asked to consult widely in an open, transparent and inclusive manner in order to inspire public confidence and report back its recommendations to Government in 2006. The Government will then make a decision about which options to implement. A discussion guide entitled "Managing Radioactive Waste in the UK – Your Views Matter" was produced and groups around the UK were able to express their views and concerns though responding to the guide via the CoRWM website or attending plenary committee meetings. A phase 2 public and stakeholder engagement exercise was completed on the 29 July 2005. This process allowed the discussion, assessment and elimination of long term waste management options. Four options have been short listed for retention;

- Long term interim storage
- Deep geological disposal
- Phased deep geological disposal
- Near surface (non geological) disposal – but with a limited range of wastes

A detailed Phase 2 report is due out in late 2005 which will show how the options were rejected, criteria that will be used to assess the remaining options, and how CoRWM will interact with specialists, stakeholder groups and the wider public.

4. THE NUCLEAR DECOMMISSIONING AUTHORITY (NDA)

The UK Government has made another major structural change in the nuclear industry. The Nuclear Decommissioning Authority (NDA) was established in April 2005 in order to ensure that the nuclear legacy in the UK is cleaned up safely, securely and cost effectively and in ways that protect the environment for current and future generations. The ownership of some twenty sites was transferred to the NDA with the previous owners, the tier 1 contractors, now responsible for the management and operation of those sites. The sites now owned by the NDA include for example the Magnox Power stations, Sellafield, Dounreay and the Low Level Waste Repository.

The NDA has recognized and openly stated the requirement to establish an open and interactive relationship with its many stakeholders. A charter has been specifically set up in order to accomplish this. This involves the formation of a national stakeholder group and the site licence companies are expected to establish stakeholder engagement practices at the site level. The Sellafield Local Liaison Committee, as it was known at the time, was recognized as being at the forefront of stakeholder engagement but it has since moved further in line with NDA requirements for greater transparency and openness.

5. WASTE MANAGEMENT AT DOUNREAY

The Dounreay site is located in Caithness, Scotland and is operated and managed by UKAEA under contract to the NDA. On site disposal of LLW has taken place in an authorized facility that is now full. This material has only been generated from the Dounreay site itself.

The authorized disposal of intermediate level waste (ILW) took place at Dounreay within a shaft, primarily between the years of 1958 and 1977. As a consequence of improved disposal practices coupled with the shafts close proximity to the sea UKAEA intend to remove the contents of the shaft.

As part of an overriding Site Restoration Plan, UKAEA launched in 2002 its public participation programme. Through this programme the public was invited to register interests toward specific site activities and become involved in the decision making processes of the site which are undertaken through a transparent Best Practical Environmental Option (BPEO) approach. Consultation exercises were held on both LLW disposal and the Dounreay Waste Shaft.

The consultation exercise on LLW disposal is now closed and the agreed strategy is currently being discussed with the regulators. The consultation exercise on the Dounreay Waste Shaft is also now closed and the chosen option of isolating the shaft by grouting incorporated stakeholder concerns. The process taken within both exercises is captured in stakeholder panel reports.

6. SUMMARY

For LLW disposal in the UK, the original site chosen did not go through a site selection process and there was therefore no formal stakeholder engagement. However, healthy and successful stakeholder engagement has taken place and continues throughout the operational lifetime of the Low Level Waste Repository. There is now an increased emphasis on local concerns and economic benefit. In the near future, the Government will launch a national dialogue on the long term management of LLW.

For the long term management of ILW, the previous site selection and characterization phases included stakeholder engagement, and the lessons learned are now being taken on board. The rejection of the planning application back in 1997 stalled the process of finding a solution for ILW in the UK. Nirex has since become independent of the nuclear industry which should assist them in undertaking their work in a transparent manner. CoRWM has now been charged with making a recommendation on the most suitable option to Government, who will decide which option(s) to implement.

The NDA was formed in April 2005 and having taken on the ownership of 20 sites has made it clear that they expect a strong emphasis on stakeholder engagement across all areas, especially waste disposal.

UKAEA has engaged stakeholders extensively in order to determine a forward and improved programme for both its LLW and ILW authorized disposals.

It is clear that the successful siting, development and ultimate operation of repositories, whether they be for low or intermediate level waste relies on a sound programme of public involvement and consideration of socioeconomic issues.

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Socioeconomic impacts of the Barnwell South Carolina low level radioactive waste disposal facility

W.B. House
Chem-Nuclear Systems, Columbia, South Carolina, United States of America

Abstract

Chem-Nuclear Systems, LLC has operated the Barnwell Low level Radioactive Waste (LLRW) Disposal Facility in Barnwell County, South Carolina (SC) since 1971. The setting and brief history of the facility will be provided. The social and economic impacts of the Barnwell Site on the state, county, and local community can be summarized in quantitative and qualitative terms. The fiscal and human resources to the community from Duratek and its employees have been significant over the years. There are several key tenants of the company's operating philosophy that have maintained positive community support for the facility. The Low level Waste Policy Act and the resultant compacting process have impacted the facility's viability, and this has influenced the community involvement programmes and the overall socioeconomic impacts of the facility. As the regional facility for the three-state Atlantic Compact, the Barnwell facility will be restricted to receiving the small volumes of waste from only those states in 2008.

1. INTRODUCTION

1.1 Location and description of the facility

The Barnwell Facility is an LLRW disposal facility located approximately five miles west of the City of Barnwell, in Barnwell County, SC. The disposal site is located on approximately 235 acres of property owned by the State of South Carolina and leased by Chem-Nuclear from the State Budget and Control Board. The Barnwell Facility is located to the east of the US Department of Energy (DOE) Savannah River Site. It is also adjacent to the recently decommissioned Allied General Nuclear Services (AGNS) facility. The South Carolina Advanced Technology Park is now located on the AGNS property. The Site is located in the Atlantic Coastal Plain province with its gentle rolling terrain, sandy surface soils, and pine forests.

Chem-Nuclear Systems, Inc. established the facility in the late 1960's and early 1970's and grew into various aspects of radioactive waste management. In 2000, Duratek, Inc. acquired Chem-Nuclear and continues to operate the Barnwell Disposal Facility.

1.2 Regulatory history

The Barnwell Facility began disposal operations in 1971 pursuant to a South Carolina radioactive materials license authorizing operation of a shallow land burial facility. The regulatory authority of the state was derived from a formal agreement between the United States (US) government and the State of South Carolina. This agreement, codified in 1969, authorized the State to regulate certain nuclear materials in quantities not sufficient to form a critical mass.

The license has been amended 48 times to incorporate technical and administrative requirements. In 1983, the waste characterization, classification, waste form and packaging requirements of US Nuclear Regulatory Commission (NRC) 10 CFR Part 61 were implemented. In 1995, the requirements for concrete disposal vaults for all waste classes and

enhanced engineered covers on all disposal trenches were included. The license has been renewed seven times since it was issued.

The most recent license renewal application was submitted to the regulatory agency, SC Department of Health and Environmental Control (DHEC) in 2000. Duratek and SC DHEC continue to complete and review the documents required to support the renewal of the license. SC DHEC and their Blue Ribbon Panel of national and international experts agreed with the facility's 2000-year site performance assessment, the Environmental Radiological Performance Verification (ERPV). The SC Sierra Club appealed the renewal of the license in 2004. After an extensive review and hearing in the SC Administrative Law Court, the Judge upheld the agency's decision to renew the license.

1.3 LLRW interstate compact system

In 1980, the United States Congress passed the Low level Radioactive Waste Policy Act, Public Law 99-240 ("Policy Act" or LLRWPA). The Act established three major policies. First, each state is responsible for the LLRW generated within its borders. Second, states could form interstate compacts to manage LLRW generated within the compact, including the authority to deny disposal of out-of-compact wastes at compact disposal facilities. Third, the Policy Act established the policy that compacts could not refuse to accept LLRW from other states until the United States Congress had ratified the compact. The Southeast Compact, consisting of eight south eastern states was formed in 1982. The Barnwell Facility was designated as the regional disposal facility. The LLRWPA was amended in 1985 (LLRWPAA) to provide incentives and penalties for states to comply with the Act.

In 1995, South Carolina withdrew from the Southeast Compact, and the Barnwell Facility began accepting waste from generators in all states except North Carolina and states in the Northwest Compact. North Carolina was prohibited from accessing the Barnwell Facility because of its failure to develop the next regional disposal facility. The Northwest Compact states disposed of their LLRW at the US Ecology facility in Washington. The SC General Assembly also imposed a $235 per cubic foot tax on all waste received for disposal at the Barnwell Facility. Proceeds from this tax went to the Children's Education Endowment Fund that has been used for educational scholarships and school construction.

In 2000, the SC General Assembly enacted the Atlantic Compact Act, and South Carolina joined the Atlantic Compact, formerly the Northeast Compact. The other member states of the Atlantic Compact are Connecticut and New Jersey.

1.4 Waste volumes and radioactivity

During the mid-1970's through the 1980's the Barnwell Facility received large volumes of LLRW. During this period the facility was receiving over half of the commercial LLRW generated in the United States. As the effects of the LLRWPAA, the increase in surcharges and fees, improved management techniques, and disposal competition came to play, the volumes of waste received at Barnwell declined. The implementation of the Atlantic Compact Act requires continued reduction of waste volumes through 2008.

The primary waste forms received in recent years are dewatered resins and filter media, compacted and incinerated dry active waste, sealed sources and irradiated hardware. The as-received total radioactivity disposed at the site is approximately 12 million Curies. The total remaining Curies after radioactive decay is about three million Curies. After 100 years only about five percent of the buried radioactivity will remain.

1.5 Regulatory agencies

The relationship of the State of South Carolina to the operation and management of the Barnwell Facility is a complex one. The State is involved with the Barnwell Facility on a number of levels and has established environmental and economic requirements and controls over the facility.

The State, through DHEC, licenses and regulates operations at the Barnwell Facility. In addition, the State owns the property on which the disposal site is located. In 1971, a 99-year lease was established with the State Budget and Control Board (B&CB). The land was originally purchased by Chem-Nuclear and deeded to the State, as required by State law. In 1976, the Lease was substantially revised, and the leased area was expanded to the current 235-acre site. The Lease provides for the establishment of the Long Term Care Fund, sometimes referred to as the Extended Care Fund, to provide for maintenance and monitoring of the site during post-closure and during the 100-year institutional control period. The Long Term Care Fund also provides funds if any remedial or corrective action needs to be taken. The Long Term Care Fund is currently funded by a charge of $2.80 on each cubic foot of waste disposed of at the Barnwell Facility. The current balance in the Long Term Care Fund is about $29 million.

The Decommissioning Trust Fund was established pursuant to a trust agreement executed in 1981 by Chem-Nuclear as Grantor, the State Treasurer as Trustee, and the Budget and Control Board as Beneficiary. The purpose of the Decommissioning Trust Fund is to provide funds for site stabilization and closure. Expenditures from the Fund must be approved by the Budget and Control Board. This Fund has already provided funding for installation of final caps on approximately 80% of the disposal trenches. This Fund is also funded by a per cubic foot charge, currently set at $4.20. The Decommissioning Trust Fund is considered fully funded with a balance of about $19 million.

With the enactment of the Atlantic Compact Act in 2000, the State became even more closely involved in the operation and management of the Barnwell Facility. In addition to providing for South Carolina to join the Atlantic Compact, the Act provides for extensive economic regulation of the Barnwell Facility. The Act authorizes the Budget and Control Board to approve disposal rates for waste generators and shippers. Declining annual waste volume limits are also specified for the Facility.

The Act requires the South Carolina Public Service Commission (PSC) to determine annually the allowable costs for operating the Barnwell Facility. The Budget and Control Board is directed to participate in the PSC proceeding as a party representing the interests of the State. Allowable costs, by statute, include the cost of activities necessary for construction of disposal trenches and vaults, and construction and maintenance of necessary physical facilities.

All revenue from operations of the Barnwell Facility is paid annually to the State minus allowable costs as determined by the PSC, the statutorily-allowed operating margin of 29% (on some of the allowable costs), and certain other payments already made to the State to pay for State agency activities and the Atlantic Compact Commission. The revenue to the State is allocated among Barnwell County, in-state generator rebates, and the Children's Education Endowment Fund.

1.6 Safety and compliance record

The Barnwell Facility has an excellent record of safety and compliance. Over 28,000,000 cubic feet of LLRW from United States generators have been safely disposed at the site. In the history of site operations, there have been no environmental releases above regulatory limits and no actual or potential radiation exposures to the public from operations above regulatory limits. The last lost-time injury at the Barnwell Facility was in 1993. No notices of violation or items of noncompliance have been issued against our operating license since 1983. Duratek has worked diligently with SC DHEC to implement improvements to waste forms, waste containers, trench designs, vault designs, cap designs, and disposal techniques in order to maintain the Barnwell Facility in full compliance with State and federal requirements.

1.7 Barnwell facility financial impacts

Over its operational history, the Barnwell Facility has been a tremendous financial asset to the State of South Carolina, Barnwell County, and the company. Since the implementation of the Atlantic Compact Act, these assets have decreased, in part due to the lower volumes of LLRW allowed, and partly due to the lower generation rates of LLRW. Table 1 shows the last five fiscal years' costs, revenues and profits from the Facility. The State has received an average of $28 million per year most of which goes to education. The Long Term Care (LTC) fund and the Closure fund contributions are based on the waste volume received. The costs of the Atlantic Compact Commission, SC B&CB support and SC DHEC support to regulate the facility are also paid from site-generated revenue. The direct cost of operating the Barnwell Facility during the last five years has ranged from about $12 - $15 million per year. The Duratek net profit after income taxes is only about $1.2 million per year.

Table 1 - Barnwell Site State Level Financials

($ in millions)	FY 00-01	FY 01-02	FY 02-03	FY 03-04	FY 04-05	5-Year Total
Operating Costs	$14.10	$12.02	$13.45	$13.50	$15.02	68.09
Duratek (Net Profit)	$1.20	$0.93	$1.37	$1.27	$1.32	6.09
South Carolina	$47.31	$23.01	$30.89	$25.61	$14.85	141.67
LTC & Closure	$0.88	$0.40	$0.46	$0.42	$0.30	2.46
Atlantic Compact	$0.50	$0.23	$0.26	$0.36	$0.26	1.61
SC B&CB	$0.75	$0.65	$0.58	$0.52	$0.52	3.02
SC DHEC	$0.28	$0.28	$0.28	$0.28	$0.28	1.4

On the county and local level, the site pays taxes and fees during the last five years as shown in Table 2. Property taxes are paid by anyone owning real property. The business license tax is levied by Barnwell County, unique to Duratek, and 15% of that tax goes to the town of Snelling, SC. The school district fees and the county general fund contribution come from the total amount received by the State. The economic development fund contribution is from the monies Connecticut and New Jersey paid to establish the Atlantic Compact and have assess to the Barnwell Facility.

Table 2 Barnwell Site County & Local Taxes & Fees

($ in millions)	CY 2001	CY 2002	CY 2003	CY 2004	CY (ytd) 2005	5-Year Total
Property / Real Estate Taxes	$0.10	$0.09	$0.10	$0.10	$0.08	~ 0.47
Economic Dev. Fund from Atlantic Compact	$2.00	$2.00	$2.00	$2.00	$2.00	~ 10
School District Fees from State	$1.00	$1.00	$1.00	$1.00	$1.00	~ 5
County General Fund from State	$1.00	$1.00	$1.00	$1.00	$1.00	~ 5
Business License Tax (Snelling)	$0.44	$0.44	$0.44	$0.63	$0.68	~ 2.63

1.8 Facility operating costs

The operating costs for the Barnwell Facility for the last five years are summarized in Table 3. The employee payroll averages about $2.5 million per year. The fringe benefits of the employees are about $1.0 million per year. The direct and indirect costs are also shown in the table. Approximately 80% of the Facility Equipment & Disposal Vaults expense is the cost of the vaults. A private contractor set up a facility adjacent to the disposal facility to fabricate the vaults.

Table 3 Barnwell Site Operating Financials

($ in millions)	CY 2001	CY 2002	CY 2003	CY 2004	CY (ytd) 2005	5-Year Total
Payroll	$2.17	$2.46	$2.63	$2.78	$2.15	12.19
Fringe	$0.92	$1.04	$1.05	$1.12	$0.84	4.97
Other Direct Cost	$3.32	$3.40	$5.49	$5.40	$3.51	21.12
Facility Equip. & Disposal Vaults	$2.73	$1.56	$1.97	$2.25	$1.31	9.82
Indirect Admin.	$2.33	$3.30	$2.98	$3.06	$2.13	13.8
Utilities	$0.28	$0.26	$0.28	$0.28	$0.19	1.29

2. SOCIAL AND ECONOMIC CHARACTERISTICS

Barnwell County is an average size county in the State of South Carolina. Of the 557 square miles of land area, about one third of the county is owned by the US DOE Savannah River Site. The population density is low and mostly rural, but only a small percentage of the people are considered farmers. Employment consists of light industrial / manufacturing, Savannah River Site, government and services. Table 4 provides the comparative census data for the Site, Barnwell County and South Carolina. About three fourths of the site employees live in a three county area local to the facility. Site employee's average pay is higher than the County average pay and much higher than the State. However, the number of employees at the Site is small.

Table 4 Barnwell Site County & State Census Data

	Site 2005	Site 2000	County 2000	State 2000
Civilian Labour Force	61	70	11 173	1 985 249
Land Area (Square Miles)	0.367	0.367	557	32 007
Population			23 308	3 972 062
Household Income			$33 325	$29 085
Annual payroll per employee	$35 245	$31 067	$25 266	$22 924

2.1 Open door policy

Grade school through college classes, industrial groups, and members of the general public visit the Barnwell Facility on a regular basis. After a short film and the safety and security briefings, visitors are escorted throughout the tour. Visitors are encouraged to ask questions and are allowed to take pictures. About 900 visitors per year have toured the facility over the past few years, and during the past decade, visitors from 25 foreign countries have been welcomed at the Site. The local community leaders visit regularly and are kept informed of site activities at civic meetings or direct contact by company management.

SC DHEC, the environmental regulator of the facility, is continually present. The on-site inspector is available daily and inspects each waste shipment arriving for disposal. SC DHEC engineers join company managers for the weekly site inspection to evaluate environmental, engineering, radiological, and security aspects at the Site. SC DHEC engineers also inspect each disposal trench during various construction phases. Additionally, the SC DHEC staff performs semi-annual license inspections at the facility.

2.2 Duratek corporate involvement

The company has been involved in the community since activities at the site began and is a sponsor and financial contributor to many activities and groups in the county. Duratek is a major financial contributor to the Barnwell County Arts Council, the annual Hooked on Fishing – not on Drugs Fishing Rodeo, and the local baseball and soccer teams. Also, many

employees devote their time and talents to these activities. Annually Duratek holds a day of appreciation (Barnwell Appreciation Day) for the community and state leaders for hosting the disposal facility. It is an all-day event with a golf tournament, skeet shooting and an evening reception.

In 2002, Duratek dedicated Craigs Pond as a new South Carolina Heritage Preserve. This 264-acre natural area features two Carolina bays. Craigs Pond is an undisturbed savanna bay with a clay-based meadow environment. Carolina bays are elliptical wetlands supporting abundant wildlife and some threatened or endangered plants and animals. The company also donated land to the town of Snelling to locate their fire main pump and store other fire fighting equipment. Duratek supports a number of state and county organizations including the SC Water Fowl Association and Barnwell County Disaster Preparedness Agency, Historical Committee, and the county libraries.

2.3 Employee community involvement

The employees are part of the community and donate their time, talent and money to many worthwhile organizations. They serve in many capacities including board members of the Chamber of Commerce, Economic Development Board, American Cancer Society, United Way, Rotary Club, Library Board, Town Council, School Board, and Airport Commission.

2.4 Barnwell community support

The Barnwell community and local leaders are appreciative of the facility and its benefits to the community and the state. The leaders and supporters routinely meet with visitor groups and government organizations interested in the site. Delegations from the community have been present and supported Duratek at the allowable cost hearings and the license renewal hearings. Certain leaders have given telephone and personal interviews to national newspapers and television networks.

3. CONCLUSION

Because of the Barnwell Facility, the company has had major involvement in the legislative, regulatory, and financial aspects of radioactive waste management in the United States, South Carolina, and Barnwell County. The financial contributions to the county and local community have been significant over the years and continue to be a substantial portion of their operating funds. The continued dedication of the local management and employees and the willingness of the community to support and speak out in favour of the facility have been a mainstay of our existence.

LIST OF PARTICIPANTS

Abramenkovs, A.	Hazardous Wastes Management State Agency, 31 Miera, 2169 Salaspils, Riga district, Latvia Email: bapa@bapa.gov.lv
Biurrun, E.	DBE Technology, Eschenstr. 55, 312 24 Peine, Germany Email: biurrun@dbe.de
Bøe, T.E.	IFE, P.O. Box 40, 2027 Kjeller, Norway Email: trondeb@ife.no
Booth, P.M.	Nexia Solutions, BNFL, H260 Hinton House, Risley, Warrington, Cheshire WA3 6AS, UK Email: peter.m.booth@nexiasolutions.com
Borissova, K.	Bulgaria State Enterprise, 51 james Bourchier blvd., fl. 18, 1407 Sofia, Bulgaria Email: knb@dprao.bg
Boyazis, J.P.	ONDRAF/NIRAS, Avenue des Arst 14, 1210 Brussels, Belgium Email: jp.boyazis@nirond.be
Dmitriev, S.	MosNPO RADON, 7th Rostovsky Pereulok, 2/14, 119121 Moscow, Russian Federation Email: sia-radon@radon.ru
Faltejsek, J.	RAWRA, Dlazdena 6, 110 00 Praha 1, Czech Republic Email: faltejsek@rawra.cz
Fleming, P.M.	CDTN/CNEN, Rua Prof. Mario Werneck, s/n Campus UFMG, Caixa Postal 941 Pampulha, 301 23-970 Belo Horizonte MG, Brazil Email: pmf@adtn.br
House, W.B.	Duratek Inc./Chem-Nuclear Systems Inc., 140 Stoneridge Drive, Colombia SC 29210, USA Email: wbhouse@duratekinc.com
Janenas, D.	RATA, Algirdo Str. 31, 03219 Vilnius, Lithuania Email: dainius_janenas@rata.lt
Jurkevics, A.	Ministry of Environment, Radiation Safety Centre, Maskavas iela 165, 1019 Riga, Latvia Email: artis.jurkevics@rdc.gov.lv

Kozulko, T.	State Nuclear Regulatory Committee, 9/11 Arsenalna Str., 01011 Kiev, Ukraine Email: kozulko@hq.snrc.gov.ua
Maset, E.	CNEA, Avda. Del Libertador 8250, 1429 Buenos Aires, Argentina Email: maset@cnea.gov.ar
Mohd Rosli, B.M.	MINT, Bangi, 43000 Kajang, Selangor, Malaysia Email : Roslimuda@mint.gov.my
Munshi, S.K.	BARC, Nuclear Recycle Group, Tombay, Mumbai 400 085, India Email: skm@magnum.barc.ernet.in
Nachmilner, L.	International Atomic Energy Agency, Wagramer Strasse 5, 1400 Vienna, Austria Email: l.nachmilner@iaea.org
Orr, K.	OPG, Box 7000 B23, Tiverton, ON, Canada Email: Kevin.orr@opg.com
Pritrsky, J.	DECOM Slovakia, Jana Bottu 2, 91701 Trnava, Slovakia Email: pritrsky@decom.sk
Seppälä, T.	Posiva Oy, 27160 Olkiluoto, Finland Email: timo.seppala@posiva.fi
Steinerova, L.	RAWRA, Dlazdena 6, 110 00 Praha 1, Czech Republic Email: steinerova@rawra.cz
Szánto, P.	Noguchi Porter Novelli, Szabadság tér 7, 1054 Budapest, Hungary Email: pszanto@noguchi.hu
Tomczak, W.	RWMP, 05-400 Otwock-Swierk, Poland Email: tomczak@zuop.pl
Tuturici, I.L.	ANDRAD, Campului No. 1, P.O. Box 10, 115400 Mioveni, Argen Region, Romania Email: liviu.tuturici@andrad.ro
Vadim, I.	MosNPO RADON, 7th Rostovsky Pereulok, 2/14, 1 19121 Moscow, Russian Federation Email: willy@conternet.ru

Zaki, A.A.
Atomic Energy Authority,
Hot Laboratory Centre, P.O. Box 13758, Inshas,
Cairo, Egypt
Email: aazaki5@yahoo.com

Zeleznik, N.
ARAO,
Parmov 53, 1000 Ljubljana, Slovenia
Email: nadja.zeleznik@gov.si