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An Overview of Stakeholder Involvement in Decommissioning

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AN OVERVIEW OF STAKEHOLDER INVOLVEMENT IN DECOMMISSIONING

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AN OVERVIEW OF STAKEHOLDER INVOLVEMENT IN DECOMMISSIONING

INTERNATIONAL ATOMIC ENERGY AGENCY
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FOREWORD

Decision making, in the context of projects which have an impact on communities and their environment, is increasingly being implemented with the involvement of those affected by the project — 'the stakeholders'. Recent experience shows that such projects may have more far-reaching impacts than deemed possible only a few years ago. It is clear that decommissioning projects fall into this category and there is already some experience of related decisions in Member States that involved a wide range of stakeholders. It is important for everyone concerned in decommissioning projects to understand the issues that may affect decisions, and therefore to be able to gain from the experience already accumulated in other countries. It is recognized, however, that different types of experience may not be universally relevant and that some issues have a particular national character.

This report addresses a topic that has been little covered by preceding IAEA publications on decommissioning. Some precedents are found in IAEA publications on other aspects of waste management. The topic has, however, been addressed by other international organizations, in particular the OECD Nuclear Energy Agency (OECD/NEA), which mostly focus on the public as the main stakeholder. However, it is important to recognize that the concept of 'stakeholders' does not only refer to the local communities, or even the general public at large, but to many additional 'players'. While this report does refer to OECD/NEA publications, it expands the scope to a wide range of prospective stakeholders and identifies specific conditions and issues of the IAEA's diverse socio-political, economic and cultural membership. This report was prepared with the assistance of of a number of international experts. The IAEA expresses its gratitude to K. Lauridsen, Denmark, who chaired all of the meetings.

The IAEA officer responsible for this report was M. Laraia of the Division of Nuclear Fuel Cycle and Waste Technology.

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CONTENTS

SUMMARY

Over the past decade or so, radioactive waste management institutions have become progressively more aware that technical expertise and technical confidence are insufficient, on their own, to justify waste management solutions to a wider audience, or to see them through to successful implementation. Because of changes in society's decision making environment and heightened public sensitivity to all matters connected with environmental protection, nuclear power, radioactivity, and especially radioactive waste, any decision regarding whether, when and how to implement waste management solutions will typically require thorough public examination and the involvement of many relevant stakeholders. The latter include waste management agencies, safety authorities, local communities, elected representatives, and technical intermediaries between the general public and decision makers. In particular, the decision making process is highly dependent on stakeholder involvement, especially when risks and benefits are shifted over time. As a major waste management activity, decommissioning of nuclear facilities is subject to the considerations mentioned above. Decommissioning also includes aspects additional to waste management, which are of interest to a wider range of stakeholders. The way in which local communities and the public in general are engaged in dialogue about the decommissioning of nuclear facilities is likely to become an increasingly important issue as the scale of the activity grows.

The main objective of this report is to provide information on the impact of stakeholders, both from and on decommissioning of nuclear facilities and related issues in IAEA Member States. It takes due account of the work of other organizations, in particular the OECD/Nuclear Energy Agency (OECD/NEA). In this regard the publication addresses the wide range of environmental, socio-political, economic and cultural environments of IAEA Member States, rather than the more uniform features of individual countries or the narrower membership of other international organizations. It is expected that the report will improve awareness among those who are about to become responsible for, and involved in, decommissioning projects, of the range of issues which may be of concern to stakeholders and approaches that have been used to reconcile them.

To begin with, technological progress needs to be properly communicated to the general and professional non-nuclear public who are displaying increasing interest in economic and environmental issues of industrial activities, and nuclear activities in particular. Finally, this report is grounded on international principles and treaties — such as the Rio and Aarhus Conventions.

It is important for all concerned in decommissioning projects to understand the issues that may affect decisions and be able to benefit from the experience already acquired in other countries. It is recognized, however, that different experiences may not be universally relevant and that some issues have a particular national character.

It should be noted that the term 'stakeholders', in the context of nuclear activities, is often used to designate the public and specific segments of it. This is not the case in this report, where the public in general and public opinion groups in particular are only a few stakeholders among many. The report also recognizes that stakeholders are not necessarily those living in the vicinity of a nuclear facility being decommissioned, but could be physically situated anywhere. In a world which is rapidly becoming a 'global village', impacts from a major decommissioning project can be felt thousand of kilometres away.

Finally, this report is not intended to provide specific guidance. The diverse social, political, economic, and cultural environments of IAEA Member States would render this task prohibitive. Rather, it seeks to identify a large spectrum of possible stakeholders, factors important to their constitution, and concrete or perceived interactions vis-à-vis the decommissioning process. It will be up to Member States to determine the applicability to their own conditions of reported case histories or situations prevailing in any given country.

Following introductory sections, the report expands on the identification of stakeholders relevant to a decommissioning project and how specific stakeholder categories typically interact with the process. The subsequent section provides generic information on areas and modalities whereby stakeholders influence the decommissioning process, and key factors in an effective stakeholder involvement process. The report further addresses a particularly important aspect of stakeholder impact, i.e. the reuse of a decommissioned site.

Local/national factors in determining stakeholder impacts are described in more detail in the section which follows. As stated above, this report takes due account of national differences and recognizes that only generic guidance is possible.

A section provides examples of quantitative methodologies to include stakeholder influence in optimizing and selecting decommissioning strategies. The report is complemented by national/project annexes, lessons learned and an extensive bibliography.

1. INTRODUCTION

1.1. BACKGROUND

Over the past decade or so, institutions with the obligation to define decommissioning and radioactive waste management policies have become progressively more aware that technical expertise and technical confidence are insufficient, on their own, to find solutions, to justify them to a wider audience, or to see them through to successful implementation. Because of changes in society's decision making environment and heightened public sensitivity to all matters connected with environmental protection, nuclear power, radioactivity, and especially radioactive waste, any decision regarding whether, when and how to implement decommissioning and waste management solutions will typically require thorough public examination and the involvement of many relevant parties. The latter include waste management agencies, safety authorities, local communities, elected representatives and technical intermediaries between the general public and decision makers. In particular, the decision making process is highly dependent on the involvement of several parties, especially when risks and benefits may be shifted over time [1, 2]. Because of the extent of the modifications introduced at a site and because of their implications for waste management activities, the decommissioning of nuclear facilities is fully subject to considerations mentioned above. Decommissioning also includes additional aspects which are of interest to a wider range of stakeholders. The way in which local communities, the public in general, and a wide range of other parties are engaged in dialogue about decommissioning of nuclear facilities is likely to become an increasingly important issue as the scale of the activity grows [3].

1.2. OBJECTIVE

The theme of this publication is that decision making, in the context of projects which have an impact on communities and their environment, as well as on more remote interests, is increasingly being implemented with the involvement of those affected by the project — 'stakeholders'. It is clear that decommissioning projects fall into this category and there is already experience of related decisions in some Member States having involved stakeholders. It is important for all concerned in decommissioning projects to understand the issues that may affect decisions and be able to gain from the experience gained in other countries. It is recognized, however, that all experience may not be universally applicable and that some issues have a particular national character.

The main objective of this publication is to provide information on stakeholder impacts from/on decommissioning and related issues in IAEA Member States. It addresses the societal aspects of decommissioning, in particular the worldwide experience related to stakeholder interactions associated with the decommissioning of nuclear facilities, taking due account of the work of other organizations, primarily the OECD Nuclear Energy Agency (see the Bibliography). In this regard, the publication addresses the wide range of environmental, socio-political, economic and cultural environments in IAEA Member States, rather than the more uniform features of individual countries [4] or the narrower membership of other international organizations. A few IAEA publications address stakeholder interactions in decommissioning and environmental remediation [5, 6], but only as one component within a broader range of activities.

It is hoped that this report will improve awareness, amongst those who are about to become responsible for and involved in decommissioning projects, of the range of issues which may be of concern to stakeholders and approaches that have been used to reconcile them. Technological progress needs to be adequately communicated to the general and professional non-nuclear public who are displaying increasing interest in the economic and environmental issues of industrial activities in general, and nuclear ones in particular.

In the past, factors negatively affecting the decision making process have been numerous. For example, there is the lack of communication between waste producers, decommissioning managers, regulators, and local authorities, the limited access to information and restricted involvement of the local stakeholders regarding essential decisions for the long term on their environment, the short term interest of politicians with regard to the long time scale of the issues at stake, and the way uncertainties are sometimes dealt with [1].

Timely stakeholder involvement may enhance safety and can encourage public confidence. Stakeholder involvement may result in attention to issues that otherwise might escape scrutiny. Public confidence is improved if issues that are raised by the public are taken seriously and are carefully and openly evaluated. Experience in many countries has shown that transparency can be an extremely effective tool to enhance safety performance [7].

Finally, this report is grounded on international principles and treaties, such as the Rio and Aarhus Conventions. For example the Aarhus Convention [8] establishes a number of rights of the public (citizens and their organizations) with regard to the environment. Public authorities (at the national, regional or local level) must contribute to allow these rights to become effective. The convention provides for:

— The right of everyone to receive environmental information held by public authorities. This can include information on the state of the environment, but also on policies or measures taken, or on the state of human health and safety where this can be affected by the state of the environment. In addition, public authorities are obliged to actively disseminate environmental information in their possession.
— The right to participate from an early stage in environmental decision making. Arrangements need to be made by public authorities to enable citizens and environmental organizations to comment on, for example, proposals for projects affecting the environment, or plans and programmes relating to the environment, with these comments taken into account in decisionmaking, and information to provided in the final decisions and the reasons for it;
— The right to challenge, in a court of law, public decisions that have been made without respecting the two aforementioned rights or environmental law in general [9].

It is recognized that international conventions provide a high level framework that promotes and gives credibility to the effective engagement of stakeholders. Interpretation of these conventions will vary between Member States, leading to differing approaches both to decommissioning and to stakeholder engagement. Coupled to this is the wide variety of social, economic, political and cultural differences between countries, which needs to be taken into account when interpreting and using this document.

As one striking example of the growing importance of stakeholders in decommissioning, the newly established Nuclear Decommissioning Authority (NDA) in the United Kingdom places the highest importance to stakeholder relations to the extent that establishing and maintaining such relations is part of the NDA's mandate. The table in Annex I.G(a) highlights the NDA's commitment to stakeholders [10].

1.3. SCOPE

The scope of this report includes the sharing of experience and lessons learned on stakeholder involvement and related issues in planning for and managing the decommissioning of nuclear facilities, particularly for countries with limited resources. This report addresses a topic that has been little covered by preceding IAEA publications on decommissioning. OECD/NEA publications provide some precedents (see Ref. [11] and also the OECD/NEA bibliography). Therefore, this report will utilize OECD/NEA contributions as far as it is deemed applicable to decommissioning, but will stress conditions and issues of IAEA Member States. This report provides comprehensive identification of stakeholders relevant to decommissioning, their interrelationships, and their role in various phases of the decommissioning process.

It should be noted that the term 'stakeholders' in the context of nuclear activities is often used to designate the public and specific segments of it. This is not the case in this report, where the general public and public opinion groups are only a few of the stakeholders amongst many others. In addition, this report does not focus on the impacts of the decommissioning process on the public, which is addressed by another IAEA publication [12]. In fact, Fig. 1 (from the BR-3 decommissioning project in Mol, Belgium) shows that the stakeholder interactions, even in a relatively minor decommissioning project, can be complex — even without consideration of public stakeholders. This recognizes that stakeholders are not necessarily those living in the vicinity of a nuclear facility being decommissioned, but could be physically situated anywhere. In a world which is rapidly becoming a 'global village', impacts from a major decommissioning project can be felt thousand of kilometres away.

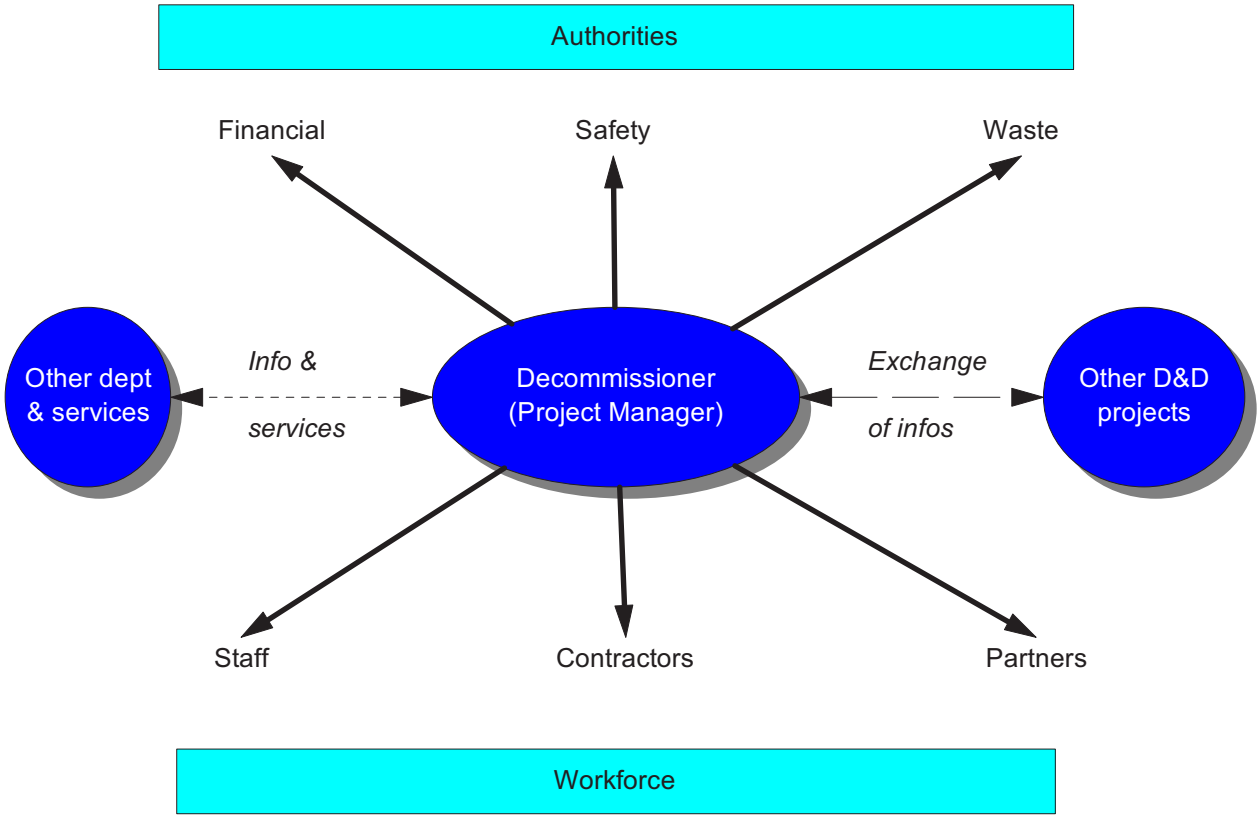

FIG. 1. Minimal links and information streams for the dismantling of research reactors.

This report is not about the stakeholder machinery per se, as a technical discipline for sociologists, but is concerned about who the stakeholders are and how their involvement can affect the decommissioning project. Stakeholder involvement techniques are dealt with to a limited extent in this report. OECD/NEA documents provide more extensive guidance on techniques to address stakeholder needs and participation, and how to establish an effective dialogue. The reader interested in these areas should consult the reference list, in particular the extensive OECD/NEA bibliography.

Finally, this report is not intended to provide specific guidance. The diverse social, political, economic, and cultural environments of IAEA Member States make this task impractical. Rather, it aims at identifying a large spectrum of possible stakeholders, factors important to their composition, and actual or perceived interactions vis-à-vis the decommissioning process. It will be up to individual Member States to determine the applicability of generic issues or reported case histories to their own conditions. In this report, an attempt has been made to include national examples from a variety of countries, with a view to supplementing the published literature which is mostly focused on industrialized countries.

1.4. STRUCTURE

Following introductory sections, this report expands on the identification of stakeholders relevant to a decommissioning project and how single stakeholder categories typically interact with the process (Section 3). Section 4 provides generic information on areas and modalities whereby stakeholders influence the decommissioning process, and key factors in an effective stakeholder involvement process. Section 5 expands on a particularly important aspect of stakeholder impact, i.e. the reuse of a decommissioned site.

Local/national factors in determining stakeholder impacts are described in more detail in Section 6. As noted above, this report endeavours to take account of national differences and recognizes that the generic

guidance provided is only applicable to a limited extent. Section 7 provides examples of quantitative methodologies to include stakeholder influence in optimizing and selecting decommissioning strategies.

The conclusions, two appendices and a number of national annexes describe stakeholder involvement in specific decommissioning projects and lessons learned.

2. DEFINITION OF A STAKEHOLDER

According to the Oxford English Dictionary (2007 edition), a stakeholder is a person, company, etc., with a concern or (especially financial) interest in ensuring the success of an organization, business, system, etc. The term is derived from one who has a stake in something, where to have a stake in something (an event, a concern, etc.) figuratively means to have something to gain or lose by, or to have an interest in, the turn of events. The term therefore applies to supporters and not to opponents [13].

The IAEA Handbook on Nuclear Law [14] states that:

> "Owing to the differing views on who has a genuine interest in a particular nuclear related activity, no authoritative definition of stakeholder has yet been offered, and no definition is likely to be accepted by all parties. However, stakeholders have typically included the following: the regulated industry or professionals; scientific bodies; governmental agencies (local, regional and national) whose responsibilities arguably cover nuclear energy; the media; the public (individuals, community groups and interest groups); and other States (especially neighbouring States that have entered into agreements providing for an exchange of information concerning possible trans-boundary impacts, or States involved in the export or import of certain technologies or material)."

Defining a stakeholder was mentioned in Ref. [5] as being difficult, but in the area of environmental remediation one definition was "Individuals or organizations which may have an interest in the results of an environmental decision or be affected by that decision", where for the purpose of this report "environmental decision" would be replaced by a decommissioning decision. The OECD/NEA Forum on Stakeholder Confidence identifies a stakeholder as "any actor-institution, group or individual with an interest in or a role to play in the societal decision making process" [15]. According to the Good Practice Guide to Project Management Definition [16], a stakeholder is "A person or organization that has a vested interest in the project — either positive or negative". There are obviously many more variations along these lines. This report assumes the latter definition as being the most inclusive. Possible stakeholders are identified in Section 3.

Stakeholders are passive entities until they actively engage with an organization or issue. At Dounreay, in the United Kingdom, for instance, a large campaign was launched to let people propose themselves as stakeholders [17].

3. STAKEHOLDERS RELEVANT TO THE DECOMMISSIONING PROCESS

During the 1990s, nearly every national nuclear waste programme faced many difficulties. There may have been awareness that nuclear waste management was more than a technical issue (typically negotiated between nuclear operators and safety authorities), but there was little experience in how to deal with the social aspects in general and the local opposition in particular. Local communities were typically involved in the last stage of the decision making process when almost all components of the decision were already fixed and local opposition was

mainly seen as something that had to be overcome by information. Waste management is now recognized as a complex decision making process involving technical, ethical, social, political and economic dimensions where no solution can be reached solely on the basis of technical considerations. While this issue is acknowledged for the community as a whole, a major dimension of radioactive waste remains the fact that its management is a global problem looking for a local solution. For any solution, a sound contract between the national community and a local community is a prerequisite [18]. Over time it has become clear that the range of stakeholders was wider than initially expected and proper identification of the parties involved is not easy.

One might ask why community involvement in decommissioning/environmental remediation projects is an issue since the contaminated site is a 'done deal' and cleanup of that contamination is a good thing, so the public should just be happy about it. However, in many countries public involvement in cleanup projects is a regulatory requirement. The client can choose to follow these regulations to the letter or to the intent.

It is important to keep in mind that at any phase in the project, the community can call for a 'change of course' if they are dissatisfied with the site's cleanup process. This possibility may also concern far-off stakeholders who may feel impacted by the decommissioning project (e.g. shareholders who might feel adversely affected by high cleanup costs). In addition, at the site closure, the site will have to be turned over, often to the community. It is therefore important to get community buy-in throughout the cleanup process, so that there are no unexpected complaints at the end that would prevent this change of control from going through smoothly [19].

The end of a nuclear facility's mission and its transition to decommissioning can create substantial hardship on nearby communities, particularly in the case of major facilities built at a distance from large metropolitan areas. A rural setting often promotes the establishment or growth of smaller communities around the nuclear facility that come to rely heavily on the facility for their economic well-being, either directly through taxes, or more indirectly, by services and support functions to the facility and its employees. Eliminating permanent staff during plant closings can result in significant negative economic effects, although a temporary local economic upturn is possible as specialized contractors, managers and labourers move to the area for lengthy decommissioning activities. Because of these financial impacts, local community opinion could range from neutral to negative initially, even if shutdown was announced well in advance. The reaction can be more dramatic in the event of swift or unannounced plant closures. It should be recognized that the local communities are not the only ones affected by the decommissioning process, and not necessarily the most affected. At the Yankee Rowe Nuclear Power Station in the USA, it was realized that new stakeholders would become relevant during decommissioning as compared with the operational phase of the plant, and a Site Closure Project Plan served as a central element in the stakeholder outreach effort [20].

The Environment Council in the United Kingdom [21] considers the relationship of particular stakeholder groups to the issue or decision under consideration. The questions listed below help identify a comprehensive range of stakeholders:

— Who is directly responsible for decisions on the issue?
— Who is influential in the area, or hosting community?
— Who will be affected by any decisions on the issue?
— Who holds positions of responsibility in stakeholder organizations?
— Who can promote a decision providing they are involved?
— Who can obstruct a decision if they are not involved?
— Who has been involved in the issue in the past?
— Who has not had a voice in the issue before, but should have?

More information on this approach is given in Appendix I.

As the previous discussion showed, a distinction between concerned groups aids in understanding their needs and likely roles. Some facility owners starting a decommissioning project have also found it useful to distinguish among various segments of their stakeholders in order to tailor a successful approach to public participation. In effect, they divide stakeholders into segments based on the impacts of the project and location of the stakeholder. Such an approach can distinguish between the local organizations and the general public not residing in a defined impact area, such as that defined by a perimeter 100 km from the facility.

Another categorization has been used in programmes of the United States Department of Energy (USDOE) [22]. The process described here is a general methodology for structuring public participation by categorizing stakeholders. In this process, managing stakeholder participation is based on the clear identification of stakeholders and a well defined approach for communication. The following decommissioning related categories were identified:

— Personally impacted stakeholders;
— Administratively impacted stakeholders;
— Generally concerned stakeholders;
— Process concerned stakeholders.

More information on this approach is given in Appendix I.

To design practical consultation mechanisms, the United Kingdom NDA used two broad categories, local and national, forming two interacting groups [23]. In relation to the type of information that has to be distributed, the USDOE proposed the following groups [24]:

— General public interest;
— Real estate transaction;
— Regulatory compliance;
— City management;
— DOE headquarters;
— Former site workers.

A concrete example of an extensive list of stakeholders for the Dounreay site in the United Kingdom can be found in Ref. [25].

There are different categorizations of stakeholders. The one given in Ref. [26] distinguishes between economic, environmental and social stakeholders. Table 1 describes typical groups and issues belonging to these categories.

The categorization given below and used in this report is different in that the category 'Technical' to the categories shown in Table 1. Thus, the categories are the following:

— Economic;
— Environmental;
— Social;
— Technical.

Within each category the areas of interest and concern specific for stakeholders involved can be identified, as shown in Table 2. Stakeholders include national bodies and committees of national relevance, local groups, groups having a more limited interest in specific features and functions of the facility/site being decommissioned,

TABLE 1. STAKEHOLDER CATEGORIZATIONS (EXAMPLE FROM REF. [26])

Stakeholders	Issues
Economic (Government, customers, decommissioning/ radioactive waste management agencies, supply chain, local community).	Economic (overall cost of decommissioning, supply chain making a fair profit, impact on economics of local community)
Environmental (regulators, local community, non-governmental organizations (NGOs), wider society).	Environmental (local environmental issues, e.g. Transport, noise, waste management).
Social (workforce, regulators, local community, local suppliers, wider society).	Social (health and safety, jobs, impact on local suppliers, impact on local community).

TABLE 2. STAKEHOLDER PRIMARY (IN BOLDFACE) AND SECONDARY (IN ITALICS) AREAS OF INTEREST OR CONCERN

ECONOMIC	SOCIAL
Facility owner	**General public**
Real estate owners	**Local communities**
Government	**Tribal nations**
Funding entities	**Archaeologists, historians, museums, archives**
Institutions	**Media**
Local authorities	Pressure groups
Elected officials	
Trade Unions	*Government*
Managers	*Institutions*
Waste managers	*Local authorities*
Nuclear industry	*Teachers, students and universities*
Non-nuclear industry	*Visitors*
Partners	*Elected officials*
	Trade unions
Regulators	*Operations staff*
Local communities	*Managers*
General public	
Tribal nations	
Media	
International parties	
Pressure groups	
Operations staff	
Future generations	
Security organizations	

ENVIRONMENTAL	TECHNICAL
Regulators (environmental)	**Regulators (nuclear safety)**
Visitors	**Managers**
International partners	**Researchers and scientists**
Pressure groups	**Teachers, students and universities**
Neighbouring countries	**Operations staff**
Future generations	**Waste managers**
	Security organizations
Government	**Emergency services**
General public	
Tribal nations	*Institutions*
Researchers and scientists	*Teachers, students and universities*
Institutions	*Visitors*
Local authorities	*Trade unions*
Teachers, students and universities	*Nuclear industry*
Archaeologists, historians, museums, archives	*Non-nuclear industry*
Media	*Partners*
Elected officials	
Trade unions	
Managers	
Emergency services	

and NGOs. This approach also identifies stakeholders that are not physically close to, or directly involved in, the decommissioning process, but can feel indirect impacts.

It should be noted that under any of these schemes, a given group of stakeholders can be assigned to several categories involving some measure of subjectivity. For example, local communities can be represented by their elected officials or be driven by self-established pressure groups. Similarly, local universities could decide to merge their interests with local communities or act on their own. The following description of typical stakeholders should be viewed with this caution in mind.

Table 3 lists stakeholders who have been identified in this report as being relevant from a general point of view. The sequence in the table does not suggest any ranking or priority. A further description of the characteristics of the individual stakeholders is given in the sections indicated in the table. The list given here does not claim to be exhaustive; local circumstances for a particular project may include other stakeholders. Conversely, there will be a number of countries or local conditions where certain stakeholders would be totally irrelevant.

3.1. FACILITY OWNER

The main area of interest of the owner is economic (with safety as a prerequisite). The choice of a decommissioning strategy may depend primarily on the owner's interest based on the following considerations:

TABLE 3. POSSIBLE STAKEHOLDERS FOR DECOMMISSIONING PROJECTS

	Stakeholders	Description in Section
Implementers of the decommissioning project	Facility owner	3.1
	Funding entities	3.2
	Operations staff	3.3
	Managers	3.4
Regulators	Government	3.5
	Regulators	3.6
	Institutions	3.7
	Local authorities	3.8
	Elected officials	3.9
Cooperating or co-interested	Trade unions	3.10
	Waste managers	3.11
	Real estate owners	3.12
	Local enterprises	3.13
	International parties	3.14
	Contractors	3.15
	Nuclear industry	3.16
	Non-nuclear industry	3.17
	Security organizations	3.18
	Emergency organizations	3.19
Affected by the decommissioning project	Local communities	3.20
	General public	3.21
	Neighbouring countries, tribal nations	3.22
	Researchers and scientists	3.23
	Teachers and students, universities	3.24
	Visitors	3.25
	Archaeologists, historians, museums, archives	3.26
	Media	3.27
	Pressure groups	3.28
	Future generations	3.29
	Others	3.30

— The owner may have a shortage of sites for new plant construction and may be forced to reuse a site for a new plant. In that case, immediate dismantling may be chosen.
— If the plant to be decommissioned is co-located with other operating facilities that will continue to be in service, deferred dismantling may be the preferred choice. The necessary security, surveillance and maintenance for the shutdown facility could be provided by the remaining operating facilities.
— As a factor in the decision to proceed to safe storage, the owner may wish to consider the reuse of some of the plant facilities, for example the cooling water equipment, the infrastructure, and some of the plant process systems, for purposes other than those for which they were originally intended or as part of a new or modified plant.
— The owner may wish to optimize his/her expenditure, depending on the economic situation, in his choice of strategy [27].

Any of the above strategies will position the owner in a specific relationship to the other stakeholders**.** One should note that a change of ownership before or during the implementation of the decommissioning strategy may impact heavily on the sensitive balance among stakeholders. In some countries, for example Spain, there are national agencies taking over from the former operator for the purpose of managing decommissioning. In this case, the owner (and former operator) remains a vigilant stakeholder during the decommissioning until the property is returned to him at the end of decommissioning [28, 29]. In this category, we may also include those companies which offer the services in global site restoration and which have the capability to provide appropriate stakeholder involvement [25].

It has been outlined in the United Kingdom that forecasting the economic cost of nuclear cleanup remains more of an art than a science [30], such that doubts remain about whether nuclear power can really withstand the cost control discipline of a purely private energy supply market without some form of governmental assistance. Shared financial objectives are needed at a very top level of strategy in order to contain costs for the government and allow nuclear firms to grow. The profits of companies in most cases become dependent on the capability of the government to fund liabilities [30].

3.2. FUNDING ENTITIES

A funding entity is understood to be any individual organization or authority that plays a role in providing funding for decommissioning (for example, government, shareholders and ratepayers). Other categories are mentioned elsewhere [31].

Often there are conflicts within this area between stability of funding, who holds the risk premiums, variations between spending profiles and funding availability. Once again the stakeholder does not want surprises but may have short term issues, which require a funding variation that will need to be sold to other stakeholders. This aspect was illustrated by the debate surrounding budget allocation in the United Kingdom during 2007 [32–36]. Given the long term nature of many decommissioning projects and significant variations in funding requirements, the timely allocation of financial resources to the project is an important consideration. Reference [37] gives a stakeholder insight into issues from a shareholder perspective for the new United Kingdom funding authority — the NDA. Ongoing developments to diversify decommissioning funds are discussed in Ref. [38].

Shareholders are important stakeholders in decommissioning. It goes without saying that the costs of decommissioning are going to impact the owners/investors. They will want to see the bill. This pressure will certainly result in accurate cost estimates and efforts to minimize costs throughout the decommissioning process, including selection of contractors, duration of activities, etc. In principle, it is possible that shareholder preferences may go against the strategies selected by the technical management; for example, preference may be given to delayed dismantling — implying diluted cash — flows rather than immediate dismantling, even if normalized costs would show that the latter is financially preferable.

The involvement of ratepayers can be illustrated by the following example [39]. Recently, State utility regulators approved a settlement agreement between the Office of Consumer Counsel and the owners of the former Connecticut Yankee nuclear power plant that extends the payment period that Connecticut ratepayers must pay for the decommissioning of the facility. By extending the payment period for an additional five years —

from 2010 to 2015 — the amount ratepayers are liable for drops from $93 million a year to $43 million a year. Connecticut ratepayers started paying for the decommissioning in the late 1990s. First, this ensures the complete decommissioning of the site of the former nuclear plant with full environmental remediation. Further, it helps ratepayers by reducing charges for the decommissioning of Connecticut Yankee at a time when other rate increases are expected over the next few years.

One important category of funding bodies is the insurance companies covering risks from a number of decommissioning activities. As an example, the cover of liabilities in the transportation of decommissioned Soviet nuclear submarines is described in Ref. [31]. A comparison of different funding methodologies for nuclear decommissioning in France is given in Ref. [32].

3.3. OPERATIONS STAFF

This aspect covers the actual workforce and clearly has a relationship with other areas, i.e. unions, managers and the local community. The issues here include managing change, continued employment, opportunities to leave, working out of a job, moving from production to decommissioning, opportunities for new skills, and changing from a production/R&D to project management style of work. Those with intimate knowledge of the plant/process to be decommissioned may hold the history of use/abuse of the site [40, 41]. Communication with the workforce is a key element to establish when and how they may (or may not) be involved in the decommissioning process and, if not, what are the declared exit strategies, i.e. early retirement or alternative employment. The opposite of this may also be required where key workers are retained in the workforce by offering them "golden handcuffs", i.e. offers to assist in their retention. From a psychological point of view, decommissioning is often considered to be non-creative. Therefore, it is often conducted reluctantly, and this may lead to a slowing down of decommissioning activities and a decrease in the quality of work. If not properly managed, the cultural change from operation to decommissioning can be extremely frustrating [29, 42]. At a site where there will still be operating units, one way to avoid such problems may be to establish an entirely new organization for decommissioning.

Decommissioning of commercial nuclear power plants leads to a range of safety management, socioeconomic and societal challenges with their employees and stakeholders. These aspects need to be taken into account to ensure smooth end-of-operation and decommissioning [43].

Decommissioning may also be associated with a loss of jobs. This can be counterproductive for the timely and successful completion of the task. However, plant personnel have greater knowledge of the plant and its operational history. This knowledge is very valuable for the decommissioning process. On the other hand, an external company has the decommissioning know-how and is interested in getting the contract. If the order is taken, the contractors will be pleased if the task is completed on time, as time is money. Therefore, there is a potential conflict and competition between plant personnel and contractors. Currently, there is a trend in most decommissioning projects to employ a mixed decommissioning team [44].

References [6, 22, 28, 29, 45] expand on the drastic changes a given organization — and its staff — is exposed to in moving from operation to decommissioning. Required cultural changes and difficulties to adjust to them are highlighted.

The following associated points characterized talks with unions in the United Kingdom [46] to discuss the implications of decommissioning on the workforce:

— New reward packages that protect pay and conditions are vital to win staff cooperation in an accelerated cleanup of British Nuclear Group reactor sites across the United Kingdom.
— Safety must not be compromised in any way.
— Management across the reactor sites is setting up seven joint working groups to discuss how to proceed with accelerated decommissioning, required by the United Kingdom NDA. Each union will have representation in the working groups, and the groups will report via a project board to the Magnox joint council, where the final decisions will be made. The Magnox joint council secretary outlined five key principles for the unions:
  • They recognize that change is coming and that they will have to work within and manage that change.

- They want British Nuclear Group (BNG) to win future contracts from the NDA, which now owns the site assets. “But if others come along, we will have to work with them. BNG are not the only show on the block”.
- They accept that working practices will have to change.
- They will not water down terms and conditions fought for over many years.
- Unions want a deal to take them beyond December 2010, when the current negotiated lifetime partnership agreement runs out for all except one site.

A pertinent case here is the thousands of workers at BNG and UKAEA who received a cash bonus of £1000 in June 2006 after meeting certain decommissioning milestones [47]. In large decommissioning programmes, new pension schemes may have to be developed [48].

3.4. DECOMMISSIONING MANAGERS

The transition from operation to decommissioning will undoubtedly require changes to business practice, skills and organizational changes which will have to be implemented by the management [49]. In the United Kingdom there is a specific Nuclear Installations Inspectorate Site Licence condition LC36 that requires a site licence holder to have an effective change management system. The change from operation to decommissioning is clearly an example of a major organizational change [50]. The managers may hold the site licence but be accountable to an owner/funding organization, for example, the UKAEA is the site licence holder and the NDA holds the responsibility of ownership for the Government**.**

The individual manager will be a stakeholder in the same sense as the operational staff, i.e. with respect to the desire to maintain his position or get a favourable arrangement if he has to leave the organization.

3.5. GOVERNMENT

‘Government’ includes the national government and governmental bodies having an essential role in ensuring the existence of an appropriate legal framework and establishing relevant infrastructures. Governments need to be assured that the project will not embarrass them, that the project is in line with the agreed policy and is affordable, all of which may change during the course of the project. Governments do not want surprises. Corporate social responsibility is about the relationship between business and society. It is extremely relevant to the decommissioning of nuclear facilities, as this requires hard issues to be addressed by governments, the industry, local communities and society in general. The success of decommissioning projects depends on understanding these issues and how they affect stakeholders [26].

It is important that the government (and governmental bodies and public authorities) play a key role in establishing and maintaining all infrastructures which will eventually be decisive in the success of a decommissioning project. As a result, the government will not only have a monitoring/controlling role in decommissioning projects, but will be viewed by other stakeholders as an entity bearing responsibility for such projects. A recent example in this regard is offered by the USA where nuclear owners sued the US Government for failing to keep its promise and provide a centralized spent fuel repository by a certain time. This failure compelled several US operators to construct and maintain on-site repositories at supposedly much higher costs [51]. A general discussion of the government’s role in nuclear energy is given in Ref. [52].

3.6. REGULATORS

Regulators that may be involved with closure and decommissioning of a site might include radiological health, non-radiological health and safety, and environmental authorities. It is essential that decommissioning plans be discussed and approved in advance so that none of the parties has unrealistic expectations. Decommissioning activities are subject to inspection, and the regulators may verify results by sharing environmental samples or undertaking independent confirmatory sampling. Good relationships with the

regulators can help maintain progress and keep costs reasonable. Managers should plan to meet all applicable regulatory requirements; if waivers are sought, they should be negotiated in advance of decommissioning activities. Unexpected problems should be reported immediately to lessen the chances of notices of violation and to enlist regulator advice in remedying the situation.

Each country will have a different regulatory framework. In the United Kingdom, the current situation is that the NII essentially has the regulatory responsibility for ensuring that the licence conditions associated with running Nuclear Licensed Sites are complied with. There are currently over 30 licence conditions that relate to safe operation of the site. In parallel to the NII, the Environment Agency (SEPA in Scotland) authorizes and regulates the discharges from the site to the environment, i.e. gases, liquids and solids, and not only radioactive substances but also any discharges which impact the environment, Their remit is minimizing environmental pollution. This situation requires a close working relationship between regulators and licence holders [53]. There may also be pressures to bring about improvements to site performance, which are difficult to resource (money, time, staffing). This situation is a key area of stakeholder management and keeping all parties informed/involved can be difficult with limited resources. The NII and the EA (SEPA) have agreements with each other to establish joint responsibilities and information exchange without impacting their individual regulatory responsibilities. The impact of the NDA in the United Kingdom has yet to be fully realized but the key role regulators have in controlling the pace at which decommissioning can take place has been recognized, and initiatives have been taken to involve the regulators in the planning/review process. This is clearly a high-level stakeholder management exercise to reduce project risk. Again, no surprises, and openness with acceptance that all sides have responsibilities for the satisfactory completion of the project are vital.

Regarding clearance of decommissioning waste in Italy, the interactions between the nuclear regulator (APAT) and the local Agency for Environmental Protection (ARPA) in the monitoring strategy, its implementation and reciprocal exchange of information are described in Ref. [54]. Chapter 4 on Environmental and Related Requirements in the Decommissioning Handbook [22] gives an indication of the regulatory framework within which nuclear decommissioning takes place in the USA and therefore identifies areas which will generate regulatory stakeholder interest. Examples of regulators versus other stakeholder interactions in the USA are given in Refs [55, 56].

The involvement of regulators as stakeholders in the disposition of waste streams from decommissioning activities is an important activity; guidance on a possible approach can be found in Ref. [57], which also contains information on early engagement of stakeholders, including regulators. Stakeholders other than the regulatory body will also be interested in the information contained in the summary clearance report. These stakeholders should have been identified early in the process, and may include:

— Owners of the materials prior to clearance;
— Receivers of the materials after clearance;
— Members of the public;
— Environmental organizations.

These stakeholders have various interests. A common thread tends to be a concern that materials cleared for unconditional release are ‘safe’ for any use, and that materials cleared for conditional release are safe for their specified use [57].

An example of this activity in Sweden identifies this position.

> “The positive experiences that Studsvik has gained from the business of melting waste from nuclear engineering operations for re-cycling are largely attributable to the way in which regulatory authorities, the steel industry and Studsvik have co-operated. This co-operation has led to mutual insight and understanding of clearance and re-use that not only benefits those directly involved but also entails conservation of natural resources that benefits all of society.” [58]

Another example of the successful interactions of nuclear regulators with other societal segments is given in Ref. [59].

It should also be noted that in several countries decommissioning can be a ‘first-of-its-kind’ exercise. If so, the regulators also face a new set of problems. The experience in Denmark is reported in Ref. [60]. From the

outset of the decommissioning planning it was agreed — more or less formally — between the regulators and the decommissioning implementers that there should be an open dialogue between the parties. The implementers have also sought to be open about matters that did not work out so well, and it is felt that this openness has consolidated the trust from the regulators.

In several countries the successful completion of nuclear decommissioning, including unrestricted release of the site, marks a transfer of regulatory functions, from the nuclear regulators to authorities responsible for regulating industrial or other site uses. To pave the way to a timely and cost effective transition, it is important that the environmental (non-nuclear) authorities be involved at an early stage before or during the decommissioning process, for example be involved in the development of site clearance criteria as appropriate and in a timely fashion. It is also important that environmental authorities be consulted on planned uses of the site for new industrial or recreational activities in order to minimize their approval time. The site release from radiological concerns does not necessarily entail that other environmental concerns cease to exist at the end of nuclear decommissioning. The remaining presence of other chemical contaminants may impose site release conditions and prevent certain uses e.g. such as for parks. After surrender of the nuclear licence, such institutional control conditions should be passed on from the nuclear regulators to the environmental authorities for implementation or may be independently established by the latter, depending on national legislation. One example of the complex regulators' network for decommissioning projects at Dounreay is described in Ref. [61]. A comprehensive, world wide overview of relevant factors and applications can be found in Ref. [62].

3.7. INSTITUTIONS

An institution is any public organization working in close partnership to ensure effective interaction with a decommissioning project. In actual terms, the traditional dichotomy of licensee versus regulator in a nuclear project (including decommissioning) seldom applies. Particularly in large projects, political institutions are generally involved in a variety of ways including: consensus seeking; project funding; urban and land redevelopment; R&D; support to local interests; inter-state transportation of radioactive and hazardous waste; security concerns; water and air impacts; job markets, etc. One example of the complexities of such interactions is given in Ref. [63]. The US Brownfield Federal Partnership Action Agenda is based on the principle that communities can be most effectively helped to assess, clean up, and redevelop brownfields[1] by linking diverse Federal programmes in close partnership. Communities with brownfields often face economic and social concerns, such as unemployment, substandard housing, outdated or faulty public infrastructure, crime, and a poorly skilled local workforce. Some of these problems also relate to poorly managed shutdown, operation-to-decommissioning transition, decommissioning/environmental remediation, and redevelopment of nuclear sites. The Agenda represents focused efforts of over 20 Federal agencies, making over 100 commitments to work together in a timely manner.

3.8. LOCAL AUTHORITIES

In this context the term 'local authorities' comprise authorities on the municipality level, as well as regional and provincial authorities, which issue specific permits and control some activities on the site. The national regulators are not included, even if they may have local offices.

Local authorities may play an important role in the decommissioning of nuclear facilities, as they often represent the legal decommissioning controlling institutions. They are involved in an early stage of planning, execution of all decommissioning measures (environmental impact assessment (EIA), approval of plans, licensing, approval of site reuse option, etc.). Generally, these local authorities are supportive of nuclear decommissioning in the framework of national legislation. In conjunction with governmental institutions and the local municipality, local authorities are charged with decision making regarding the execution of

[1] Brownfield: real property, the expansion, redevelopment or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant or contaminant.

decommissioning operations. Local authorities can be grouped using the methodology described in Table 2. Some local authorities are concerned with social issues, others with environmental or technical issues. As one example, the Port Hope Municipality, in Canada, was instrumental in clearing a historical legacy site affected by previous nuclear activities [64]. The municipality's viewpoint regarding a decommissioning site is also described in Ref. [65].

3.9. ELECTED OFFICIALS

Elected officials are all politically elected members of city councils, regional assemblies and national parliaments. Elected officials play a very important role at the local level, as they typically represent the most affected constituencies. They are also charged with making decisions in the overall best interests of their jurisdiction. Generally, these officials are supportive of beneficial and productive reuse of facilities being decommissioned, especially when attracting new industries can offset declines in employment. In conjunction with local government staff such as planning and zoning authorities, these key stakeholders are charged with decision making regarding land use within their jurisdictions. They control what types of infrastructure may be available to support redevelopment of a site, and can often provide resources from the jurisdiction's budget or by virtue of its access to regional or national grants for economic development.

Individual elected officials may become stakeholders on their own if they identify issues, which they have a particular interest in or are critical of and bring these up in the elected forum, thereby influencing the decision making process on that particular subject. They are also stakeholders in the sense that they have to maintain the support of their constituency.

3.10. TRADE UNIONS

All worker issues — continuity of employment, early-out schemes, incentives to stay, support for alternative employment, post-decommissioning, requirements for different working practices — involve a move from production/R&D to a decommissioning project approach. As one example of this debate, the trade union Amicus has called for the permanent staff of the Sellafield nuclear power plant in the United Kingdom to be retrained to carry out the decommissioning work and plans to oppose the outsourcing of any core work [66]. In another case from the United Kingdom, the Union warned that safety standards in the decommissioning industry may be put at risk by the new competitive environment in which it is operating [67]. A strike at the Hunterston nuclear power plant undergoing decommissioning in Scotland is described in Ref. [68]. It has been assumed that a shortage of qualified labour may increase salaries, and that this factor may affect nuclear decommissioning budgets [69].

3.11. WASTE MANAGERS

As a result of decommissioning operations, a wide range of materials arise. Some of them will be radioactive; some will continue to have an economic value and/or are in a form which can be recycled or reused. Others will have little or no economic value, and these are the wastes that have to be disposed of, or which must be stored if no accepted method of disposal exists, in either case at major economic cost to the industry and, ultimately, to the community at large. Inactive solid materials also arise from the decommissioning of nuclear facilities. If appropriate segregation and decontamination processes are available, the volume of radioactive material requiring treatment can be reduced significantly.

In the selection of a decommissioning strategy, the following technical, regulatory, economic and social considerations which form the main elements of a waste management strategy, have to be taken into account:

— Availability of a waste management infrastructure. This includes storage and disposal and an evaluation of the various amounts of radioactive material which will be produced by the dismantling operations (i.e. their characteristics, quantities, production rates, etc.).

— Regulations governing the recycling of materials and equipment in the public domain and the various possibilities for waste storage. This is to avoid unnecessary storage of large amounts of radioactive wastes and takes into account national policy, the existence of a site, and the administrative and technical conditions of storage.
— Possibility of reusing the site and buildings, and of recovering plant, equipment and materials for nuclear or other purposes (without neglecting the social and political aspects). This presents important incentives for considering decontamination practices and significantly reducing the potential amount of radioactive wastes remaining.
— Existence of technical resources, specialist teams and local support for dismantling, decontamination and contaminated material handling. This includes considering the available means of waste minimization and evaluating how existing facilities on-site can be modified to meet the needs with minimum expenditure.
— Costs and financing. Knowledge of the cost of each possible approach is needed, including the cost of labour, materials and supplies, as well as financing costs and cost savings involved when applying waste minimization principles and techniques.
— Social considerations. These include public perception of radioactive waste treatment versus recycle and reuse options, which are usually taken into account in the procedure whereby proposals are submitted for approval by the safety authorities. The way in which this is done varies among Member States.

Depending on the above factors, a number of different waste managers will be involved. This includes those doing the handling, treatment, conditioning, packaging, storage and disposal of radioactive waste (not necessarily the same organization); organizations responsible for the management of non-radioactive waste and materials, in particular hazardous waste; those doing the recycling of materials e.g. the smelters of metallic materials, etc. These various stakeholders will in turn interact between and among each other, and with other stakeholder categories such as facility operators and decommissioning implementers, regulators, and local communities. Annex I.D gives an interesting example of how stakeholders at the decommissioning site may have interests different from, and perhaps conflicting with, the stakeholders at the waste disposal site. Management of decommissioning waste creates a link between the decommissioning stakeholders and the waste management stakeholders. More information on management of decommissioning material/waste, and associated stakeholders, is given in Refs [70, 71].

3.12. REAL ESTATE OWNERS

The impact of the decommissioning project will have a particularly important effect on real estate owners. These are likely to be affected by a facility's shutdown and decommissioning in multiple ways. Positive impacts may include the release of areas formerly restrained by the presence of the nuclear facility. Following shutdown and decommissioning, such areas might be reused for profitable purposes. It is also possible that sites formerly used for the needs of a nuclear facility (e.g. houses or community buildings for the operations staff) depreciate due to reduced demand. In this regard, the public is usually interested in re-use options for the decommissioned site. One example is given in Ref. [72]. A particularly critical case is when nuclear facilities originally built at remote locations get closer to populated areas due to growth of cities. (See the Kurchatov case in Ref. [73].) On the other hand it may be the case that radiologically-affected areas will become much more profitable when decommissioned and released for unrestricted use.

3.13. LOCAL ENTERPRISES

Providers of local services are also typically impacted by a decommissioning project. Typical examples are:

— Catering companies;
— Hotels;
— Sanitation companies;
— Health care;

— Educational services;
— Shops;
— Construction companies;
— Electricians, carpenters, painters, etc.;
— Transportation services;
— Recycling companies;
— Real estate brokers.

These services are strongly dependent on the number and type of local residents and visitors, and whether decommissioning activities will import or decrease staffing. Thus, the impact on the stakeholders may go both ways.

It has been claimed in the context of the Wylfa nuclear reactor that decommissioning of the reactor would cause the firm Anglesey Aluminium — which is closely linked to the livelihood of about 500 people — to close down. In fact, the firm's existence is conditioned by the low prices of energy it receives from reactor operation [74]. For the same reactor, efforts are under way to ensure that North Wales does not miss out on hundreds of decommissioning jobs [75]. The decommissioning is foreseen in 2010, but negotiations have been taking place since 2006.

3.14. INTERNATIONAL PARTIES

International organizations, institutions or groups of people may affect a decommissioning project through, for instance, conventions, standards, information exchange, expertise, research and development, and financing.

There are many international treaty/legal obligations that may impact the course of decommissioning, e.g. Euratom Article 37 requirements, nuclear material movements /accountancy [52, 76]. Decommissioning is one nuclear activity whose general data should be reported in Euratom countries before implementation. One of the first examples is the decommissioning of the Niederaichbach Nuclear Power Plant in Germany [77]. Two recent examples of Article 37 applications concern the decommissioning of the Risø research reactors and other nuclear facilities in Denmark, and the FMRB reactor in Braunschweig, Germany [78]. Other European Union requirements that may impact the course of decommissioning are those related to 'fair competition', e.g. any bidding process. For example, the European Commission (EC) called into question, but eventually approved, a proposed transfer of liabilities from BNFL to the NDA .The EC had feared that the offer of the Government of the United Kingdom to top up payments may be deemed as State aid, and it set conditions for the transfer [66, 79].

There are also a number of international agreements associated with any given decommissioning project. This normally includes exchange of information and visitors. As one example, in the context of Dounreay decommissioning, the UKAEA is collaborating with its counterparts in France to establish common international standards in decommissioning qualifications. In general, UKAEA has collaborative agreements with organizations abroad, which are also engaged in decommissioning. These include the CEA and EDF in France, SOGIN in Italy, and INEEL and USDOE in the USA [80]. Cooperation in sodium treatment with Kazakhstan BN-350 fast reactor is based on Dounreay's expertise and achievements in destroying the sodium inventory of their fast reactor. This is described briefly in Ref. [81]. Norwegian authorities have promised to allocate ?100 million to ensure nuclear safety in the decommissioning of Russian submarines [82]. The Comisiòn Nacional de Energìa Atòmica in Argentina promoted the creation of a Latin American network as a tool to share advice, assistance and cooperation in case of limited resources in any country on the continent [83].

By and large, international agreements to share information on decommissioning projects are managed through the aegis of international organizations. One OECD/NEA programme in place since 1985 is the International Co-operative Programme for the Exchange of Scientific and Technical Information Concerning Nuclear Installation Decommissioning Projects [84].

In the IAEA, coordinated research projects (CRPs) are a mechanism whereby institutions from several Member States create a partnership to exchange data on progress and techniques used in specific decommissioning projects. The achievements of one CRP are given in Ref. [85]. Given the fact that the need for

decommissioning and environmental restoration exists on all continents, cleanup and restoration operations will tend to be of an international nature in the near future. There are three modes of international cooperation that can be utilized in this domain. The first is through bilateral arrangements between countries and/or organizations. The second is cooperation on a regional level and the third is through the activities of international organizations. The latter form of cooperation, with emphasis on information and technology exchange, including joint research and development and demonstration projects, has been very successful in the decommissioning area. CRPs are the typical mechanisms for implementing such a strategy. Cooperation of this nature has many benefits and is practical for several reasons. First, it makes good economic sense to share and learn from each other's experiences and compare future strategies. The resulting benefit is that it prevents duplication of effort. A second point worth mentioning is that projects initiated by any or all of the international organizations tend to be considered more credible and therefore generate more financial support. Third, joint projects create a support network and a system of formal and informal peer reviews. This external review process enhances and adds technical credibility and validity to national approaches and methodologies. And finally, cooperation and exchange of information are required and used by countries as a means of checking their own progress [85].

The IAEA programme on decommissioning includes two main areas. One is the development of safety standards, practical guidance and collection and dissemination of state of the art information all of which is published or made available otherwise. With this mechanism, one should assume that the IAEA acts as an indirect stakeholder for any decommissioning project. The other is technical cooperation (TC) through which the IAEA directly assists Member States with limited resources in the transfer of knowledge in the use of nuclear techniques. Two selected examples of such decommissioning-related activities are given in Refs [86, 87]. One should note that a Member State recipient of IAEA assistance is bound to fulfil the requirements given by IAEA Safety Standards and adhere to TC mechanisms (e.g. on expert missions, procurement of equipment, workshops, etc.). In fact, the IAEA behaves in all respects as an important stakeholder for such projects. Figures 2–4 refer to IAEA TC projects. Examples of multilateral activities in the field of decommissioning include the IAEA Contact Experts Group for which significant support is provided to the dismantling of nuclear submarines and other obsolete facilities [88], and the recently launched International Decommissioning Network (IDN). The IDN was established in late 2007 to stimulate the transfer of hands on skills and knowledge from acknowledged centres of excellence in decommissioning to those Member States with a need to apply them.

In terms of international cooperation, one should also mention the scientific, technical and financial support assured by donor countries and organizations to countries having limited resources. For example, it is important to mention the European Commission, e.g. through their programmes PHARE and TACIS directed at Central and Eastern European countries. The PHARE programme is one of the three pre-accession instruments financed by the European Union to assist the applicant countries of Central and Eastern Europe in their preparations for joining the European Union. Originally created in 1989 as the 'Poland and Hungary: Assistance for Restructuring their Economies (PHARE)' programme, it has expanded from Poland and Hungary to currently cover ten countries. It assists eight of the ten 2004 accession Member States: the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia, as well as those countries that acceded in 2007 (Bulgaria and Romania), during a period of massive economic restructuring and political change. TACIS is an abbreviation of 'Technical Aid to the Commonwealth of Independent States' programme, a foreign and technical assistance programme implemented by the EC to help members of the Commonwealth of Independent States (as well as Mongolia), in their transition to democratic market-oriented economies. An example of two selected EC publications resulting from assistance programmes in decommissioning is given in [89, 90].

Occasionally the participation of independent donor organizations (be it individual countries, international organizations or a mixture of these) in the same project may result in difficulties and delays. For example, the decommissioning plan developed by a group of donor countries for the BN-350 reactor in Kazakhstan was rejected by the IAEA as it did not meet international standards. In parallel, a "plan of priority measures" was independently developed under the umbrella of other donor organizations and decommissioning is progressing satisfactorily [91].

The repatriation policy of new or spent fuel from research reactors to the country of origin (so far limited to Russian Federation or the USA) is another case in question. The fuel transport involves multiple jurisdictions,

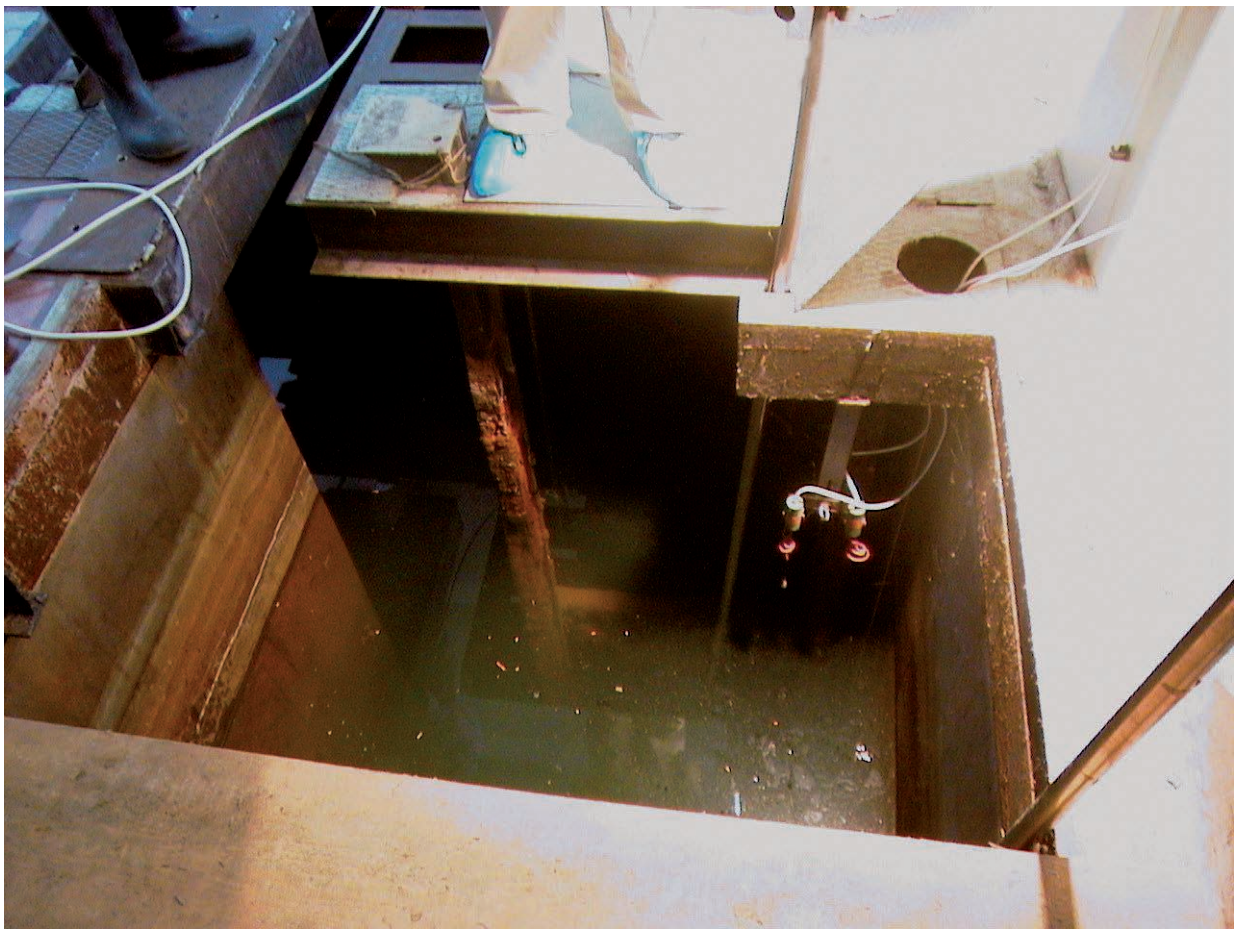

FIG. 2. Corrosion in fuel pond at the Vinča reactor, Serbia.

including not only the departure and arrival countries, but also intermediate countries. A discussion and examples on this issue are given in Ref. [78].

A recent trend is the formation of international consortia to address the decommissioning of nuclear installations. While this has been the practice of the European Community for years to fund the decommissioning of nuclear facilities at new Member States (programmes PHARE and TACIS), a privately-based consortium has been recently formed including British Nuclear Group, Germany's NUKEM and the Russian Federation's Rosatomstroy and AtomStroyExport. The target is decommissioning projects in new and prospective EU member states [92].

In the specific cases of Bulgaria, Lithuania and Slovakia, dedicated 'International Decommissioning Support' funds have been collected and are being administered by the European Bank for Reconstruction and Development (EBRD).

Finally, a special case is when a nuclear facility belongs to or is operated/regulated by different countries/international organizations. For example, EU Joint Research Centres involve responsibilities of both the EU and the host country. A unique case is the Krško Nuclear Power Plant, which is co-owned by Croatia and Slovenia. The impact of this situation on Krško's provisions for decommissioning is described in Ref. [93] and its difficulties in Ref. [94].

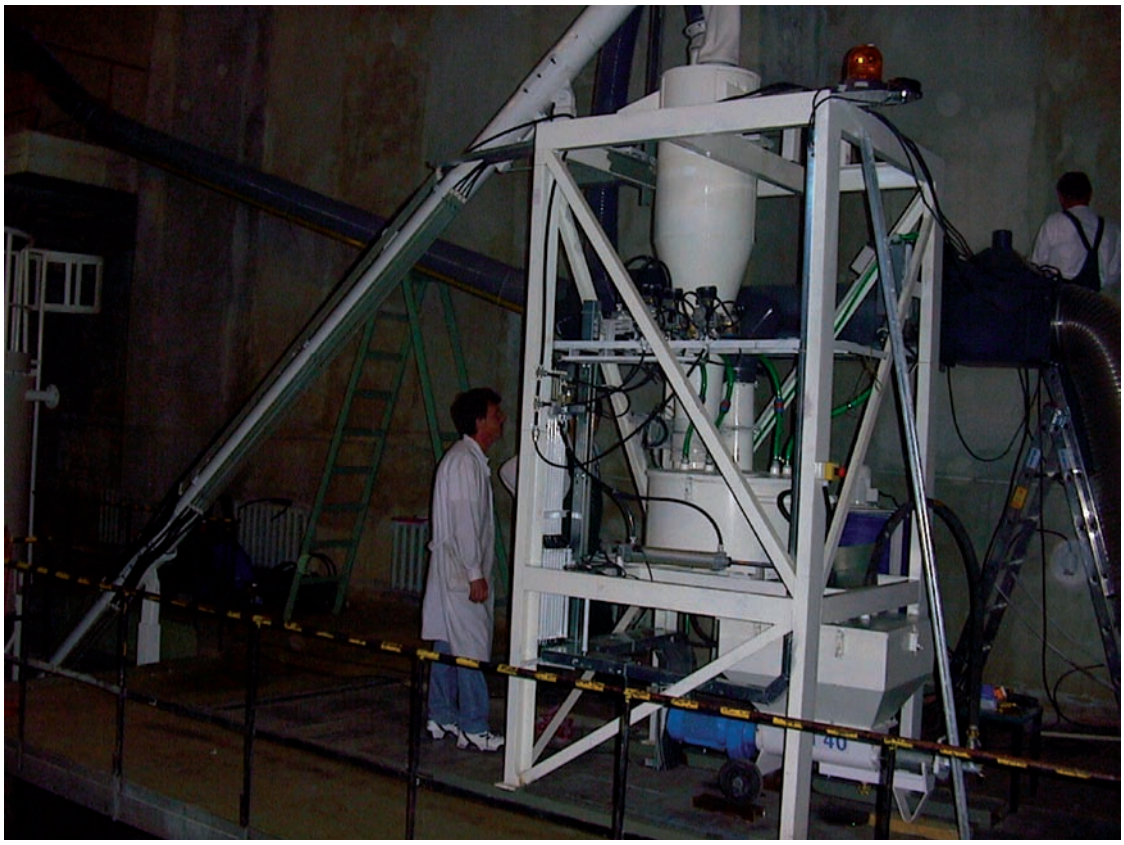

FIG. 3. Salaspils reactor, Latvia: detail of the waste cementation plant procured by the IAEA.

3.15. CONTRACTORS

In decommissioning projects large amounts of work may be contracted to external contractors, who may be already known to the decommissioning organizations or new types of contractors, e.g. for concrete demolition. In this section only contractors for actual decommissioning activities are considered. Local service providers are mentioned in Section 3.13.

Some contractors may absorb surplus labour from the existing workforce, thus alleviating the problems of loss of jobs in the decommissioning organization**.**

In large decommissioning programmes the role of contractors may not be limited to providing services but they may constitute lobbyists. A related example for Sellafield decommissioning is given in Ref. [95].

Even in a relatively small decommissioning project, the role and number of contractors can be significant and their interactions with the licensee and between themselves are not trivial. The decommissioning of the NASA Plum Brook Reactor Facility (PBRF) is described below as one example. PBRF was the only reactor NASA ever needed to decommission, and as a result NASA decided that there was no value in building up a large contingent of knowledgeable full time NASA decommissioning personnel. Instead NASA opted to team with another government agency, the US Army Corps of Engineers (USACE), that would handle all the contracting and directly oversee the actions of the prime and subcontractors. The USACE in turn brought in Montgomery Watson Harza (MWH), who was already under contract to the USACE. MWH was then the prime contractor, and assembled the in-house talent and a team of subcontractors that performed the actual decommissioning work. This team includes Mota Corporation for general decommissioning activities, Wachs Technical Services for reactor internals removal and reactor tank segmentation, Toltest Incorporated for asbestos remediation and heavy equipment operation, Bartlett Nuclear Incorporated for radiation protection technicians, and other selected subcontractors for specific tasks. Local contractors and workers were used where possible. More information on NASA projects can be found in Annex I.H-6.

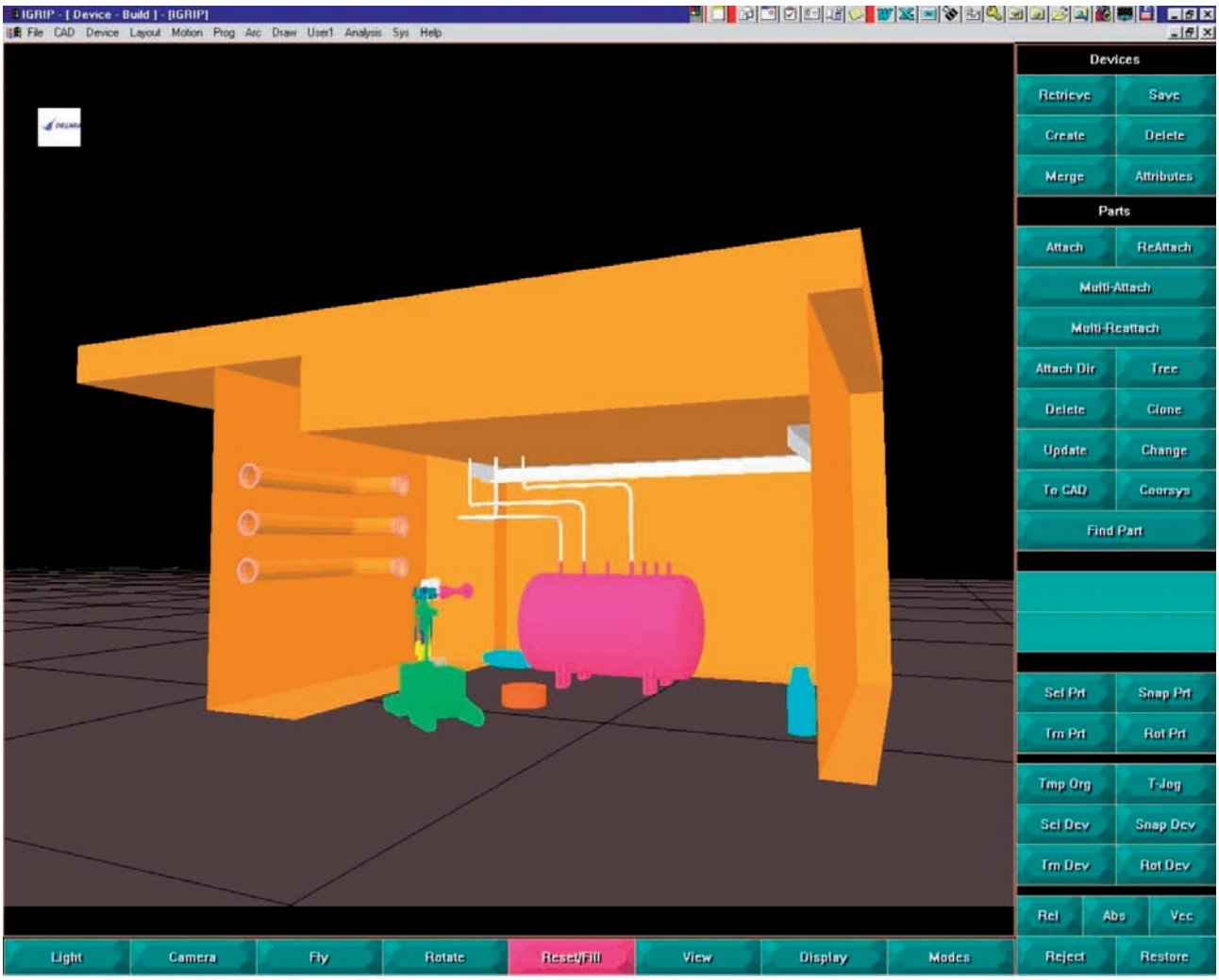

FIG. 4. IGRIP simulation of room at the A1 NPP, Slovakia.

Even with this arrangement NASA, as the licensee, remained solely responsible to the regulatory body for ensuring safety, and that all licence conditions were met at all times. To accomplish this NASA put together a team made up of several NASA engineers, technical specialists from Argonne National Laboratory, an administrative staff, and a small group of technicians under direct contract with NASA. For its public relation efforts NASA hired FOCUS Group Risk and Strategic Communications Consultants [55].

An example of contractors' interactions in a small decommissioning project (the Jason Research Reactor, United Kingdom) is given in Figs 5, 6 [29].

One specific problem with contractors' interactions is described in Ref. [96] and concerns the protests by the losing bidders of in DOE contract awards. One reason for protesting is that the incumbent in a contract continues to generate a fee during the protest period, so the incumbent has an incentive to protest. A stronger reason behind the protests is that the contract process itself can be flawed. The level of detail required from a bidder is so great that it is almost impossible to generate it unless you are the incumbent. In addition, large investments in preparing a bid may not lead to a contract. Finally, protests are often a way to get better information out of the DOE, in particular, why a contractor or team lost a bid.

Some decommissioning activities may not be based on contracts or in-house services provided by the operator. Materials, utilities, tools, transport equipment, etc., can be utilized on the basis of partnership and bartering arrangements rather than a paid contract.

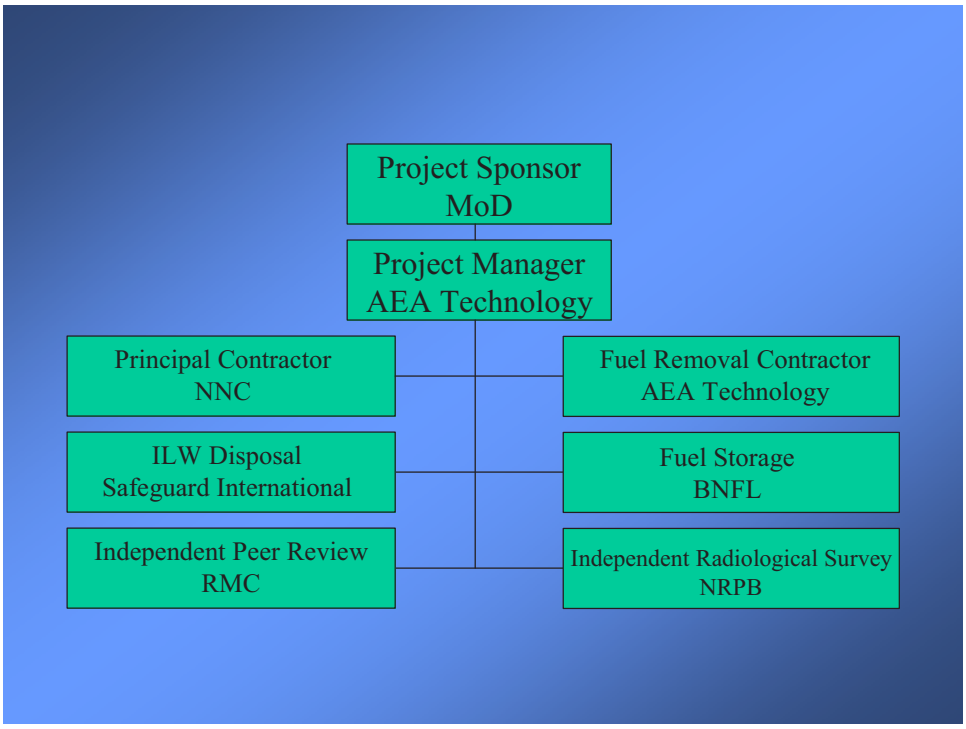

FIG. 5. The decommissioning project management team, Jason reactor, UK.

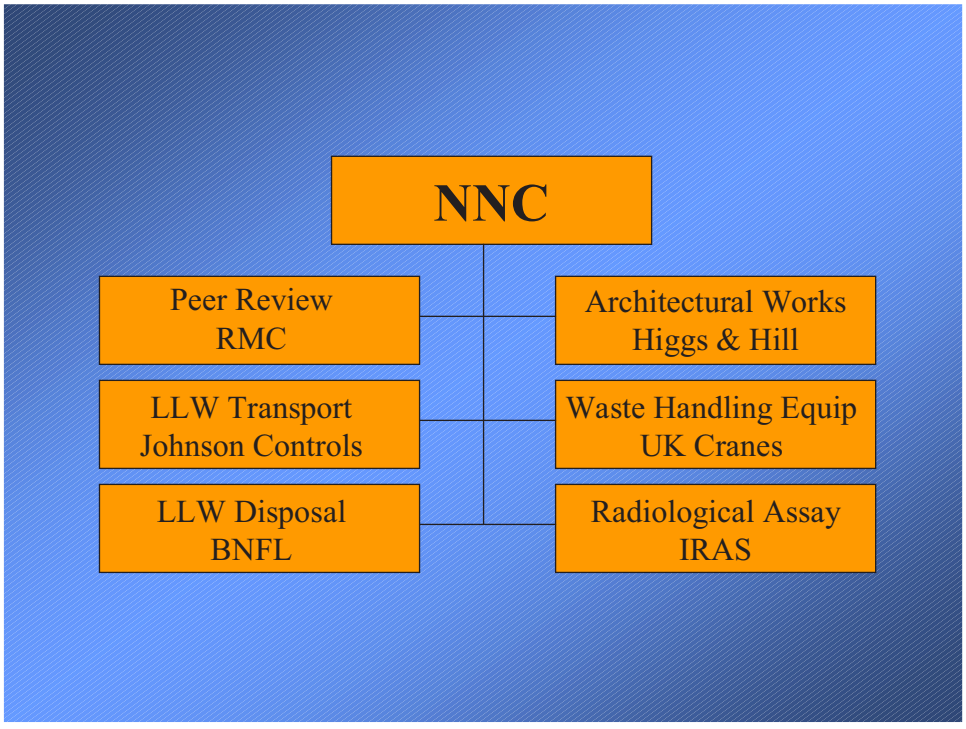

FIG. 6. Principal and major subcontractors for the Jason decommissioning project.

3.16. NUCLEAR INDUSTRY

The term ‘nuclear industry’ covers utilities, manufacturers of components, designers, and architect/engineers, who can benefit from a decommissioning project. The decommissioning of nuclear facilities has an important influence on the nuclear industry. The following influence areas can be identified:

— Opportunity to support other sites;
— Learning from experience;
— Facilitating the development of the nuclear industry.

Support for other sites can be provided by the transfer of equipment, spare parts, materials and skilled personnel. This results in significant economic savings for other sites and has a positive impact on the efficiency of the nuclear industry at large; therefore, the nuclear industry is also a stakeholder in the decommissioning of a facility not only at the national, but also at the international level.

The nuclear industry is also a stakeholder for shared experience from the decommissioning of nuclear facilities. The positive impacts of lessons learned include the upgrading of existing decommissioning methodologies and technologies. Experience from decommissioning can be used for other similar nuclear facilities, e.g. for upgrading of decommissioning plans

Decommissioning of a nuclear facility generally facilitates the development of nuclear technology at large. It stimulates the development of material sciences, new technologies for maintenance of nuclear facilities and decommissioning purposes.

As an example, in Latvia a significant number of industrial stakeholders are involved in the decommissioning of the Salaspils research reactor [97, 98]. Their main areas of interest are:

— Recycling of metallic scraps;
— Demolition of reactors systems no longer in use;
— Decontamination of buildings;
— Upgrades of reactor infrastructure systems for decommissioning;
— Free release of materials.

The upgrades of reactors systems were performed not only by local stakeholders, but also by international stakeholders.

In the USA, the DOE Grand Junction project, reusing and recycling excess equipment received much attention. This included transfer of equipment to universities, national laboratories and metal salvage centres, and resulted in multiple interactions with new stakeholders. The DOE estimates that these waste minimization efforts produced considerable overall savings for itself and other parties [99].

One should mention here an international trend. At several decommissioning sites, training centres are being established to promote the training of decommissioning workers/specialists either for the site itself or for other national or international programmes. The pioneer in such large scale activities is the Dounreay site [100–102], in the United Kingdom. It should be noted that, as of November 2007, the DERC facility was undergoing a review to focus and align with the NDA’s nuclear skills academy. Another training centre of this kind has been established for the decommissioning of Hinkley Point A, also in the United Kingdom [103]. In parallel, decommissioning courses are being established elsewhere to serve the needs of the industry [104, 105]. In turn, the trainers and the trainees can be viewed as stakeholders. An extensive overview of training practices for decommissioning purposes is given in Ref. [106].

In the above context, it is worth mentioning the annual trade exhibition which takes place at the Dounreay decommissioning site. In May 2006, it involved some 60 suppliers of engineering equipment and services to the nuclear industry [107].

3.17. NON-NUCLEAR INDUSTRY

The non-nuclear industry is generally influenced by the decommissioning of nuclear facilities and can be defined as a stakeholder. The following non-nuclear industry decommissioning influence areas can be identified:

— Opportunity to be a stakeholder for the nuclear industry;
— Learning from experience and imported skills.

Support of decommissioning is an important area of interest for non-nuclear industries. Many companies from the non-nuclear industry are usually involved in decommissioning to provide services. The typical areas are connected with non-radioactive material management, construction activities, installation and upgrading of essential systems (ventilation, water treatment, power supply, etc.) for decommissioning. It significantly promotes the implementation of decommissioning projects.

The non-nuclear industry is also a stakeholder for shared experience from the decommissioning of nuclear facilities. The positive impacts of lessons learnedinclude the transfer of nuclear facility decommissioning methodologies and technologies to branches of the non-nuclear industries (e.g. the construction industry, hazardous wastes management industry, offshore oil and gas installations). Decommissioning of nuclear facilities generally facilitates the development of non-nuclear technologies. It stimulates the development of material science and new technologies for non-nuclear industries. Needless to say, the converse is also true.

An example of the transfer of technology from the non-nuclear industry comes from the field of asbestos removal; the techniques for establishing containment around the working place apply in a nuclear decommissioning project as well.

One possibility that has been successfully used in some countries is to utilize existing military technology in the nuclear decommissioning industry. Various technologies that range from sensors, materials to remote control vehicle design have been developed for military applications that have direct benefits and can be implemented to meet the challenges that face the nuclear industry. In particular, it has been observed that optimized human–machine interfaces for the remotely operated control of remote platforms can reduce time and operator errors when compared with standard hand-controlled devices [108].

3.18. SECURITY ORGANIZATIONS

Communication with security stakeholders is a key element to facilitate the execution of decommissions activities, mainly connected with radioactive and nuclear materials management. The security force [22] is routinely responsible for:

— Personnel background checks;
— Personnel access control;
— Guarding against intruders;
— Monitoring access for service and vendor vehicles;
— Guarding against theft of materials.

Another important issue is concerned with the management of classified information during decommissioning. The communication and other activities with the security stakeholders usually are regulated by national legislation. However, these stakeholders must be included in the early stages of the planning of decommissioning activities for related items. It helps to avoid potential conflict situations, which can cause delays and unexpected financial loses. The additional involvement of a wide range of contractors and individuals from the outside during decommissioning may result in changes to the security system for the facility and this should be managed appropriately [109]. Once all spent nuclear fuel and sensitive materials have been removed from a site, the security force may not need to monitor personnel and vendor vehicles or require armed responders to prevent intruder access. The force may be reduced to reflect the reduced concerns for the remaining activities, eventually to the more economical security guard or night watchman

[22]. Nevertheless, five security organizations were involved in the Calder Hall cooling tower demolition project. These are described in Ref. [110] as well as the security issues related to this project.

3.19. EMERGENCY ORGANIZATIONS

After transition from the operation phase to decommissioning the need for preparedness from the emergency services for nuclear events may diminish. This might result in a lesser need for staff. On the other hand, the number of 'conventional' industrial incidents and accidents may increase. Hospitals and ambulance staff may no longer need very specific knowledge about radioactivity in the decommissioning phase, but it is worthwhile for the decommissioning organization to maintain a contact to these to make certain that they are sufficiently prepared.

An external fire brigade becomes an important stakeholder in the case of a fire (or accident involving chemicals) at the facility under decommissioning. In many Member States the leader of the fire brigade will take command of the mitigating measures and have a higher authority than leading staff from the decommissioning organization [111].

Also, the police force may take command in cases where they are called in, for instance if attempts are being made to steal nuclear material, or if demonstrations are developing into riots.

3.20. LOCAL COMMUNITIES

In decommissioning (as well as any other major projects which impact local communities) a spontaneous or externally driven (e.g. by major national or international opinion groups) coalition of local interest takes place to review plans and monitor activities. Recognizing that this situation is inevitable, many operating organizations, regulators or governmental officials promote the launch or organization of such groups in the hope that consensus will be reached more easily through a planned consultation process. Usually, this effort starts with engagement of the public through the mayors of local municipalities (or through other elected representatives). Particularly in remote areas, the job losses resulting from decommissioning may severely affect the local economy [112]. Social compensation programmes have been established to support a number of decommissioning programmes. One such programme is described in Ref. [113]. In another case, United Kingdom's NDA is to invest over £60 000 (US $120 000) in three years to help local communities develop their green energy scheme [114]. Also in the United Kingdom, the nuclear decommissioning consultant Fluor Ltd has set up a £30 000 annual grant fund to benefit the communities affected by the Sellafield plant [115].

In order to have an idea about the impact of the plant on the local activities, it is interesting to note that Dounreay nuclear research site activities were among the main factors that caused the tripling of the population census of the nearby town in twenty years. Moreover, one in every three jobs in the county depends on the decommissioning activities. For this, tourism and agriculture are recognized among the activities impacted by decommissioning [17].

At Sellafield — a major centre of decommissioning activities in the United Kingdom — the West Cumbria Sites Stakeholder Group was recently established. This group is independent of the NDA and the two companies which operate the sites, British Nuclear Group and the UKAEA, yet intends to talk regularly with those organizations and others involved in the future of Sellafield and nearby sites [116]. This applies to all sites under the NDA.

In Slovakia, no legally based strategic information was systematically given to the public before 1994. However, from the end of the 1980s, the operator's top management performed consultation meetings two times per year with the mayors of surrounding municipalities. The goal of the meetings was to involve the public in remediation projects: removal of localized contamination from channel and river banks [117] and tritium removal from underground water (see Annex I.F).

In the USA, the DOE has several initiatives in place to involve the public in its environmental remediation projects. These initiatives are illustrated in Ref. [118]. As one example, the Canyon Disposition Initiative was established to consult all stakeholders on the final disposition of the five major chemical processing facilities ("canyons") at Hanford. The process included partnering with the regulators, between DOE programmes, and

other stakeholders including three tribal nations [119]. Also in the USA, the Energy Communities Alliance (ECA) is the organization of local governments that are adjacent to or otherwise impacted by DOE activities. The ECA's mission is to bring together local government officials in DOE impacted communities to share information, establish policy positions, and advocate community interests in order to effectively address an increasingly complex set of constituent, environmental, regulatory and economic development needs [120]. The local community has been deeply involved and had a big influence in the Rocky Flats project in Denver, Colorado, USA [121].

At the Vandellos decommissioning project in Spain, the transition period between permanent shutdown and the start of decommissioning work took nine years. The direct loss of employment has meant the disappearance of almost 300 jobs in a community of some 4000 inhabitants [6]. To alleviate this situation, one hundred people coming from the former operator were integrated into the decommissioning organization as contractors, in the fields of operation, maintenance and health physics. During the active decommissioning phase, a total of 1800 people were involved, with a peak figure of 400 workers simultaneously on-site. The composition of this employment was 65% local and 35% from other areas. The Spanish regulations call for establishing an Information Committee to function throughout the construction, operation and decommissioning of nuclear installations. This committee is made of representatives from the nuclear site, the regulators, and central and local authorities [122].

Sometimes, the presence of the plant and the public participation during operation was an aggregating factor whose disappearance after decommissioning has to be considered as a serious issue. Several examples of community interactions in decommissioning projects are given in Ref. [6].

3.21. GENERAL PUBLIC

The general public considered in this context is the public and individuals beyond the local communities close to the facility. Spontaneously formed movements with a particular aim are included here.

The general public will be a heterogeneous group of stakeholders to the decommissioning project, having a wide range of interest in the matter, if any. In cases where the decommissioning is to be paid by the taxpayers the general interest may be higher than if the cost is to be covered by a utility or from a fund that has been established for that purpose. Environmental or safety aspects of the decommissioning probably will not be a large concern for parts of the general public living far away from the site, as opposed to the concern for accidents in operating nuclear power plants, even plants in other countries.

In some cases, when the object of decommissioning is very important to a country, the interested general public will be all of the citizens of the country. The closure of any major industrial facility will inevitably create certain difficulties. However, in the considerations surrounding the shut down of the Ignalina NPP, there is an exceptional factor: after independence from the former Soviet Union, the Ignalina NPP has been by far the major source of electricity in Lithuania. Its closure will, therefore, necessitate a complete restructuring of the national electricity supply and the creation and modernization of replacement capacity [123]. The closure of the second reactor by 2010 will affect the entire Lithuanian population because the electricity price will go up. Interest in the closure of the Ignalina NPP has been very high: articles appeared in the national and regional press, television and the internet on a daily basis.

3.22. NEIGHBOURING COUNTRIES, TRIBAL NATIONS

There may be certain cases where multiple jurisdictions are affected by a project, e.g. if the facility is located near a regional or national boundary. Residual illwill may exist if the nuclear facility was initially built in spite of opposition from residents or officials from the adjoining jurisdiction. In such cases all potentially impacted jurisdictions should be informed or consulted when planning for decommissioning and reuse. This is one of the objectives of Euratom Art. 37, which addresses the planning of nuclear projects in European Union countries. A pertinent case in question is the waste repository in Lithuania, which is planned to take waste from the decommissioning of the Ignalina NPP. The repository is close to the Belarus border. Reference [124] highlights the concerns of Belarus.

Particular problems may arise if countries break up into new States, such as has been the case with the former Yugoslavia. Here the two new States, Croatia and Slovenia jointly own the Krško nuclear power plant situated near their common border. Questions concerning, for instance, funding for decommissioning needed to find new solutions after the splitting of the country [125].

Regarding tribal nations, one specific example, within the USA, is the Native American tribes, which are considered sovereign nations and must be consulted if their territory is affected [126]. In other parts of the world, tribes or native peoples may also have legal rights that need to be taken into account when planning a significant change in site status, e.g. initiating decommissioning. Interactions between regulators and native tribes in Canada in the context of decommissioning projects is described in Ref. [59].

3.23. RESEARCHERS AND SCIENTISTS

Basically, decommissioning is demolition. Like any other industrial process, decommissioning should be completed as early as possible and at the lowest cost (without compromising safety). One should observe, however, that several decommissioning projects conducted in the 1980s and 1990s had a significant R&D component in that they were aimed at the development and optimization of new techniques. For example, the EC, through its Framework Programmes (mainly FP3 and FP4), supported the development and demonstration of innovative technologies. With its four pilot projects (AT1, France; BR3, Belgium; KRB-A, Germany; WAGR, United Kingdom), this programme allowed demonstration and testing of developed technologies in actual environments and scale. It should be noted that the EC programmes addressed firstly the R&D of innovative, emerging technologies per se and later on focused on adaptation of these and conventional technologies to large scale projects. In Japan, a lot of experience and development was gained from the decommissioning of the JPDR (Japan Power Demonstration Reactor) and other research facilities at JAERI [127].

At present, most people consider that decommissioning is a mature industry or at least that currently available technology is able to deal with almost all problems and issues that can arise in this domain. Continuing R&D in decommissioning can at times result in ‘re-inventing the wheel’. However, a tendency remains in some research environments to tackle decommissioning as a research project. This is particularly evident in some research reactors where the former operators were recruited and worked for many years to conduct research. It is often difficult for such groups to convert their mindsets to the more ‘prosaic’ realities of an industrial project. Similarly, external research groups (from universities, research institutes), which actively supported a facility’s operation, may find it difficult to give up their professional expectations. Researchers can represent active stakeholders in decommissioning and often represent views in contrast to the selected decommissioning strategy [78].

Conversely, a decommissioning project allowing space for R&D activities is likely to enjoy support by those groups. This approach can be a necessity in countries or institutions having little access to the decommissioning market (e.g. due to costs or political constraints) and being forced to develop their own techniques. Also, maintaining researchers’ jobs helps to obtain and retain their support.

3.24. TEACHERS AND STUDENTS, UNIVERSITIES

Teachers and students may be considered as a special subgroup of the general public, engaging themselves particularly strongly in the public debate. In addition, they and their universities may become stakeholders themselves if special educational programmes [128] are established with a view to decommissioning, either as a result of an initiative from the universities or from the nuclear industry.

There are a number of examples of this group of stakeholders bringing very different views from those of many of the other groups. Particular aspects are long term legacy waste/residual site issues, and views on how the money is to be spent. Knowing how tight money may be in the school system, they have views on how much projects cost to achieve certain goals and may consider that the money would be better spent in the schools or hospitals or directly in the community [129]. The DOE EM Student Forum, in the USA, is a pilot programme, formed in 2001 and designed to provide essential feedback on communications materials and product development. It comprises a small group of students from the Advanced Technologies Academy High School in

Las Vegas, Nevada. By involving their families and school faculty members, the students are able to pass on their expertise and knowledge beyond the classroom walls. One might also argue that this approach allows involvement of tomorrow's stakeholders today [130].

The DOE takes the position that citizens who are active in environmental decision making, and have a working knowledge of both the procedure and substance of an issue, can better protect themselves and help produce decisions that reduce conflict and save limited resources. DOE supported capacity building programmes help municipalities improve their ability to participate in environmental decision making processes, chart their own courses and determine their own destiny [131].

At Dounreay, in the United Kingdom, the Decommissioning and Environmental Remediation Centre (DERC) is being built alongside a hi tech test and trials facility at the Janetstown Industrial Estate [102]. DERC is being spearheaded by North Highland College. Programmes will be provided for a wide range of specialities for research projects undertaken by undergraduates, graduate and doc students. As well as tie-ups with universities in the United Kingdom, DERC has paved the way for the launch of a European Masters in Nuclear Decommissioning. At present (2007), a review of DERC is being undertaken. The latter stems from an agreement reached with France's CEA and the University of Grenoble [132]. The Sellafield decommissioning programme provided the impetus to launch the United Kingdom's first degree in nuclear decommissioning [133, 134].

In Germany, the University of Hanover, Institute for Material Science, has been instrumental in developing and testing dismantling tools at various decommissioning projects. A report of 1991 [135] and a recent paper [136] bear witness to the Institute's long-standing support to the decommissioning industry.

3.25. VISITORS

Visitors are generally attracted by decommissioning/environmental remediation sites due to the wide coverage of those activities by the media. They take their impressions home with them and may contribute to the success of such projects. In addition, tourists give substantial support to the local economy, even in the long term if they are attracted by the landscape or other features, and may be instrumental in promoting the re-vitalization of decommissioned sites. To create the conditions for such developments, it is imperative that decommissioning projects be equipped with information centres including observation points (Fig. 7) and a chance be given to visitors to observe ongoing decommissioning activities (Fig. 8) [6].

FIG. 7. Vandellos 1 NPP decommissioning project: visitors at the observation point.

FIG. 8. Vandellos NPP decommissioning project: Journalists looking at waste containers.

Experience from the Dounreay Visitor Centre, UK, is given in Refs [137, 138]. It was noted that visitors came from most European countries plus Canada, America and Australia. The centre employed four employees on a rota basis, who were trained by the Scottish Tourist Board. Among other things, it described how UKAEA is working with the local community to establish a global centre of excellence in nuclear decommissioning, qualities that can sustain the skills and enterprise base of the north Highlands beyond the closure of Dounreay. Nearly 9000 people visited the centre during 2005.[2] A brochure describing decommissioning activities at CEA's Fontenay-aux-Roses Visitors' Centre is pointed out in [139]. Figure 9 [6] shows visitors being shown inside building 779 during the decommissioning of Rocky Flats, USA.

In later years, unfortunately, the possibilities for bringing visitors onto nuclear sites have diminished in many places due to the fear of terrorist acts.

3.26. ARCHAEOLOGISTS, HISTORIANS, MUSEUMS, ARCHIVES

In recent years, growing awareness has developed of the need to partly preserve industrial sites as cultural heritage. Institutions and opinion groups might express a desire for the preservation of some buildings and components of a decommissioned facility. In this way, they might have a say on the extent of a decommissioning

[2] Due to storm damage the Visitor Centre was closed in 2007. In its place the history of the site will be incorporated into a "community museum".

FIG. 9. Visitors in building 779 at Rocky Flats, USA.

project and the end state of the site. These interests may conflict with other stakeholder's involvement in planning for and implementing profitable reuse of the site. As one example of this issue, the organization that cleared the Dounreay site where the first criticality occurred in Scotland sought ideas from members of the public about how to mark historic places [140]. Also at Dounreay, the dismantling of the fast reactor dome — a site landmark — raised concerns [141]. In the USA, the National Historic Preservation Act requires federal agencies with jurisdiction over a federal, federally assisted, or federally licensed undertaking to consider the effects of the undertaking on properties included in, or eligible for inclusion in, the National Register of Historic Places [22]. A historic and archaeological survey at DOE nuclear sites — including those being actively decommissioned — is presented in Ref. [142]. Preservation of historic artefacts in the course of DOE's decommissioning programme is described in Refs [143, 144]. Such properties represent stakeholders' interests and are taken into account in the formulation of decommissioning plans. An example of aspects to be considered in the planning is given in Ref. [145] from the decommissioning of the LOFT facility in the US.

A special case of stakeholder interactions occurs when the nuclear facility is adjacent to or even housed in a historic site. A case of the latter type was the decommissioning of the Jason reactor. Jason was a low energy training reactor located in the King William Building (KWB) at Greenwich, near London. The KWB is a grade one listed building and is part of a Scheduled Ancient Monument. The decommissioning works were designed to avoid potential impacts to the KWB and were discussed with English Heritage. An application for Scheduled Monument Clearance was made for the works and approved by the Department of Culture Media and Sport [146]. Figure 10 shows the spent fuel removal from Jason reactor: the historic building is visible behind the truck.

In New Mexico it is expected that the remediation activities in Los Alamos will lead to finding ancient Indian artefacts or even graves, whose management the native populations would like to closely follow [147]. In the same site, most of the buildings to be remediated were part of the initial Manhattan Project which some historical society would likely be interested in preserving.

There are a number of examples of nuclear museums established on the site of (partly) decommissioned facilities or planned for this purpose including [62]:

— Chinon-1 NPP in France;
— FR-2 research reactor, Germany;
— Mutsu nuclear ship in Japan;
— HIFAR reactor in Australia;
— ORNL Graphite reactor, USA (Fig. 11);

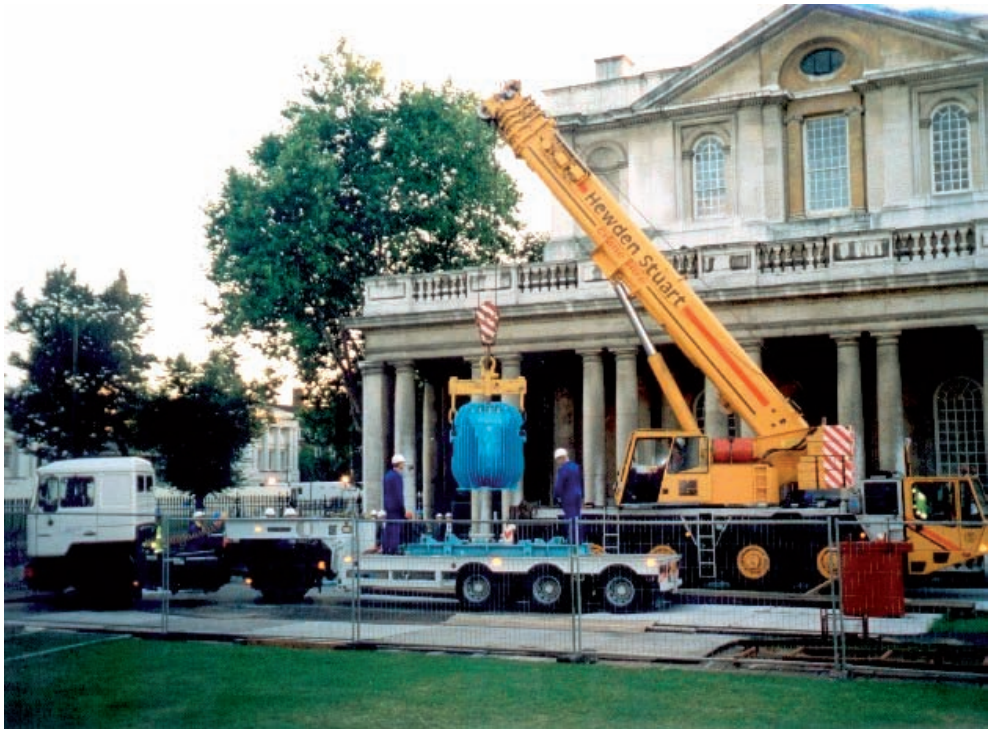

FIG. 10. Spent fuel removal from the Jason reactor, UK.

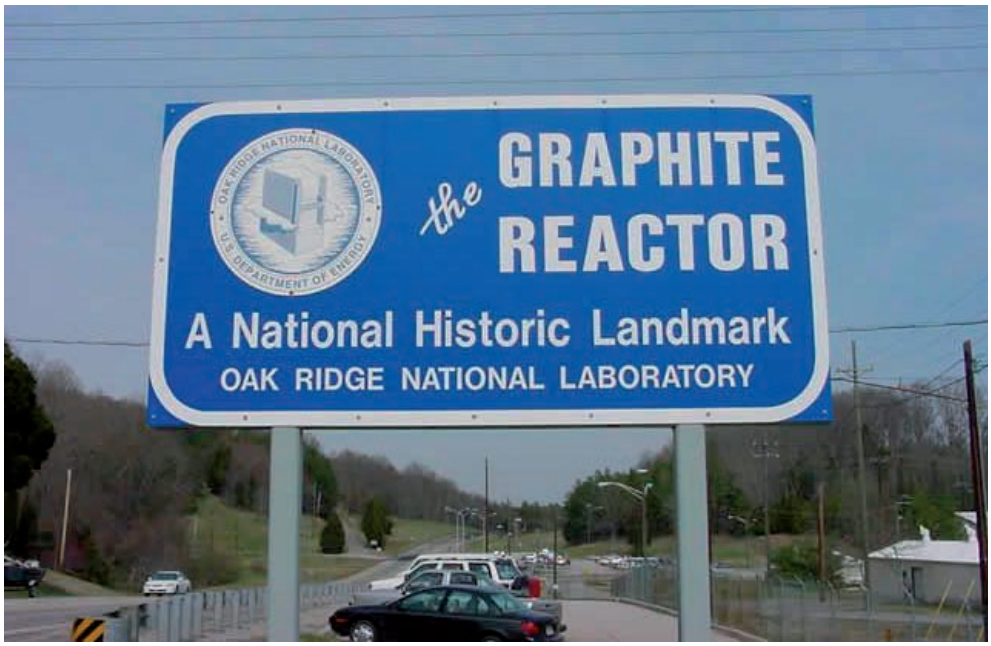

FIG. 11. Sign pointing out the ORNL Graphite Museum.

— B reactor at Hanford, USA;
— EBR-1 reactor, INEEL, USA;
— HTRE reactors, INEEL, USA;
— AM reactor, Russian Federation.

Some nuclear facilities are more suitable than others to be converted to nuclear museums or nuclear exhibition centres. This may depend on factors such as interest shown by local communities, tourists or corporate promotion policies. Location and access would be important factors in such a decision. Conversion to a nuclear museum can also be a convenient way to release part of the site for unrestricted public access while allowing radioactive decay of remaining structures. One caveat is that environmental cleanup and historic preservation might be incompatible in times of tight budgets and may result in conflicting positions among stakeholders.

Record keeping is an essential part of the decommissioning project and an irreplaceable service to decommissioning implementers. As such, record keepers are no different from those in charge of decommissioning. However, record-keeping may develop into a different function, which goes beyond the operational needs of decommissioning, since in most countries there are obligations to deliver recorded material to the national archives once a facility or activity has ceased to exist. The extent of the records to be archived may vary and may in many cases be determined by the organization itself. As one example of a large scale archiving, one of the most important collections in the history of nuclear energy has been preserved for future generation after a £400 000 ($800 000) investment in a new archive facility at Dounreay, UK. Two hundred thirty tonnes of records have been brought together under one roof in a state-of-the-art archive that will preserve the site's history for generations to come [148]. One should note that record-keepers are a distinct group of stakeholders having interests potentially opposite to decommissioning implementers, who would normally get rid of redundant records. In fact, segregating records is not a trivial activity, absorbs resources and may tend to complicate the orderly management of decommissioning. Also at Dounreay the Scottish Natural Heritage has requested a heritage strategy to be compiled to ensure that anything of historical interest is not lost.

In the State of New York, the fuel testing facility and research of Nuclear Lake was decommissioned and the buildings were donated to the National Park Service for public recreation purposes. Unfortunately residual plutonium was found on the site, clearance limits had changed and the lesson learned was that detailed records have to be preserved [147]. This in turn highlights the importance of record keepers as a stakeholder segment.

3.27. MEDIA

Decommissioning is a major change in a facility's lifetime and will almost invariably impact the local communities and others. As such, it is likely that most decommissioning projects will have significant coverage by the media, particularly at the beginning of the project. In turn, media interest is likely to attract more attention by the stakeholders (Fig. 8). The media therefore provides a useful communication channel to stakeholders. However, the media itself represents a potentially problematic stakeholder especially where there is a dialogue component to a stakeholder engagement plan. Stakeholders are more inclined to state their or their organizations positions when the media are present rather than enter into a discussion to identify common ground, which is the essence of dialogue. Therefore, special consideration needs to be given to the media as stakeholders in any engagement process.

3.28. PRESSURE GROUPS

Pressure groups in this section are considered as more permanent organizations, which are not necessarily established with a view to the decommissioning project in question. NGOs and pro and anti-nuclear groups are included here.

3.28.1. Non-governmental organizations

Different interests in society are often represented by voluntary associations or NGOs. Countries will recognize the legitimacy of these groups in different ways, some having formal legal status and some operating in the informal sphere. Both should be recognized as important stakeholder groups in a decommissioning process.

Local pressure groups are usually concerned with local issues and impacts such as employment, local economic development and quality of life. National groups and NGOs usually take a wider perspective, campaigning on national and international issues. They often provide 'thought leadership' to the wider public and particularly in western societies, where trust in politicians and political process is diminishing, they are increasingly seen as societies spokesperson. The two levels are often linked through local networks that try to provide local expression to national issues

Pressure groups by their nature represent a particular 'position' and campaign to see that the position is understood and accepted by society. They often represent a membership or community of interest that provides them with legitimacy and an accountability structure. Increasingly these groups are part of a wider international network that makes sophisticated use of the internet to support their activity.

The important point here is to understand that pressure groups and NGOs do not represent a unified group of stakeholders but a wider range of opinions and positions. Their positions and the motivation of the organizations and people behind them need to be well understood.

An example of pressure group interference with pre-decommissioning activities at the Yankee Rowe Nuclear Power Station in the USA is given in Ref. [149]. Two citizen groups filed a petition for the NRC to halt six preparatory activities (e.g. installation of a temporary electrical system) until the decommissioning plan was in place. In this case, the request was denied.

One should note that there are groups interested in a number of apparently unusual issues. The Trawsfynydd NPP decommissioning strategy was heavily affected by stakeholder desire that the residual buildings minimize the visual impact over the long period of care and maintenance. To this end, the building height was reduced from 55 m to 35 m, and a curved roof designed and installed to blend into the surrounding landscape [150, 151]. One example of greens' interactions in decommissioning is given in [152]. This refers to the recent establishment of the Nuclear Decommissioning Authority (NDA) in the UK. Basically the greens expressed the view that NDA's constructive engagement would only be sustainable if evidence of impact was provided. Perhaps the greatest challenge for the NDA is to live up to the high expectations which have been raised. If there is a major disconnect between what stakeholders expect and what the NDA is prepared to provide, then the potential is for failure and disappointment as opposed to progress and co-operation.

3.28.2. Pro and anti-nuclear groups

In setting out a strategy for stakeholder management it is a mistake to write-off a relationship with any one stakeholder due to the perceived negativity or unreasonableness of its views. Firstly, some degree of engagement and influence may be possible, at least in assisting to ensure that their arguments are factually accurate. Secondly, other stakeholders may become more sympathetic to the 'troublesome' stakeholder's cause if they are seen to be under unreasonable attack from, or ignored by, the nuclear business. Having said this, a stakeholder that uses his position falsely or to the extent of disrupting work or the involvement of others may need to be excluded. Most pressure groups are aware of this and find a balance in their relationships with the industry.

So called anti-nuclear groups will range in attitude from opposition to specific policies or plans of an operator through to outright opposition to the use of nuclear power in any circumstances. An awareness of the position of each stakeholder will inform the conduct of relations with them. They should be informed of the actual state of affairs to the same degree as any other stakeholder. In addition, their views should be understood and material prepared to respond appropriately to any attempts by them to influence or misinform others.

The particular concerns and arguments that may arise from such groups fall broadly into the following categories of increasing disaffection:

(1) Concerns over a specific policy or plan. For example this may be over the intention to incinerate waste on a site or to defer dismantling for a long period. The arguments used in these cases are usually related to the

safety of the activity or policy and often a claim that the safety implications have been underestimated, perhaps in response to cost pressures.

(2) Concerns over waste retrieval, processing, storage, transport and disposal. Here the arguments are often that the industry does not know how to deal with the wastes it has produced and that they represent an unknown yet significant threat to the community. There is sometimes an acceptance of the storage of waste at the site at which it was produced, but a discomfort over sites becoming 'dumping grounds' for other people's wastes, and for the transport of 'dangerous waste' through populated areas. A case in question is highlighted by Fig. 12. It shows anti-nuclear demonstrations in Germany in the context of spent fuel transportation — a key step of decommissioning [153].

(3) Concerns over hidden costs. A view that the industry massages its figures to put nuclear energy into a better economic light and with a major contributor being large back end costs.

(4) Concerns over the use of decommissioned sites for new nuclear power plants. Those opposed to the building of a new nuclear power station are aware that new sites are likely to be difficult to find in many countries and so see the removal of an old plant as opening a site up for redevelopment. The arguments used against decommissioning though difficult to make are likely to be similar to those used by the industry where a policy of deferral of decommissioning is applied — the value of radioactive decay, the unavailability of adequate waste routes and the better use of cash elsewhere.

(5) For those absolutely opposed to any form of nuclear power, then a valuable 'weakness' of the industry is its perceived failure to close the back end of the fuel cycle and waste management. For these opposition groups, the more difficult it is to decommission and deal with spent fuel and wastes, then the less likely it is that investors will risk investing in further nuclear construction. The arguments used are drawn from all of the above and are more easily made if the industry has not been open or accurate on costs and technical issues. The case described above under 2. also belongs to this category [37].

A recent development is the appearance of pro-nuclear groups, e.g. demonstrators against the closure of an NPP. Concern for job losses is a typical motivation for such demonstrations. Figures 13 and 14 show anti-nuclear and pro-nuclear demonstrations at the Barsebäck NPP, Sweden, in 1975 and 2000, respectively.

FIG. 12. Police shoot water cannons at protestors blocking the Castor transport route.

FIG. 13. Anti-nuclear demonstrations at Barsebaeck, 1975–1980.

FIG. 14. Pro-nuclear demonstrations at Barsebaeck, 2005.

3.29. FUTURE GENERATIONS

The ethical basis for the selection of a decommissioning strategy can be found in IAEA's Principles of Radioactive Waste Management [27, 154]. Principles 4 and 5 refer directly to protection of, and burden on, future generations (Table 4), but are not prescriptive in nature. IAEA Member States are given the flexibility of evaluating how to implement these principles as reflected in safety guides, e.g. Refs [154, 155]. It can be generally assumed consistent with more recent IAEA positions [156] that immediate dismantling is the preferred strategy, but the case-by-case strategy selection is left to national parties. It is possible that the ethics inherent to the selection of the decommissioning strategy may lead to the involvement of ethics-oriented stakeholders. Further guidance on ethical aspects in decommissioning funding can be found in Ref. [157]. The BPEO process for the low level Waste project at Dounreay [129] involved a Youth Stakeholder Panel in an attempt to get views from a younger age group; this was one of three stakeholder panels who were all provided with the same level of information. Figure 15 is a flow chart used by UKAEA at the Dounreay Site to map the overall process in stakeholders' interactions and how this fits in with a decommissioning project(s).

The USDOE has instituted a student forum in which a number of students work with the USDOE to assess a variety of stakeholder communication documents [130].

3.30. OTHERS

Other stakeholders may be identified as a result of the consultation process, e.g. facilitators, and mediators. The facilitators appear to be able to play a significant role in the stakeholder interaction as they can be seen to be independent and act as the facilitators/mediators in the interaction, essentially as an honest broker trusted by all the stakeholders, but not essentially beholden to any of them. There are numerous positive references [5, 129, 158] to this aspect. Good facilitation is a skill that should be identified and if possible indications of the nature of the skill advised.

In specific decommissioning projects there may be special circumstances leading to the emergence of stakeholders not mentioned in the present report. An illustration of how large the number of stakeholders identified may become is shown in the UK Magnox Decommissioning Dialogue where approximately 80 groupings of stakeholders were consulted [159, 160] (see Annex I.G(b)).

4. UNDERSTANDING STAKEHOLDER INFLUENCE ON DECOMMISSIONING

This section describes the general areas in which the stakeholders have an impact. It is important to balance the impacts of any particular stakeholder, in as much as they can have positive and negative impacts (much as with risk assessments). The key to good stakeholder management is to maximize and develop the positive aspects and minimize the impact of the negative aspects, without undermining any group's confidence in the process. This does not mean there has to be agreement on all aspects, but there should be agreement on the evaluation process.

TABLE 4. RADIOACTIVE WASTE MANAGEMENT PRINCIPLES RELEVANT TO THE SELECTION OF A DECOMMISSIONING STRATEGY [154]

PRINCIPLE 4:	PROTECTION OF FUTURE GENERATIONS Radioactive waste shall be managed in a way that the predicted impacts on the health of future generations do not exceed relevant levels that are acceptable today.
PRINCIPLE 5:	BURDEN OF FUTURE GENERATIONS Radioactive waste shall be managed in a way that will not impose undue burden on future generations.

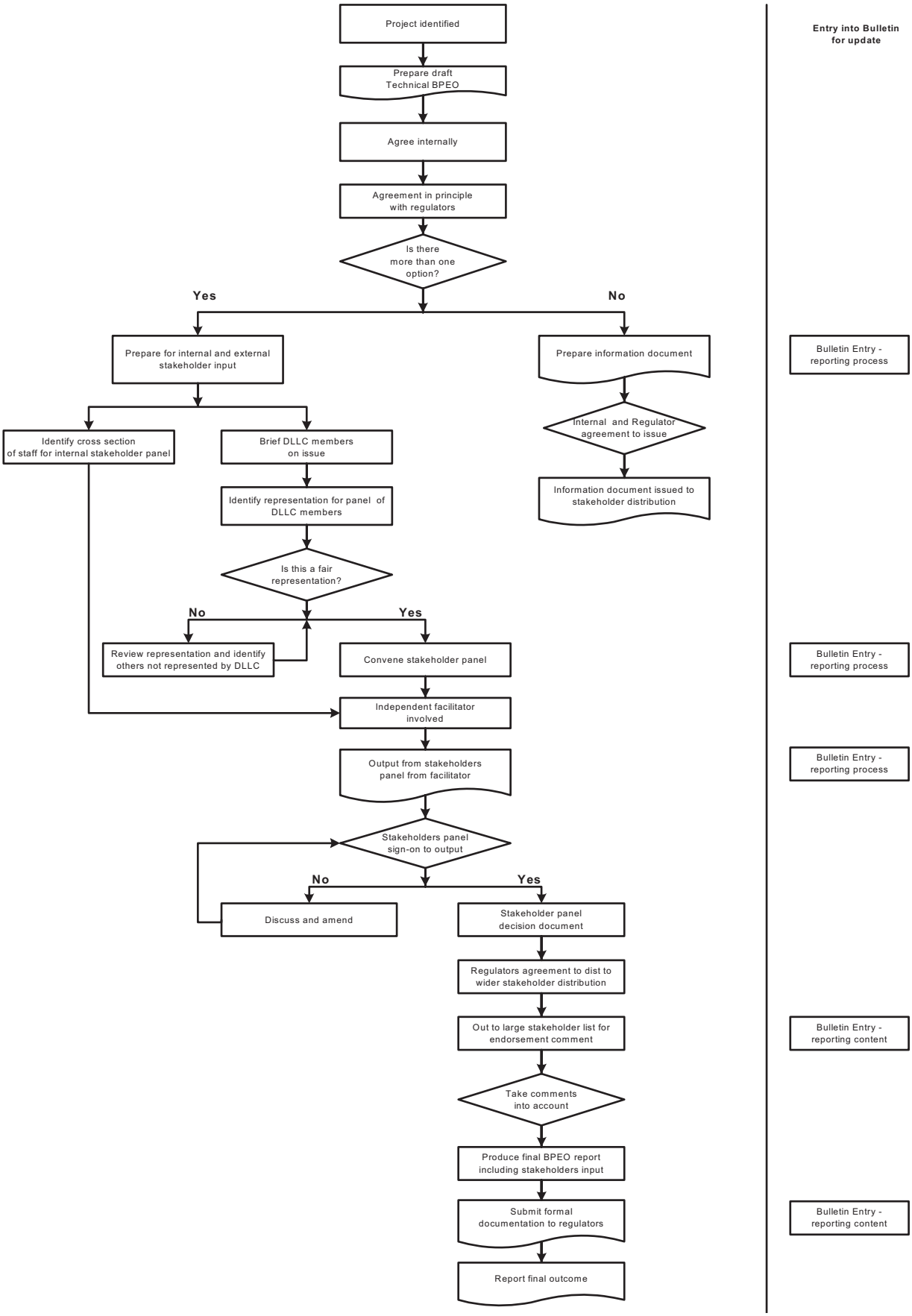

FIG. 15. Process diagram for stakeholder consultation at Dounreay.

The UKAEA Dounreay Best Practicable Environmental Option (BPEO) on the LLW project as supported by Royal Commission on Environmental Pollution 1988 [129] is an illustration of the technique to develop the positive aspects and minimize the impact of the negative aspects. This approach is intended to ensure that all feasible options have been identified and compared on the basis of their effects on the health and well-being of people and their environment (environmental factors), as well as their technical factors and financial costs (practicable factors).

In order to avoid profligate and unplanned use of scarce stakeholder resources in situations where the role of, and extent of influence of stakeholders is unclear, it is important to consider methods for, and extent of, stakeholder engagement, and an integration of programmes so that issues addressed are:

(a) At the appropriate level (international/national/local)
(b) At the appropriate time in the decision-making chain
(c) Ensuring the involvement of appropriate stakeholders
(d) Grouped effectively.

The extent to which these measures can be achieved will decide how much communication is called for, and this will almost certainly be inversely related to the amount and effectiveness of the action [161].

The successful involvement of stakeholders in a decommissioning project:

— Enhances the project's ability to deliver within time, cost and performance by providing a unified vision of risks, plans and developments.
— Provides improved opportunities for innovation and ideas.
  Note – this may not happen if the stakeholders are not engaged early enough or have not been convinced of technology demonstrations/underpinning/R&D/debates [162].
— Provides better identification and mitigation of risks which enables an improved risk management process to be implemented.
— Reduces costly delays to projects by avoiding and effectively resolving conflicts between interested parties.

The DOE also identified the top five attributes for public participation success [163], giving more emphasis on process, understanding and decisions than on their effects. For instance, one key attribute is that the decision making process is accepted as legitimate by the stakeholders.

Table 5, used by the Environment Council in the UK [21], presents four typical steps in the involvement of stakeholders in a project.

TABLE 5. TYPES OF STAKEHOLDER INVOLVEMENT

Approach	What is meant by this	Aim
Information giving	Where we give information to people, for example, raising awareness of an issue, alerting people to opportunities for getting involved, telling people of a decision which may effect them and so on.	To ensure that those who want or need it are in receipt of relevant information.
Information gathering	Using survey methods to gather information. Usually used where we need to understand the opinions of a large number of people (e.g. the population of the county or a town)	To generate information to inform the decision-making process.
Consultation	Giving people the opportunity to consider and respond to proposals, issues and options that we have developed.	To generate clearer understanding of people's concerns and opinions.
Dialogue	Where we bring smaller numbers of people (usually "key stakeholders") together to discuss and "deliberate" together with us, before decisions are made.	To create opportunities to build shared understanding and agreement (or better understand disagreement)

4.1. AREAS OF CONCERN/INTEREST

Stakeholders will be concerned with or interested to give contribution in a wide range of areas, which are sometimes but not always overlapping. Due to the large number of stakeholders that may be involved in a given project it will usually be feasible to identify relevant areas of concern and the corresponding attributes. Table 6 shows areas of concern/interest which are relevant to each of the categories defined in section 3. The table is inspired by a list of areas of concern given by the UKAEA in their Public Participation News Letter Number 1 [164], using them

TABLE 6. AREAS OF CONCERN/INTEREST FOR STAKEHOLDER INVOLVEMENT IN DECOMMISSIONING

Category	Areas of concern/interest
Economic	Cost
	Benefit
	Financial risk
	Economic impact
	Best use of available funds
	Timely availability of funds
	Diversification of funds
	Reuse of site
	Change of land value
	Reuse of facility infrastructures
	Optimization of services in place for other operating facilities
	Cover identified risks by insurance
	Social compensations
	Opportunities for enterprises
	Management of bids
	Development of partnerships
	Defense of property
Environmental	Air quality
	Water quality
	Land quality
	Visual amenity
	Noise
	Traffic — transport of radioactive waste
	Traffic —construction
	Preservation of habitat for flora and fauna
	Conservation of species
	Management of materials coming from decommissioning
Social	Public health & safety
	Worker health & safety
	Employment issues
	Maintenance of qualified jobs
	Psychological environment
	Radiological issues
	Quality of life in the local community
	Management of the territory
	Cultural/heritage (preservation of historical vestiges)
	Educational programmes
	Opinion forming, communication and information distribution
	Maintaining support from constituency
	Assert and defend ideological positions
	Secure dangerous materials
	Increase/ maintain confidence

TABLE 6. AREAS OF CONCERN/INTEREST FOR STAKEHOLDER INVOLVEMENT IN DECOMMISSIONING (cont.)

Category	Areas of concern/interest
Technical	Proven technology
	Compatible with regulation/planning laws
	Flexibility to change if circumstances change
	Develop experience and technologies in decommissioning
	Improve design and operation of plants
	Spread technical findings
	Exchange knowledge and techniques with non nuclear activities
	Use of external expertise
	Produce standards and regulations
	Improve inspection methodologies
	Perform R&D activities
	Establish international conventions/agreements
	Organizational schemes
	Management system (including safety management)
	Emergency preparedness

as a basis for ranking individual stakeholder's priorities. The UKAEA recognizes [165] that the stakeholders may positively intervene in the choice between strategic options and the DOE has outlined [166] how gathering opinions, perspectives and values helps in making informed decisions even in general areas such as recycling policies and waste minimization. Moreover, it has to be recognized that disputes between stakeholders may arise. UK NDA experience showed that an appeal mechanism has to be considered and an additional independent organization might be involved to resolve such disputes [23].

4.2. AREAS OF INFLUENCE

Taking into account that the decommissioning is rather complicated and long term process, stakeholders have an important (sometimes governing) influence on it. The areas of influence depend on the categories of stakeholders. Table 7 describes typical influence areas of different stakeholders' categories.

4.3. CRITICAL SUCCESS FACTORS FOR CREATING EFFECTIVE STAKEHOLDER RELATIONS

Both legal and moral imperatives encourage any decommissioning facility to begin stakeholder interactions. And, when conducted well, the process normally yields indisputable benefits. Both completed and ongoing projects have demonstrated that a properly tailored process that promptly involves the stakeholder, is thorough in its communication, and includes meaningful interaction, should result in better long-term decisions and prevent unnecessary delays [22].

The process of effective stakeholder relations is moving towards inclusive governance and project management which clearly includes stakeholder participation, and is increasingly at odds with the 'old-style' technocratic approach, which assumed that knowledge, science and technology totally drove the process. A recent EU publication [167] attempts to describe how 'inclusive risk governance' may be achieved with stakeholder involvement. Stated desired outcomes include:

— Empowerment of affected individuals and groups;
— Conditions for mutual respect and trust;
— Practical decisions and strategies, flexible and open to revision;
— Recognition as legitimate and fair;
— Feedback on contributions.

TABLE 7. TYPICAL AREAS OF INFLUENCE TO DECOMMISSIONING PROJECTS OF DIFFERENT STAKEHOLDERS' CATEGORIES INVOLVED IN DECOMMISSIONING (BASED ON EXAMPLE [26])

Category	Areas of influence
Economic	Provide funds Withhold funds Provide insurance Fine operators Impact continuity Support project initiatives Hire contractors/consultants Take profit from the land
Environmental	Regulators may change rules/requirements/not responding to project demands Generate unnecessary expenditure Have disproportionate cost and time impacts Input good ideas Support project initiatives Bring new experiences to the project Responsibilities of the management are safely discharged
Social	Generate unnecessary expenditure Input good ideas Bring new ideas/experiences to the project Internal stakeholders continue to fund and support the project Responsibilities of the management are safely discharged
Technical	Stop or slow the project Divert project effort Generate unnecessary expenditure Input good ideas Offer cost savings Support your project initiatives Bring new ideas/experiences to the project Responsibilities of the management are safely discharged

To achieve these desired outcomes there are a series of critical success factors to consider.

4.3.1. Organizational readiness

The Decommissioning organization planning to engage with stakeholders needs to consider its own situation and preparedness for the engagement process. It is important to understand the change from an operations environment to a decommissioning project.

A stakeholder engagement process is not a one way street and will provide feedback to the decommissioning organization on performance, profile and personnel. The decommissioning organization needs to have the mechanisms in place to respond to this with integrity. An earnest effort must be made to listen and respond to the concerns of all stakeholders, thereby requiring informed and empowered facility representation. Many contested issues can be resolved if decision makers demonstrate that they function with a sincere consideration for the concerns of others. It is a maxim in public participation that if stakeholders perceive the process to be fair, they will be more likely to accept the results [22]. Key areas for consideration are;

— Top management sign up and involvement: This is seen as a key element in establishing the confidence of the stakeholders and commitment of the management staff [168];
— Development of operating policies around openness, transparency and stakeholder relations;

— The whole company has to be behind the engagement process, so that if and when stakeholders meet company employees they receive the same message and witness the same open and transparent behaviour;
— Access to knowledge of stakeholder engagement theory and process, either in-house or via contractual arrangements;
— Staff with good 'people skills' with the ability to listen and communicate with stakeholders in non technical language;
— Managers must make an honest attempt to engage participation at the beginning of the planning process, and to focus on the balance of cost and risk [169].

In a presentation by BNFL [26], stakeholder interactions were described as part of BNFL's Corporate Social Responsibility. "Corporate Social Responsibility is about the relationship between business and society. It is extremely relevant to the decommissioning of nuclear facilities, as this requires hard issues to be addressed by governments, the industry, local communities and society in general. The success of decommissioning projects depends on understanding these issues and how they affect stakeholders".

4.3.2. Planning

As with all aspects of managing the nuclear cycle, effective planning leads to optimal results. This is also the case with stakeholder engagement. The earlier this takes place within the planning timeframe for decommissioning the better the engagement process is likely to be. This early planning should facilitate early engagement of stakeholders, which is essential in maximising constructive contributions and getting buy-in from stakeholders.

It is important to realize that decommissioning is a completely new phase in site life and plans, and that processes that were used during the operational phase may not be appropriate in the decommissioning phase. With respect to stakeholders, those with an interest may have changed and their areas of concern and influence may be different. Make the decommissioning programme a clear break from the previous activities. If there is no connection to a new build, say so. If there is a nuclear intention, be honest.

The key planning consideration is to clearly identify why stakeholder engagement is important in a particular context and what is hoped it will achieve; what value it will add to the decommissioning process. A stakeholder management plan should be developed which is integrated into a project management plan, with clearly identified responsible individuals for each aspect. In outline it should define the following:

— Objectives for stakeholder engagement;
— Clear ownership by individuals for each part of the plan;
— Individual means of communicating with stakeholders;
— Critical success factors;
— A process route map that sets the key components of the engagement process.

Ideally early engagement of stakeholders enables them to be involved in the development of the stakeholder management plan. This creates a sense of ownership of the process, which is understood by all the stakeholders and should be widely disseminated. A strong communication plan is essential to ensuring that the right message goes to the right audience.

The planning process should also address the financial and legal issues around stakeholder engagement: who will benefit and what opportunities may arise. The process of decommissioning option evaluation should be established on a legal basis or in a set of rules.

4.3.3. Stakeholder relations and communications

Early analysis of which stakeholders should be involved is essential. Try to ensure that all stakeholders are considered. "Hell has no fury like a stakeholder scorned!" Section 3 indicates the range of groups who could be considered as stakeholders and should be used as an initial checklist. Previous stakeholder interactions suggest that, while there may be a significant number of "registered stakeholders", the active number may be a very small percentage, since this is by the choice of the individuals [170].

The stakeholders identified should include employees, contractors, boards of directors, regulators, elected officials, media, public etc. [171, 172].

Once identified stakeholders need to be communicated with in a consistent and effective manner. Promote the flow of information between parties with an interest in the project. Keep up the flow throughout the process. Failure to achieve this may lead to the project moving from one that illustrates best practice, [168] to one where some of the stakeholders appear to have been disenfranchised. Make sure that presentations in general are fit for the audience. The stakeholders concerns/issues and ability to comprehend the presentations should be considered before any meetings and the presentations made "fit for purpose". It is important to present technical/ scientific information in a non-technical way and thereby create a common understanding of the issues among all involved. Information is power and it is often real or perceived power imbalances that make stakeholder relations difficult.

Various methods can be employed to achieve effective communication:

— Web sites;
— Newsletters;
— Open-house invites;
— Ensuring two way communication;
— Fact sheets/ project intention sheets ;
— Media relations;
— Stakeholder tours of facilities and visitor centres; opportunities should be taken to conduct stakeholders around the facilities, allowing them to meet and talk to operators; follow-up tours can be arranged to see progress and build confidence;
— Regular progress reports;
— The key personal skill to be employed in stakeholder communication is effective listening skills – "listen to understand not to be understood".

Do not prejudge what stakeholders wish to know, better to ask them to ensure the effective flow of information. A good example of this would be the communicating of funding sources. Identify who is paying for the decommissioning activity. This should either raise issues about who is providing funding, or give comfort that the activity is funded, or a combination of both. In addition funding opportunities associated with decommissioning may be identified.

An important component of stakeholder communication is to effectively manage the expectations of all parties. The benefits of decommissioning the plant in question should be clearly stated and as far as possible cover the likely stakeholder concerns. Stakeholders should be encouraged to understand that the site has priorities as well as their own. This is a central part of the process to order priorities amongst the various groupings and apply a consistent process to their evaluation. At the same time, organized opposition should be embraced but not surrendered to. Better to involve the pressure groups and recognize their issues, than exclude them when they will become more suspicious of your motives. The rules governing stakeholder participation must be clear and fair. They must be communicated to the stakeholders and must be applied fairly to everyone [22].

4.3.4. Openness and transparency

The development of trust between the decommissioning organization and the stakeholders and between the stakeholder groups themselves is the key raw material of an effective engagement process. Trust enables difficult issues to be discussed in an open and proactive manner and for progress to be made on addressing key issues. Stakeholders need to believe what they are being told; they will only do this if they trust the messenger. It is often difficult to build trust but very easy to erode it. An open and transparent approach to communication is essential as it needs to treat stakeholders with respect giving them the time and space to express their views and voice their concerns. Trust accumulates through a process; it is not an automatic outcome of better information. Education, better information, and improved understanding are often part of the process when people learn to work together and begin to understand that although they have different opinions they also have much in common. Be open about risks and share with stakeholders. This opens up dialogues and trust, and identifies the

uncertainties surrounding any projects of this type of complexity [164]. Key elements for consideration are provided below:

The decision making process:

— Not give the impression that the decisions have all been made before the stakeholder engagement process started [168];
— If you are unsure whether to involve the public in a decision, ask them [169];
— Where pre-conditions exist or change over time these need to be shared and discussed with the stakeholders so they understand the boundaries to their engagement;
— That stakeholders must be aware of the process by which their input is considered and how it may be scored, so that they have confidence in the process, even though it may not satisfy their entire individual needs i.e. their individual aspirations may not be fully met (or not at all). The decision process must be unbiased;
— Organized opposition is often encountered, and the public involvement process should include it but not surrender to it [169].

Accessibility of information: Excessive use of confidentiality and secrecy laws will undermine the development of trust. As Member States implement the Aarhus convention and develop legislative arrangements around Freedom of Information there should be a presumption that as much information as possible on the decommissioning process should be made publicly available. This should also be the case regarding the deliberations arising from the stakeholder engagement process.

Record keeping:

— Make sure any presentations, discussions and decisions are recorded
— That minutes/action lists are made available to stakeholders. The decommissioning technology is of interest to some stakeholders so be prepared to discuss, and present the scientific basis of your proposals. However, environmental aspects, disposition of wastes and buildings, and economic impacts are of generally higher interest [173].

4.3.5. Developing effective process

Engagement processes do not just happen, they need to be planned and managed like any other activity [174]. There is a growing body of expertise in the area of process design and facilitation and a number of competing techniques to choose from. What is important is that a process is designed to suit the nature of a particular project and the social and economic context of the stakeholders. For example, stakeholders who are asked to comment on plans will only criticize, whereas stakeholders who are involved in the process can develop ownership and a positive attitude resulting from empowerment [169]. However, there are a number of generic considerations which need to be addressed:

Time and flexibility

Stakeholder engagement is a human process and human relations and trust require time to mature. Do not rush the process as stakeholders will feel that they are being rushed into a decision and become suspicious of your organization's motives. There needs to be recognition that things change along the way and ensure the ability for change is built into the process. It is therefore encouraged to build in flexibility to adapt to changing circumstances.

Complexity and uncertainty

The decommissioning process is inherently complex and the developing of plans is often surrounded by levels of uncertainty that are difficult for stakeholders to understand. In other words, decommissioning does not take place in isolation as it is affected by international and national policy making, social and economic change and growing environmental concerns. The decision making process is seldom linear and requires the evaluation

of options and the consideration of scenarios. Often in these situations the technical analysis is questioned by stakeholders who do not trust the data or analysis placed before them. Therefore processes need to be developed such as 'Joint Fact Finding' [175] whereby stakeholders can collectively develop an analysis of the situation under concern.

Facilitation

The use of independent facilitators can greatly assist the quality and development of the conversation between different stakeholder groups. They should not represent or support any of the stakeholder views but instead manage a process that allows all views to be expressed, considered and recorded. They should be able to help in the interactions between experts and stakeholders, as the facilitator may be able to interpret the question better than the project person. They should also be able to help reduce levels of conflict and contention that can stand in the way of effective engagement. Illustrations of the use of facilitators can be found in [129].

Key coordinators in the stakeholder process

Typically drawn from the organizations' public relations (PR) section, the holders of these positions can benefit greatly by understanding the dynamics of the media and to local/wider issues before the stakeholder engagement starts. They can be in a unique position to understand the local and national issues and the technical solutions.

Decision methodology

The use of a decision assisting methodology based on attributes, accepted by the stakeholders (as identified in Section 4.1), has been useful in supporting decisions even when some of the stakeholders did not support the eventual way forward [129].

Two such processes that have been used successfully by the Environment Council in the UK are 'Joint Fact Finding' [175]; to overcome the lack of trust in scientific data provided and Strategic Action Planning [176]; to deal with high levels of uncertainty in the decision making process. Further information about theses techniques can be found in.

4.3.6. Evaluation

Evaluation is essential to ensure that the engagement project meets its objectives by continually reviewing performance so that those involved can learn from the process to inform future engagement activities. Evaluation needs to be planned at the outset and where possible needs to be designed with active participation of the stakeholders. Effective evaluation allows for the development of good practice, which should then be shared with a wider audience through reporting and publication. The 'art' of stakeholder engagement is a developing field and there are still many lessons to be learnt

Given a good process, some, or maybe all of your objectives, may be owned by the stakeholders. Ownership of all aspects is not necessarily your goal i.e. some debated and ranked issues may be outside your plans. Your objective should be to arrive at the decisions by a logical process in which the stakeholders have trust and understanding, even if they do not necessarily favour the outcome [168].

5. STAKEHOLDER INFLUENCE ON REUSING DECOMMISSIONING SITES

5.1. AREAS FOR STAKEHOLDER CONCERN/INTEREST

In the coming decades a large number of nuclear facilities will reach the end of their useful lives and require decommissioning. Many of these facilities will be decommissioned with the aim of either replacing them with new facilities that serve the same purpose or the site may be reused for another completely different purpose. By recognizing and promoting the redevelopment potential of facilities and their sites at the design stage or earlier in their operating life, it is possible to enhance the prospects for worthwhile redevelopment offsetting the costs of decommissioning and ensuring that best use is made of the material, land and human resources associated with each facility. The IAEA has recently issued a technical report, dealing with reuse of sites [62]. The stakeholders who have particular areas of concern/interest with a view to re-use of the site are described briefly below [177].

The owner of the facility will be interested in the potential profit to be made from re-use of the site and will be responsible for the definition of policy and the sanctioning of projects.

Local community leaders, environmentalists and conservation groups, and other interested parties will have concerns about the — positive or negative — consequences of establishing a new activity at the site. These groups should be included early in the decision-making process to provide input on the ultimate fate of the site and the most acceptable approach to reuse. Financial and legal aspects may play an important role in site reuse considerations.

5.2. AREAS OF INFLUENCE

The areas of influence for particular groupings are described as follows.

There is a tendency in the modern industrial culture, driven by priorities and indicators of performance, for matters relating to the eventual closure of an operating facility to be considered low priority. This is generally due to the fact that there is no perceived urgency for action and because there are few management indicators that focus attention on closure. Therefore it is especially important that management policy draws explicit attention to the need to address closure. An important practical element of this accountability in many cases is the decommissioning plan, which should be prepared for each installation and which should consider both the decommissioning and future prospects for redevelopment of the installation. These plans provide a measure of the expected costs and potential benefits likely to arise when the installation reaches the end of its useful life. More importantly, they also offer the opportunity to consider actions in the immediate future that could increase the potential future benefits and reduce potential future costs. One way to help identify these immediate actions is to consider a range of anticipated scenarios for the end of life of the installation and to identify those scenarios that are most favourable and build appropriate actions into the decommissioning plans.

Despite the common features shared by many nuclear sites, redevelopment opportunities are rarely the same for any two sites. This situation arises because of the importance of local and random chance factors in the initiation of development opportunities and because of the different regulatory, political, climatic and geographic conditions in different regions. It follows therefore that each site should be considered individually and that for each site there should be a redevelopment plan that takes into account the specific circumstances of the site and local factors affecting its redevelopment potential. Organizations may have a manager responsible for property or 'real estate' and this person is often the most able to co-ordinate actions aimed at enhancing the long-term value of the site.

The property manager may:

— Seek the advice or interest of development groups who have experience in the area, bearing in mind that they are potential future partners in any redevelopment activity;

— Discuss the possibilities with local (including state, municipal and regional) planners and determine the long-term economic development plans for the local area and the surrounding region;
— Develop a list of those aspects of the candidate site that may make the site valuable.

Operating staff at all levels can also influence the redevelopment value of a particular installation. Good standards of record keeping [178], maintenance, housekeeping, and other operational aspects for the management/operation of a facility will eventually be very useful in the support of decommissioning and may improve the prospects for future use. Decisions taken by plant operators often have consequences for the ease with which assets can be reconfigured or put to other uses. It is helpful for technical staff to be aware of these implications and to take account of them in their work where the potential consequences are significant.

Environmentalist and conservation groups may be quite active in a re-development project. They may view industrial re-development as an opportunity wasted to return the site to its original use (agricultural, recreational or site of special scientific interest (SSSI) or to de-congest an industrial region. They may, depending on possible reuse, appear either for or against the proposals

Other interest groups that may warrant a role in the re-development decisions include business development interests, adjacent property owners, labour unions, and the unaffiliated interested citizen. Outreach to these groups through public participation opportunities are important elements of maintaining effective stakeholder engagement.

Overlaying the above are the financial and legal aspects associated with the owner's transition from nuclear operation and decommissioning to a new site re-use. These are greatly dependent on national and/or local legislation. In particular, these factors impact on stakeholders' interactions and relationships during the re-development process. A partial list of actions and incentives is as follows [179]:

— Create an exit plan for the seller (e.g. use financial and liability restructuring, insurance and intermediaries; configure the buyer's development plan so that it is harmonized with the seller's remedial action plan);
— Create a liability protection plan for the buyer (e.g. obtain seller indemnity, insurance, use an escrow account);
— Seek out legislation which provides loans, tax deductions etc. available to the seller and/or buyer;
— Check if a government cost recovery action is in place against liable parties and environmental cost lien on property considerations;
— Obtain incentives for the buyer/developer to satisfy its "due care" obligations in a way that may relieve part or all of the seller's remedial obligations thus reducing the seller's costs (e.g. by not requiring the site to be brought to a complete greenfield[3] status).

5.3. CRITICAL SUCCESS FACTORS

This section indicates the critical success factors which will need to be considered / evaluated to establish the overall benefit with respect to the site reuse.

An illustration of the impact on a community, giving an indication of an area of stakeholder interest, is considered. Opportunities for developing a sustainable economy that will be viable after the closure of nuclear sites may be created through:

— The decommissioning process itself;
— Diversifying the local economy;
— Creating a skills based centre of excellence;
— Exploiting the global dimensions of decommissioning.

[3] Green field: A condition where the nuclear site has been granted unrestricted release from regulatory control, buildings have been demolished and no redevelopment is planned.

The scale of the challenge means that, if real benefits are to accrue to local communities, it is essential that site operators, public sector agencies and the private sector form effective partnerships to exploit the opportunities. In particular, site operators must recognize the fundamental change in status between an operational site and one that is moving into the decommissioning phase. There is an imperative for them to understand local development issues and how their actions impinge on those issues. This may require them to acquire developmental skills as part of their core management function. If site operators are to gain public acceptability of the decommissioning programme they must demonstrate that while they are achieving their own objectives they are adding/maintaining overall value to the local community [180].

5.3.1. Economics

Replacement jobs

Replacement of jobs at the nuclear facilities will be a big issue for local communities and politicians. The operational staff should know well in advance all possible future solutions of usage of the land to prepare itself to be useful in new positions: both for decommissioning purposes and for new working places available in the area.

Optimizing the impact on local economy, businesses/direct employment, housing, hotels, contractors

These need to be carefully assessed and, if possible, plans should be set up to mitigate the negative impacts. There may be short term positive local effects with inflow of decommissioning contractors.

There are not only numerical issues, but a quality issue, i.e. replacing a nuclear facility with a call centre may be numerically equivalent but skills and professional jobs will not balance. It may be necessary to consider downsizing and privatizing the workforce. The following lessons learned may apply [181]:

- **Communications:** Throughout any privatization process, effective communication is paramount to success. Communication goes beyond management and decision makers providing details, soliciting input, and addressing concerns of the stakeholders.
- **Timely and accurate dissemination of developments:** Rumours about the process and potential outcomes were prevalent throughout the process. Most rumours had no grounding in fact. Honest and open information provided as often as possible helps minimize anxiety among affected workers. As a by-product, trust develops, allowing for a much easier transition.
- **Partnership with the bargaining unit and full-time workers is required:** Enlisting the support of the workers is essential. They can wield tremendous power during privatization efforts. "Hostile takeovers" do not work in this arena.
- **Planning details:** As with any complex endeavour, unplanned events pose risk.

Gaining expertise which may be saleable

This can be an interest all the way through the supply chain i.e. individuals, local communities, local/national/international contractors, national aspirations to be world decommissioning players. This will bring in established decommissioning players i.e. expertise already available which may create tensions with local/national players and subsequently impact on some stakeholders thoughts on who may benefit from the activity. For example, money flow to local/national organizations versus flow out to the international contracting community. A balance may need to be struck in this area, with partnerships being a possible solution, but this needs to be in line with high level government policy decisions [164, 182].

Funding considerations.

In most cases the nuclear facilities have been a significant contributor to the local economy during facilities' operation.

Whether decommissioning funds are local/national or company based proactive support to local contractors/businesses may be encouraged. The local/national officials will have issues of timing, sources of revenue impacts, maintaining local/national tax base, etc. [183].

5.3.2. Environment

Local environmental considerations/concerns in this area

Includes all aspects of pollution such as temporary increases in discharges, spoil-heaps as environmental legacies and aesthetics, disposition of waste i.e. on-site or central facilities, transport issues such as truck movements, ships, rail, need for new facilities, roads, ports, loading, unloading in any transport area. The impact of change in these areas includes also local use for other purposes of any of these facilities and whether they are viable post decommissioning.

Sustainability of nuclear power

The sustainability issues in the UK are described in detail [159], based on the best practicable environmental option (BPEO) approach as recommended by the Royal Commission on Environmental Protection in 1988 [184]. The guidance [159] focuses on the specific inclusion of sustainability considerations into the key stage of a BPEO study. Namely, options identification and screening, the selection of attributes and options analysis, and public and stakeholder engagement.

In many cases building new nuclear power plants will be a good solution for the reuse of a site.

5.3.3. Social

Future uses for the site

Below are some of the future uses for sites. Work on these may begin before decommissioning has been completed [185] and may include some of the following options:

— A nuclear future for the site;
— A non-nuclear future for the site;
— A mixed future for the site;
— Areas of outstanding beauty in national parks used for recreation;
— Sites of special scientific interest (SSSI).

See also Refs [150, 186]. A recent example of stakeholder involvement prior to planned shutdown and decommissioning of Wylfa nuclear power station, UK, is given in Ref. [187]. A site stakeholders group, which included local councils, farming unions and tourism organizations, built up a complete dossier of views. Voters had a choice of eight different options including using the site for conventional or radioactive waste processing or disposal. Other proposals looked at the possibility of developing the site into a country park or nature reserve, using it for housing or returning it back to farming. Also high on the list was building a new nuclear power station. Those taking part in the poll were also asked if they thought the site should be used for recreational, leisure or tourism applications such as hotels, sports or leisure facilities or a holiday park.

The input of decommissioning and clean up can strongly influence small communities. Christmas Island has been occupied since 1882 and became independent in 1979 within Kiribati. The island had been selected for nuclear testing in 1957 and operations ceased in 1964. The cleanup programme was launched in 2005. It started with building accommodation for the workers and the intention is to cleanup and restore the land for tourism after decommissioning. It is intended to provide support to the local community to build bungalows and other facilities for the tourism industry [188].

Impact on the horizon

The issue of how the view of the horizon of the plant appears during the decommissioning process can be both positive and negative to particular groups of stakeholders, e.g. knocking down a feature which has been part of the landscape such as the Windscale Piles Chimney, can be seen as a positive sign of progress. Building a long-term store which is obtrusive in an area of outstanding natural beauty may be seen as negative. Further examples are mounds, new facilities and changes to the horizon. References [150, 151] illustrate how the situation at Trawsfynydd resulted in residual safestore buildings, which were designed to minimize visual impact within a national park area. See also Ref. [129].

Continued viability of schools, including other teaching institutions

The local schools may have been very dependent on the operating facility for funds and students, so viability of schools will be a stakeholder concern. Issues include numbers of students/teachers/support staff, funds, curriculum, and attractiveness to local communities, teachers, and students.

6. FACTORS THAT MAY INFLUENCE STAKEHOLDER INVOLVEMENT IN DECOMMISSIONING

The following section discusses the possible environments in which the stakeholder interactions may take place. In fact, the national/local context in which decommissioning decision making will take place is a relevant factor for stakeholder interactions, but the converse is also true and stakeholders determine the decommissioning environment. Certain issues, such as local social and economic conditions, and legislation / regulations, are embedded within both a national and local socio-cultural context, and will shape the way in which the process is played out. The context of decision making will shape both the overall objectives of a decommissioning project within the framework of competing societal goals, as well as generate constraints on the decision making process including stakeholder contributions. Most decisions do not exist in isolation, but are built on decisions that have already been taken and affect the choices that will be available in the future. The timing of a decision may, therefore, also be an important factor, since the circumstances surrounding the decision will determine the external constraints, any other factors to be taken into account, and the people who should be involved. The measure of a decision is not just whether it is made efficiently and economically, but whether the decision making process has sufficient legitimacy, the decision sufficient acceptability and the subjects are sufficiently motivated to permit implementation [5, 27].

It is not possible to discuss in detail how different contexts can influence the interfaces among the stakeholders, but the following factors of influence are discussed, providing also some ideas on how to minimize their drawbacks:

— Governmental and institutional structure;
— Local and national economical policies;
— Education and training infrastructures;
— Decommissioning related strategies decided at national level (legislation, waste management, funding);
— National experience on decommissioning;
— Factors related to the location of the facility.

6.1. GOVERNMENT AND INSTITUTIONAL STRUCTURE

The legislative and regulatory framework will decisively influence the decision making process in decommissioning, both with respect to the way it is progressing and with respect to end-points to be achieved. In some Member States, an extensive legislative basis and regulatory framework to address issues of decommissioning and contaminated site remediation is already in place. In others, due to a lack of prior experience, or due to transitions in the governmental structures, the legislative basis may be incomplete or even non-existent. Both situations offer potential challenges for the stakeholders [5].

The legal or regulatory framework will often develop in an evolutionary fashion in response to a particular contamination situation in a Member State. For states with an extensive legislative basis on environmental issues, the historical development of different laws may give rise to conflicting requirements at a given site. Typically, this is due to the historical events leading to adoption of the various laws and regulations. In many cases, the decommissioning and remediation activities may proceed on a legislative basis originally intended to address a different problem or a different aspect of the same problem.

On the other hand, decommissioning/remediation activities may be strongly impeded by the lack of a clear-cut legal framework for managing contaminated lands. In particular, the lack of a mechanism for identifying responsible parties for managing legacy sites may delay or prevent cleanup, even when the need for remediation is widely acknowledged. Some countries have adopted legislation to deal with contaminated sites 'orphaned' by the disappearance of their originators, most notably the formerly state-owned enterprises in Central and Eastern Europe.

Where such competition amongst different legislation exists, some Member States either allow room for stakeholders' negotiation, or assign through an administrative act, the leading responsibility to one government department.

Decommissioning/environmental remediation projects are often multi-year undertakings. Hence, pertinent legislation and the underlying political thinking may change from the time the justification is developed to the time when the implementation is fully achieved.

Courts may become actors if, for instance, some involved subject misses its contractual obligations. For example, the US Court of Federal Claims has awarded the Sacramento Municipal Utility District (SMUD) $39.7 million in damages against the Department of Energy as compensation for the agency's failure to begin disposing of utilities' spent fuel by a 1998 contract date. The case in question was related to SMUD's closed Rancho Seco nuclear power plant [189]

6.2. NATIONAL AND LOCAL ECONOMICAL POLICIES

Depending on the size of the problem, decommissioning decisions can have wide-ranging economic implications. Integrating economic considerations into the decision making process is not a straightforward task. On the other hand, it is probably fair to expect that public benefit from public money be maximized. Therefore, the economic benefits, or detriments for that matter, of decisions on remediation projects need to be evaluated a priori. They will determine to a large extent the stakeholders' involvement as shown below [5].

Economic impacts of contamination events may manifest themselves in a variety of direct and indirect forms, including loss of property value, loss of markets for agricultural produce, job losses, relocation costs, costs of extended commuting to farther workplaces, or higher cost of foodstuffs. Unlike the siting of nuclear installations, including waste management facilities, where often the negative perception of nuclear matters prevails, there may be a expectation of considerable potential for economic benefits for the local community from the decommissioning/ remediation activities. The remediation measures may bring with them an influx of money. Education and training opportunities for local inhabitants often increase (Section 6.3). Overall, the standard of living increases — at least with respect to a situation without remediation — sometimes to a level above the pre-contamination level.

The choice of decommissioning/remediation strategies/technologies may be tailored to the economic needs of a region or the resources available. Thus the overall economic benefit for a region might be improved by choosing a less sophisticated technique, but involving more local staff and other local resources. Or, in former industrial areas, drawing out a project over a longer time-scale, thus keeping local staff employed for a longer

period of time, might be more economical than earlier completion followed by paying unemployment benefit; and it may add a social dividend. Working out such trade-offs requires the collaboration of all parties involved: the contractor, the operator, licensing authorities, the funding bodies and the public.

The structure of the local economy may be significant in framing the objectives of the decommissioning/ remediation activities. Remediation in an industrialized region may focus, for example, on issues such as employment and economic reuse of lands. In a region with a primarily rural traditional economy, emphasis on avoiding disturbances to indigenous cultural conditions may be paramount. A prolonged contamination situation and ensuing remediation measures may have a serious impact on the socioeconomic structure of the communities concerned. Such impact may ensue from restrictions on land use or on marketing of its products, or from perception by the outside world, which may find investing in the area unattractive or shy away from buying the products. Compensation to be paid to the affected people can be a major item of the overall project costs. While some effects may be desirable, such as creating employment, at the same time dependency on the project itself may develop.

6.3. EDUCATION AND TRAINING INFRASTRUCTURES

Depending on the size and nature of the problem, a decommissioning/ remediation programme may be both determined by, and impact on, the skill base and level of education available in the community or region [5]. Local unavailability of skilled personnel may be a constraint on implementation of an otherwise viable technology. The problem may be overcome by either recruiting staff with the required skills or by training and education, if project resources and time scales permit this. For example, retraining and redeployment of scientists and engineers from the workforce of the previous operation on a site is a major element of the conversion programmes from nuclear weapons production to civilian activities in the USA and the successor countries of the former USSR.

The effects on the socioeconomic context of the communities may be quite varied, again depending on the scale of these measures with respect to the size of the community. A sizeable influx of outside workers may give rise to social tensions, but also boost the economic situation of the community. Training and education of locals is likely to improve their 'market value', but can induce demographic changes later on, for instance by outward migration following the completion of the remediation project. Assessing such effects in detail is probably beyond the means of the average remediation project, but decision makers on the political level may well be guided by such deliberations.

6.4. DECOMMISSIONING RELATED STRATEGIES DECIDED AT NATIONAL LEVEL

There are two basic decommissioning options for a nuclear facility for which the decision has been made not to return it to service. These two options are:

— Immediate dismantling;
— Long term storage followed by dismantling.

Each influencing factor must be examined for the conditions specific to the facility under consideration to arrive at a satisfactory decommissioning plan. In turn, these factors will determine stakeholders' involvement in any decommissioning project. Important national factors are briefly discussed in the subsections that follow [27].

6.4.1. Legislative and regulatory requirements

Decommissioning strategies and their timing are regulated in different ways by Member States, resulting in a greater or lesser role for stakeholders. In general, three different schemes may be found as described below:

(a) Regulatory arrangements are fully prescriptive, in which national legislation provides detailed framework for decommissioning planning and timeframe;

(b) Regulatory arrangements are somewhat prescriptive, and require preliminary assessment of possible decommissioning options, with the final option being selected and justified by cost benefit or multi-attribute analysis;
(c) Regulatory arrangements are not prescriptive and allow the operator to propose any option subject to a safety justification.

Examples of different decommissioning schemes are:

(a) Japan requires that facilities go to total dismantling within five to ten years of facility shutdown to allow further use of the site. This is an important consideration in Japan where land is at a premium;
(b) Based on technical studies of different nuclear facilities, the US NRC allows a possession-only licence only for nuclear power reactors and limits the surveillance period to up to 60 years or as approved. Technical studies showed that for US power reactors there is little benefit in delaying dismantling for longer time periods.
(c) In Italy, the operator's decommissioning strategy for shutting down nuclear power plants was previously long-term safe enclosure. This was essentially based on the lack of a radioactive waste disposal site in the country. Recent developments towards early dismantling are driven by public opinion and strenuous efforts to achieve consensus on siting waste/spent fuel storage or disposal facilities.

It should be noted that other regulatory requirements are essential for safe and cost-effective planning/implementation of decommissioning. Clearance criteria for decommissioning material/waste are probably the most important of such requirements. Such criteria are now available in most countries, e.g. Germany, Spain and UK. In some cases they are part of the legislative framework, in others they were established for specific projects.

An example of a decommissioning planning process that initially did not go smoothly is the Ignalina NPP [190]. The overall decommissioning strategy had not been formally agreed with the Lithuanian Government when the first draft of the Final Decommissioning Plan was presented to the Lithuanian Authorities in June 2002. As a consequence the Decommissioning Plan was not accepted. Following further submissions to and considerations by the Lithuanian Authorities regarding technical and financial matters on the decommissioning strategy, a decision was made in November 2002 that Immediate Dismantling was the preferred option of the Lithuanian Government. This resulted in a rewrite of the Final Decommissioning Plan, which was not finally approved by the Lithuanian Government until 2005.

6.4.2. Waste management

If no suitable disposal facilities for the amounts and categories of waste are available, then the following options exist to:

— Maintain the facility in safe enclosure;
— Condition the waste and store in appropriate waste stores.

Waste storage arrangements for large amounts of conditioned waste may also be costly or difficult to maintain. These considerations therefore will influence the timing of final dismantling and the period of safe enclosure. Both approaches will have stakeholder implications.

The application of techniques, in particular new ones, always entails an element of risk and, hence, uncertainty about meeting the stated objectives [5]. Waste management is discussed here as one example of national/local conditions determining the stakeholders' interactions in a given decommissioning project. At the planning stage, there may be some uncertainty with the respect to the acceptability of certain waste management techniques by all or some parties concerned, namely the owner, operator, regulator and the public. Some techniques are considered more 'politically correct' than others, for instance, waste incineration is not favoured in certain countries. Technology acceptance is strongly related to the issue of innovation, innovation acceptance, and stakeholder participation in technology development.

Moving cleanup wastes or residues from one site to another site may result in industrial, radiation and traffic accidents that lead to morbidity, injury, or mortality. Transportation may also impact on natural resources or pose an ecological risk. In general, the magnitude of transportation risk depends on the number of kilometres travelled and the specific mode of transportation. The severity of the impact associated with a transportation risk depends on the type of material being transported and the degree to which the material is confined, i.e. the waste form if any.

The potential for transportation risks may influence the choice of a remediation technology because some technologies require off-site transportation of materials for conditioning, or result in residues to be disposed of in designated and licensed facilities.

When communicating on decommissioning issues, it is important to address the subject of radioactive waste management including transportation and disposal [191].

As with management of radioactive waste, spent fuel management is an essential component of decommissioning. A variety of stakeholders can be involved, depending on the national infrastructure. In several Member States contracts were negotiated with other Member States to transfer spent fuel, but later on this became difficult or even impossible for various reasons. The repatriation policy – either to the USA or to the Russian Federation – has been re-installed in recent years, and this has favoured smooth progress of decommissioning in many countries (see Section 6.3.4) [78].

6.4.3. Funding Mechanisms

Many Member States today have adopted the 'polluter pays principle', meaning that the originator of a contamination is responsible for adequate remediation measures [5]. However, in many cases the originator has ceased to exist, or it is difficult, even impossible, to assign the financial responsibility of a decommissioning/remediation project to the former operator – often, because of lack of resources available to them. Owing to the nature of such radiological contamination, the responsibility for making-safe, cleanup, and monitoring often is assumed by the government in the wider public interest. Where the government has to fund such activities through (regular) tax revenue, limited income in any one year may hamper and delay remediation.

Similar constraints apply to private enterprises, where remediation funds typically need to come out of the annual (gross) profits or from (non-taxable) reserves, if these are permitted under the prevailing legislation. In some instances alternative funding can be sought, such as through the increase in market value of property following cleanup and re-development. Speculations on the property value may indeed influence the performance of a remediation programme as well as its end-point, for property value is closely linked to foreseen land use.

Resources available for remediation measures are usually limited both in total amount and with respect to the time over which they can be spent. Allocation to the various sub-tasks and supporting activities will be an important aspect of the decision making process. Cost control not only addresses the allocation of resources to individual sub-tasks, but also controls the flow of resources over time. The amount of funds available at any one time might well limit the choice of remediation option. Two possible extremes are (i) an option involving a high investment over a short period of time, as opposed to (ii) an option involving moderate expenditure over a longer period, both options incurring the same total cost. The second option may be more in line with tax money availability, but additional costs from spreading out the task must be taken into account. These typically include interest on loans, rental fees and higher depreciation for equipment, and maintenance costs for the necessary infrastructure. This indicates that a full economic cost assessment and accounting is an essential element of the decision making process. Depending on the approaches taken, the nature and interactions with stakeholders will be different.

6.5. NATIONAL EXPERIENCE OF DECOMMISSIONING

It should be noted that using decommissioning technology is easier in countries (France, Germany, UK, USA etc.) that possess a significant nuclear programme. In such countries, a decommissioning "market" has developed which should be financially beneficial to the decommissioning budget. This implies the participation

of stakeholders (the nuclear and non-nuclear industry) favourable in principle to early implementation of decommissioning.

An advantage of immediate dismantling is the retention and utilization of plant expertise on the site during the actual dismantling. This expertise could lessen the potential for accidents and would avoid dose associated with retraining of personnel. This may be needed particularly in cases where there is a lack of records, where undocumented changes were made during construction or backfitting, and where experimental facilities are to be decommissioned. Also this factor assumes the constant collaboration of stakeholders (staff, service providers, contractors).

6.6. FACTORS RELATED TO THE LOCATION OF THE FACILITY

The quality and availability of local infrastructure can affect, and in turn may be affected by a decommissioning/ remediation programme [5]. Those responsible for the infrastructure effectively take on the stakeholder role. Relevant variables include:

— Local facilities, e.g. transport (road, rail networks), accommodation, etc.;
— Regional facilities, e.g. transport (road, rail networks), waste disposal facilities;
— General state of development.

Depending on the size of the site, an area larger than the actual contamination may be required for installations, intermediate storage of wastes and so on. Removal, transport and disposal of residual wastes may result in environmental impacts and risks at locations other than of the original contamination. In addition, the remediation techniques chosen may generate large quantities of secondary waste and may pose risks of exposure to the public or operators that exceed the risks of quiescent contamination.

Environmental risk may also extend to possible impacts on natural resources such as surface waters, groundwater, air, geological resources, or biological resources, even at great distance from the decommissioning site, and may create a lot of additional stakeholders. Natural resource damages can be assessed in terms of mitigation of existing damage or prevention of new damage. The potential for environmental risk may be an important factor in decision making because some remediation technologies are more likely than others to produce adverse impacts on ecological receptors, including habitat disruption, or generate natural resource damage. One should also note that, in terms of stakeholders' impacts, often "perceived" impacts are as real as actual impacts.

Local land use in the region will also affect the remediation decision. For example, decisions on the remediation of a contaminated urban site may be very different from those taken in a wilderness area. In the first case, the local needs for industrial or commercial lands may shape the final end-state and require a different remediation process.

The infrastructure impact may be an important factor in the decision making process. Due to the numerous and disparate factors which describe an area or community infrastructure, it is not possible to be comprehensive here with respect to methods to be used for the analysis of potential benefits for and impacts on the infrastructure.

7. METHODS FOR OPTIMIZING DECOMMISSIONING STRATEGIES TAKING STAKEHOLDER CONTRIBUTION INTO ACCOUNT

In decommissioning projects, the primary decision-making criteria are: protection of human health and environment, compliance with legal requirements, and costs. Other factors include but are not limited to:

schedule impacts, local economic impacts, institutional preferences, local social preferences, and environmental impacts (land disturbance; water quality degradation; air quality degradation; energy use). It is obvious that some of these factors are pertinent to the stakeholder interactions presented in this report. In fact, the overall scenario is further complicated by the presence of different – and often conflicting- groups of stakeholders. While a generic recipe for the resolution of strategic issues cannot be given, it is worth mentioning that a multi-attribute analysis is a possible mechanism offering some measure of objectivity. Installation of a quantitative decision aiding system allows implementing the complex process of decision-making in a way transparent to all stakeholders.

Reference [192] offers one example of such methodology as applied to a decommissioning issue. In the decision phase of the Fernald decision methodology, values were assigned to each of these factors to provide a means for comparative ranking of the disposition alternatives. This ranking allows for construction of a decision summary matrix that may be used as a tool for selecting among competitive alternatives that passed the screening or threshold phase of the analysis. As a general methodology, however, some problems in using multi-attribute methods are the following:

— One may confuse management by requiring them to get used to a whole new frame of reference regarding the economic decision which they have already considered.
— The entire decision process becomes more complex.
— One needs to develop expert solicitation of the values of all variables and of the importance functions. This can be a complex and highly subjective process, open to intentional or unintentional abuse, which could detract from the value of the analysis.

It is possible that the multi-attribute analysis method is secondary to a priori decisions made by the licensee, but the relevance to any given decision ultimately depends on who the owners and final decision makers are. If the decision makers are ultimately politicians and the owners are the public, then the method may be of much greater importance. Politicians generally get more support if they are seen to be taking more than economics into account.

It should be noted that some difficulties with the multi-attribute analysis are not uncommon. Much of the traditional ‘cost-benefit’ assessment is based on balancing monetary and non-monetary factors:

— How much to spend in $ to avoid X man-Sv radiation exposure to plant workers?
— How much dose by plant workers has to be taken to implement a safety upgrade intended to slightly reduce the risk of an accident which might involve a dose uptake by the public?

Other industries face the same issues:

— How much does an airline have to spend on maintenance?
— How do you decide when it is time to reconstruct a road as traffic density increases?
— How much public transportation should be subsidized to avoid the impacts of the alternatives?

There are straight economic arguments to make for all of the above, and the level of relevance of any other factors than economy depends on the audience (the owner/manager, or other impacted parties).

In order to accommodate the areas of stakeholder concern identified in Section 4, the methods should also be able to handle soft issues such as, for example, visual amenity, conservation of species, standard of living in local communities and air quality.

A powerful tool that may be used is the multi criteria decision analysis, which is both an approach and a set of techniques, with the goal to provide an overall ordering of options, considering monetary and non-monetary objectives. This approach breaks the problem into more manageable pieces. Objectives and criteria have to be identified, scored and weighted. The results have to be examined and the decision can then be taken after having performed a sensitivity analysis [193].

8. CONCLUSIONS

Decisions regarding site decommissioning and reuse should be made with considerable attention to stakeholders. This ensures that as decommissioning, reuse, planning and implementation proceed, stakeholder needs and concerns are properly addressed which improves the probability of success.

Managing expectations is essential from the onset of stakeholder engagement. It is important to clearly identify the objectives so that stakeholders can understand the extent of their involvement and responsibility.

The local community, which includes elected officials, interested citizens, workers, business interests, and environmentalists, will have a range of opinions regarding the closure of a nuclear facility, its decommissioning and its redevelopment. However, the range of (potential and actual) stakeholders extends far beyond the local communities. Good relationships, open communications with regulators, government officials, and others can speed approvals and increase their supportive participation in rezoning, site planning and other decommissioning issues.

Both legal and moral imperatives encourage any decommissioning facility to begin stakeholder interactions as early as possible. And, when conducted well, the process normally yields indisputable benefits. Both completed and ongoing projects have demonstrated that a properly tailored process that promptly involves all stakeholders, is thorough in its communication, and includes meaningful interaction, should result in better long-term decisions and prevent unnecessary delays.

The objective of this report is to share experience in seeking and promulgating technically/economically optimal solutions of a decommissioning process that are, at the same time, acceptable to the stakeholders. The applied international practices, bringing both positive and negative results, may provide guidance to interested countries on how to outline and implement or improve their national approaches when integrating non-technical aspects with technical ones. Other benefits are seen in becoming acquainted with experiences regarding the involvement of the public and debates over sociological, environmental and economic impacts of decommissioning on society. The report recognizes that decision-making mechanisms may vary considerably by country, depending on culture, history and governmental philosophy. Even taking into account such differences, it is nonetheless desirable that all countries create instruments that enhance stakeholder involvement. The active involvement of stakeholders in nuclear issues can provide a substantial improvement in safety and can enhance the general acceptability of the ultimate decisions made [7].

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Appendix I

APPROACHES TO STAKEHOLDER IDENTIFICATION

The examples provided in this appendix are connected with the identification and classification of stakeholders. The examples given are not necessarily best practices; rather they reflect different approaches based on national nuclear programmes and traditions.

I–1. APPROACH OF THE ENVIRONMENT COUNCIL IN THE UK [I.1].

I–1.1. Identifying stakeholders – A checklist of questions

When setting out to identify who your stakeholders are, bear in mind the following list of questions. It can be most effective to run through this list with a colleague or indeed your project team. The answers will not be definitive but are effective prompts to thinking about who might be engaged.

— Who is directly responsible for decisions on the issue?
— Who is influential in the area, or hosting community?
— Who will be affected by any decisions on the issue?
— Who holds positions of responsibility in stakeholding organizations?
— Who can promote a decision providing they are involved?
— Who can obstruct a decision if they are not involved?
— Who has been involved in the issue in the past? (use existing lists as a reference)
— Who has not had a voice in the issue before, but should have?

This of course is not an exhaustive list but provides a clear place to start.

Key message: Continually review your stakeholder lists *with* your stakeholders. Ask *them* who is missing right from the start, at every meeting and in occasional letters that you send to them.

I–1.2. Defining stakeholders – Two models for consideration

There are (at least) two useful models to bear in mind when considering the question of who your stakeholders are. The first illustrates the importance of recognizing different types of stakeholder, and the second the significance of engaging each group in appropriate and often different ways.

I–1.2.1. Zones of influence

Key Message: Recognize the different types of stakeholder that may exist for your situation, and be clear about which type you need to engage, and why.

I–1.2.2. Breadth versus depth of engagement

Key Message: There is always a tension between the depth and breadth of engagements of stakeholders: you can't do both to an unlimited degree due to inevitable resource limitations. The tension is best managed by engaging the different types of stakeholder in different ways.

I–1.2.3. Mapping stakeholders by influence and impact

This simple analysis can be helpful when there is a need to think through how different types of stakeholders might be engaged in a process of decision making. It organizes different stakeholders according to

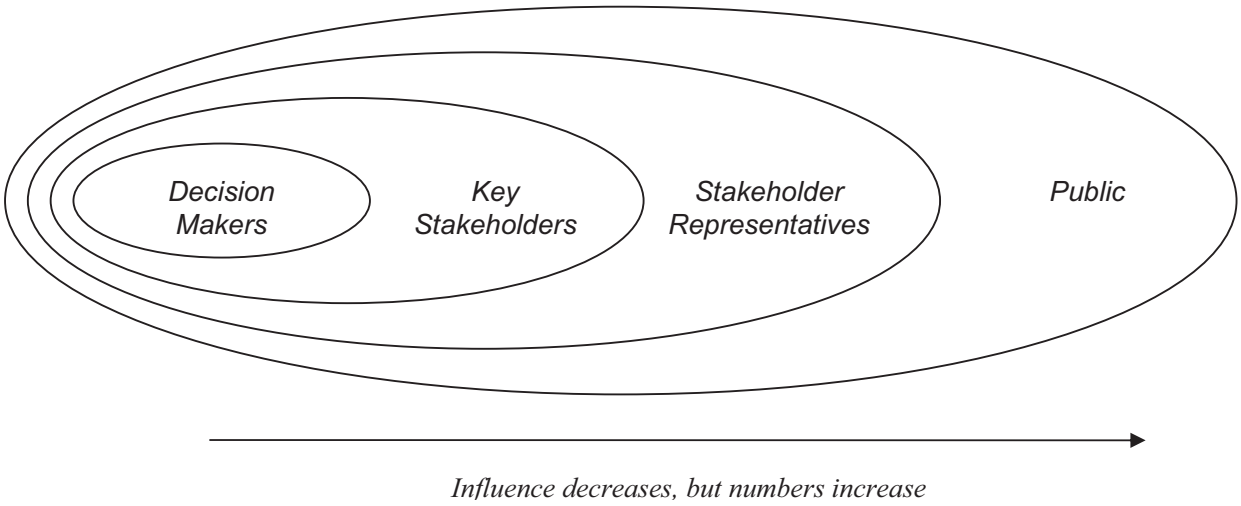

FIG. I.1. The concept of "zones of influence" amongst stakeholders.

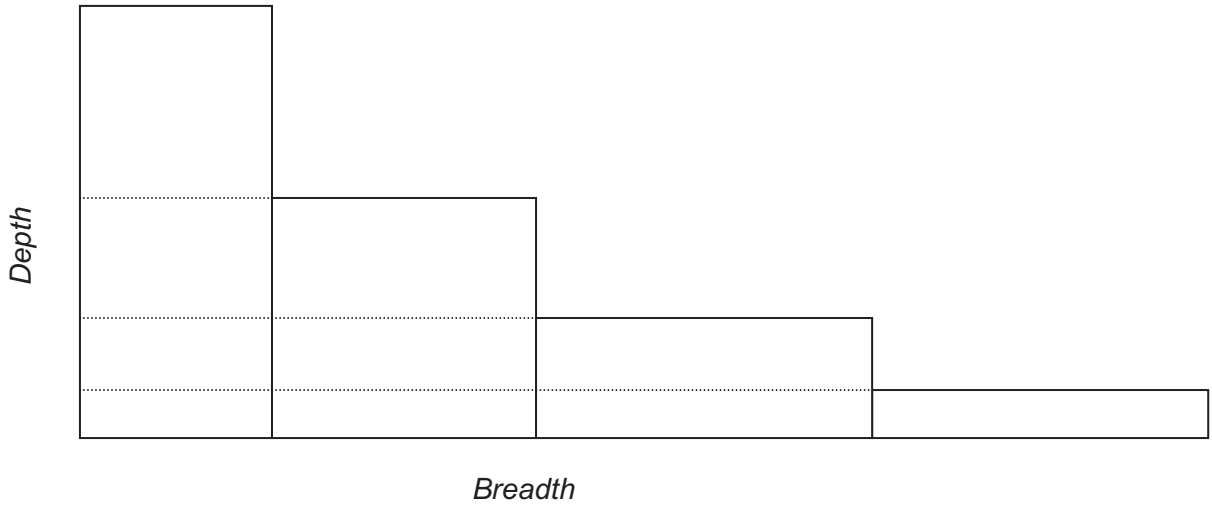

FIG. I.2. The concept of breadth versus depth of engagement amongst stakeholders.

(i) their likely influence over the decisions to be made and (ii) the likely impact of the decisions upon them. It is particularly useful when an integrated process is needed (i.e. many approaches or methods).

Key message: the aim is to inform the design of your engagement process, which requires be done before choosing approaches and methods.

The analysis can be carried out by groups (usually process planning groups) using pieces of paper on a tabletop or on the wall with post-its, with the matrix written up on a flip chart. A number of stages are useful:

(1) Identify stakeholders and write them on a post-it (one per post-it)
(2) Organize and agree placement of post-its on the matrix
(3) Consider the relationships (responsibilities, rights, levels of conflict etc) within and between stakeholders in each area of the matrix. (e.g. there is generally a responsibility for those in the top right to take particular account of those in the bottom right).
(4) Consider potential strategies (approaches – methods) for engaging the different stakeholders in each area.

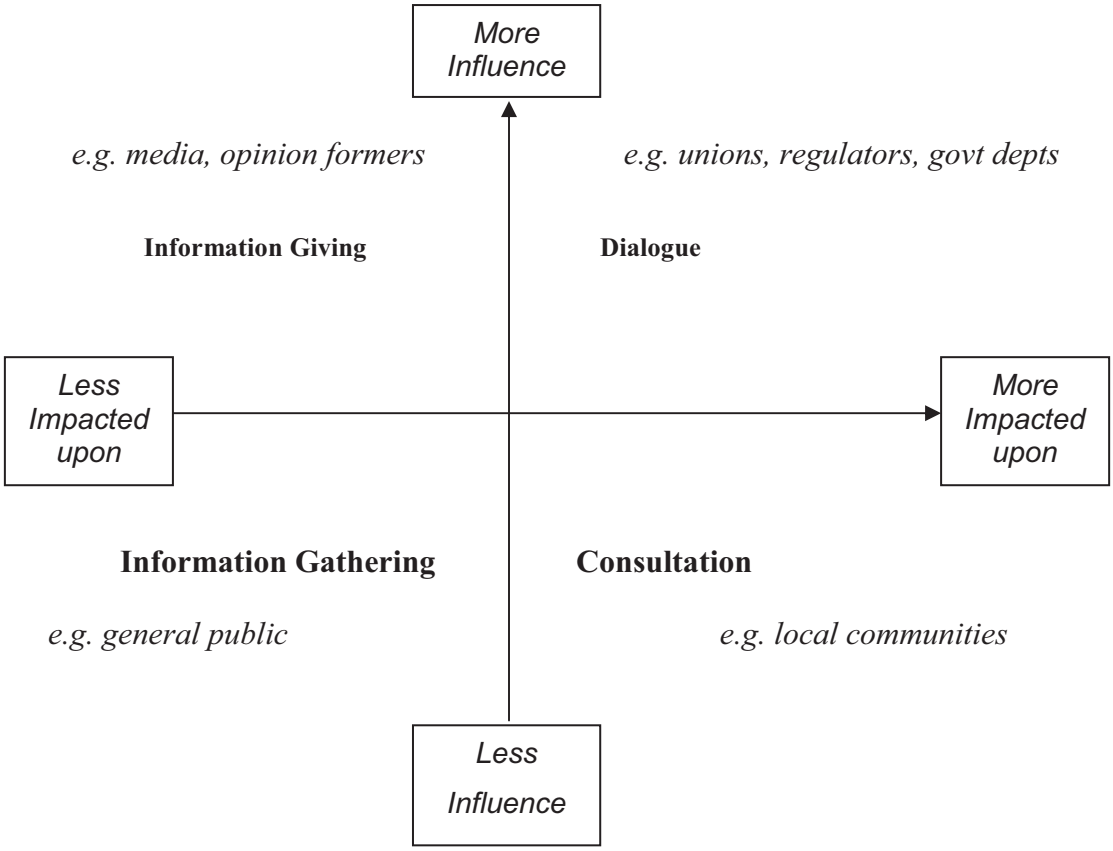

FIG. I.3. Influence versus impact amongst stakeholders.

The lines of the matrix should not be taken as hard and fast boundaries — they are for guidance only.

I–2. APPROACH TO THE STAKEHOLDER CATEGORIZATION BASED ON US DOE PROGRAMMES [I.2]

I–2.1. Personally impacted stakeholders

These peoples' lives are directly impacted by the proposed action in terms of health, income, property value, or any other major aspect of life. Due to the nature of this category, impacts must be well defined, both scientifically and from a practical perspective. The following sub-categories can be defined:

(1) *Human health impact:* People at risk for potential human health impacts from any decommissioning action are a critical subset of stakeholders. The risks to these individuals or a combined nearby population must be calculated. This impact is normally addressed through safety assessment and regulatory review, as described in a number of IAEA documents, e.g. Ref. [I.3]. It will not be further discussed in this report.
(2) *Employment impact:* A person whose job would be impacted by the proposed decommissioning project is also considered a personally impacted stakeholder, provided the job gain or loss is at the targeted facility or the proposed project can be reasonably assumed to cause the loss or gain. Examples include workers performing decontamination and/or its related work, such as waste packaging, transportation, and disposal.
(3) *Financial impact:* If the value of personal property could be financially affected, that individual would be personally impacted, as would someone whose business could be impacted by the proposed

decommissioning. None are considered personally impacted if the project could impact the market price of a facility owner's corporate stock.

(4) *Others:* Although not always necessary, some circumstances may warrant the creation of another group of directly impacted stakeholders. People impacted by foul smell, excessive noise, or similar environmental insults are also considered personally impacted.

I–2.2. Administratively impacted stakeholders

These are the elected, appointed, or employed people who must ensure that the proposed decommissioning is defined, reviewed, approved, and implemented in accordance with applicable laws, regulations, permits, licenses, or agreements. The participation is more straightforward than for the personally impacted stakeholders. This category includes the following groups:

- Elected officials whose constituency represents, or is likely to speak on behalf of, a major portion of the personally impacted stakeholders
- Elected officials whose constituency includes a small portion of the personally impacted stakeholders, such as representing individuals from a potentially impacted area (mayors, relevant state representatives, and members of the House and Senate)
- Individuals or groups responsible for preparing/implementing permits and licenses
- Members of regulatory agencies at the local, state, and federal level who are responsible for regulations, permits, licenses, and enforcement.

In many cases, one or more regulatory groups have the authority to terminate a facility license upon satisfactory decontamination. Overlapping regulatory oversight can occur between various state and federal agencies. Because of the significant impact of regulatory agencies on decommissioning decisions, it is important to include this group of stakeholders in the process.

I–2.3. Generally concerned stakeholders

These people, by virtue of their personal philosophies, beliefs, or ideologies are interested in or concerned about a proposed decommissioning. Obviously, personally impacted and administratively impacted stakeholders are also generally concerned.

This group is most often represented by a specific entity, such as a public interest group with a well-defined purpose.

I–2.4. Process concerned stakeholders

A fraction of the public is concerned over the process used to manage and complete the proposed action. Distinct groups within this category include those who:

- Consider the direct stakeholders' participation in the decision process important to improve the quality of the decision and for the stakeholder acceptance of the final decision
- Are concerned over potential undue influence that stakeholders may exert during decision-making and want to ensure influence commensurate with their vested interest in the outcome
- Work at similar facilities that could be impacted by decisions made by regulators
- Expect decision-making to be based on sound scientific principles and the best available data. Professional scientific and engineering organizations constitute an important core of this group.

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Appendix II

DECISION MAKING METHODOLOGIES

Two decision making methodologies making methodologies that have been used successfully by The Environment Council in the UK are (i) 'Joint Fact Finding'; to overcome the lack of trust in scientific data provided; and (ii) Strategic Action Planning; to deal with high levels of uncertainty in the decision making process.

II–1. JOINT FACT-FINDING

II–1.1. The difficulty of creating scientific consensus

The history of science is littered with debate and controversy. A genuine scientific consensus may be very slow in appearing — as the issue of climate change bears out. It needs the input of many practitioners in a field and may not be built in timescales needed by decision makers and society to address the issue.

The problem is that few people recognize that even the simplest fact — or science — is based on assumptions. If people dislike what a particular study says, they may commission their own using different assumptions. This of course leads to conflicts in evidence and even the contracting out of the dispute to teams of experts in opposing camps, thus heightening the adversarial nature of the debate and polarization. So rather than trying to develop a scientific consensus — a consensus amongst scientists — The Environment Council believes it is preferable to build a consensus amongst key stakeholders on the direction, assumptions and methods of scientific research.

II–1.2. How science is built into policy

> The latest draft of 'Guidelines 2000 — Scientific Advice and Policy Making' [II-1], states (para. 12): "Departments should draw on a sufficiently wide range of the best expert sources, both within and outside Government. These might include not only eminent individuals, learned societies, advisory committees, or consultants, but also professional bodies, public sector research establishments, lay members of advisory groups, consumer groups and other stakeholder bodies."

The draft Guidelines also state (para. 17) that 'Where issues are sensitive, departments should take the utmost care that the questions are framed to cover the concerns of all relevant stakeholder groups'.

Stakeholders are the people or organizations who have a stake in a situation or a decision. Many stakeholders are sophisticated and able to access a variety of information sources, and even to commission their own research. Excluding them from the process of commissioning scientific advice can often only fuel controversy at a later stage. A large amount of money, both public and private, is spent on scientific research and attention must be paid to spending it effectively.

II–1.3. Joint fact-finding

Science can be a useful tool in controversial public issues only if the key stakeholders have the opportunity to discuss the direction, assumptions and methods of scientific research. Tried and tested dialogue management techniques can be used to establish a consensus on the way to undertake scientific research. Joint fact-finding helps stakeholders effectively agree or at least define the assumptions behind future studies. The parties might even agree who does studies or reviews of research and even who funds the work. This means any discussion of the results is focussed on the substantive issues rather than criticisms of methodology and probity.

If stakeholders are not involved, the outcomes of the research will be questioned on many fronts. Were the concerns for the stakeholders addressed? Did the stakeholders buy into the methodology, so that they agree to use the research as a basis for discussion, even if the outcomes are not what they would like to see? Apparent contradictions in scientific evidence will create a great deal of uncertainty both amongst decision-makers and wider society, but in many instances it is avoidable.

Traditional approaches to risk assessment make it difficult to incorporate ethical or value-laden points of view into their analyses. Where ethical considerations are likely to be taken into account in a policy decision, these should be brought into discussions on the formulation of scientific advice. This can help inform scientists of the wider considerations of society, and will also lessen any conflict between science and ethics in the future.

The impartiality of evidence is sometimes called into question. Stakeholder engagement at an early stage would be able to address this issue. Any stakeholder who might be likely to question the impartiality of the scientists, or the validity of their methodology, would be able to raise those concerns before scientific research was carried out. This approach means that instead of avoiding or documenting potential conflicts of interest, it is possible to gain positive approval on the way forward. Joint fact-finding also provides an important foundation for agreeing contingency plans in case key assumptions turn out to be wrong (e.g. as a result of research by scientists outside the process turning up new information which should be taken into account).

The presentation of uncertain or conflicting conclusions to scientific study is extremely difficult. The Environment Council's experience shows that these difficulties should be addressed before, rather than after, the evidence is gathered. The uncertainties and differing conclusions are not the result of failings within the scientific community or policy makers, but are inherent in the nature of such complex questions. Joint fact-finding will help address those uncertainties that are of greatest importance to stakeholders, and reduce the likelihood of stakeholders gathering conflicting evidence. Stakeholders would communicate with their own constituencies and allow for greater acceptance of results. Potential presentational difficulties could be raised at an early stage and stakeholders themselves asked to address them. This approach will also give stakeholders a far better understanding of the process of scientific advice so that when results are put forward, most presentational difficulties will already have been addressed.

II–1.4. Conclusions

Joint fact-finding means a managed dialogue process to give key stakeholders the opportunity to discuss the direction, assumptions and methods of scientific research. This approach will build out of the policy-making process future questioning and rejection of scientific evidence, and the likelihood of stakeholders compiling their own, contradictory evidence. By recognizing the policy pressures around an issue at this stage, scientific advice can be made to be a much more effective policy tool.

The fear of such an approach may be that it will lead to unnecessary conflict and argument. Our experience in a wide number of cases is that such conflict, if it is not addressed at such an early stage, inevitably emerges later on in the decision making process and is much more difficult to resolve.

II–1.5. Recent examples of joint fact-finding

BNFL National Stakeholder Dialogue

A socioeconomic study of the role of BNFL in the West Cumbrian economy and the implications of different future strategies for the area [II-2].

Jointly agreed sampling and monitoring (JASM)

Investigations into whether there is any detectable radiological residue at key sites/routes used by trains carrying spent nuclear fuel [II-3].

II–2. STRATEGIC ACTION PLANNING (SAP)

This section tries to explain the difference between a conventional strategy and one developed using SAP. One example of the latter is given in Ref. [II-4].

A conventional strategy has one, agreed, best future and an action plan setting out the steps needed to achieve the future.

This may sound simple, but it is often very difficult to agree on the one best future, especially where there are many uncertainties and many stakeholders. It can be so difficult that the search for agreement has to be abandoned, and the way forward is chosen by individuals who are in a position of power of some sort.

A Strategy Developed with SAP has a number of acceptable or possible futures combined with a Strategic Action Plan. This Strategic Action Plan shows what you would have to do to be able to reach these possible futures.

During the process of selecting acceptable or possible futures there will some futures that are agreed as not acceptable or less desirable and these can be excluded.

This approach means that the search for just one most desirable long term future, on which everyone has to agree, can be put aside. In its place will be a strategy in which there are a range of possible futures, all or any of which are acceptable.

SAP is a tool to expose and creatively manage the uncertainties inherent in any scenario. It is crucial to acknowledge uncertainties and agree what to do about them instead of suppressing or ignoring them. A scenario is a sequence of activities leading to a particular long-term future.

SAP is not a tool to choose between scenarios, or a tool that will produce "an answer".

Outcomes from a SAP process are likely to be:

— Knowledge about what short-term actions/decisions are needed to keep a range of futures open/possible;
— Recognition of dates or timeframes by which if actions/decisions have not been taken some of the acceptable futures are no longer possible;
— A set of agreed explorations that are needed to reduce the most significant uncertainties;
— A set of contingency plans that are sensible in case any of the assumptions made in a scenario turn out to be wrong;
— And a great deal of learning and shared understanding amongst the participants doing the work.

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Annex I

The examples provided in this annex range from national policies and programmes to the detailed organization of decommissioning in both large and small facilities. Both approaches are useful to provide practical guidance on how stakeholder interactions in decommissioning projects are planned and managed in various States. The examples given are not necessarily best practices. Rather, they reflect a wide variety of national legislation and policies, social and economic conditions, nuclear programmes and traditions. Although the information presented is not intended to be exhaustive, the reader is encouraged to evaluate the applicability of these annexes to a specific decommissioning project. These national annexes reflect the experience and views of their contributors and, although generally consistent with the main text, are not intended as specific guidance. These annexes have only been edited to the extent considered necessary for the reader's assistance.

Annex I.A

STAKEHOLDER INVOLVEMENT IN DECOMMISSIONING IN BULGARIA

I.A–1. INTRODUCTION

The commercial use of the nuclear energy in Bulgaria started in the late 1960s, when a decision was taken with the agreement of the former USSR for the construction of a nuclear power plant near the village of Kozloduy which was later declared a town. It is located in the north-east part of Bulgaria on the Danube river bank.

Kozloduy NPP was constructed in three stages. The first stage was the construction and commissioning in 1974 and 1975 of Units 1 and 2. They are WWER-440 type V-230 standard design.

The second stage was the construction and commissioning of Units 3 and 4 in 1980 and 1982 respectively. These were also WWER-440 but of advanced V-230 design. Advanced means that Units 3 and 4 were equipped with three tray safety systems, low pressure emergency core cooling system, emergency control room and other features later implemented in V-213 standard design.

The third stage was the construction and commissioning of Units 5 and 6 in 1987 and 1991 respectively. They are next generation Russian WWER-1000 reactors.

In the period when all six units were in operation the Kozloduy NPP produced around 45% of the electricity in the country.

Kozloduy NPP is a state owned shareholding company with the state as a single share holder.

The preparation for decommissioning of units WWER-440 at Kozloduy NPP started after signing an agreement between the European Commission and Bulgaria in November 1999 in the framework of the EU accession process for Bulgaria. In the agreement Bulgaria committed to shut down for decommissioning the Units with WWER-440 reactors before the end of the administrative life time, which is 30 years. Following the agreement Units 1 and 2 were finally shut down on 31 December 2002. Units 3 and 4 were shut down on 31 December 2006 as a result of the commitment of Bulgaria reflected in the Accession Treaty for Bulgaria and Romania.

As a result of the negotiations for Bulgarian accession to EU, a so-called Kozloduy International Decommissioning Support Fund (KIDSF) was established, similarly to Bohunice NPP in Slovakia and Ignalina NPP in Lithuania. The Fund is administered by EBRD.

The major stakeholders in Bulgaria can be identified as follows:

- The State;
- The Ministry of Economic and Energy;
- Other ministries;
- The plant as operator and license holder;
- Bulgarian Nuclear Regulatory Agency and other regulatory authorities;
- The general public;
- The local authorities and public;
- Non-governmental organizations;
- Local and international contractors;
- International organizations (IAEA, OECD/NEA, etc.);
- Neighbouring countries.

I.A–2. THE STATE, THE MINISTRY OF ECONOMICS AND ENERGY AND OTHER MINISTRIES

As was mentioned above, the Kozloduy NPP is a State owned shareholding company. Until 2000, Kozloduy NPP was a branch of the National Electric Company (NEC), an entity responsible for the generation, transmittal and distribution of the electricity. In 2000, Kozloduy NPP was separated from NEC and constituted as an independent company with the name “Kozloduy NPP Plc” and it is 100% State owned. The State is acting

as the owner through the Ministry of Economic and Energy, correspondingly the Minister of Economic and Energy.

According to the "Safe Use of Nuclear Energy" Act [I.A–1] the decommissioning activities in Bulgaria are financed from the national fund "Decommissioning of Nuclear Facilities". The fund, established in 1995, is currently about 900 million Bulgarian Lev ($450 million). The fund is managed by a "Managerial Board" and the Minister of Economics and Energy is Chairman of the Board. Members of the Fund Management Board also include the Deputy Minister of Finance, the Deputy Minister of Health, the Deputy Minister of Economy, the Deputy Minister of Environment and Water, the Deputy Minister of Regional Development and Public Works, the NRA Chairman and representatives of the licensees operating nuclear power plants.

Every year a contract is signed between the Board of the Fund and Kozloduy NPP for the approved expenses from the fund and a corresponding report is submitted at the end of the year.

I.A–3. THE KOZLODUY NPP

Currently the shut down Units 1–4 have been issued licenses for the operation in the mode of storing and cooling the spent nuclear fuel (SNF) in SNF pools without production of heat and electricity. They will stay in this mode until the decommissioning permits are issued by BNRA. The permits are expected to be issued in 2010 for Units 1 and 2 and in 2012 for Units 3 and 4. In 2006, the licenses were modified, including a permit for dismantling of "III category" equipment. "III category" equipment is not necessary for operation and safety.

I.A–3.1 Management of decommissioning

After the signature of the above mentioned agreement between the European Commission and the Bulgarian Government, Kozloduy NPP established a dedicated organizational unit called the "Decommissioning Division" in 2000. The basic task of the Decommissioning Division at this period was planning, co-ordination and management of the activities directed to the decommissioning. The Division reports directly to the Executive Director of the plant and is staffed with 20 highly-qualified people. Some of them work in Kozloduy PMU that is organized to manage the funds from KIDSF.

The initial decommissioning strategy was outlined in the completed "Technical design for decommissioning of Kozloduy NPP units 1 and 2" in 2001. The document has been developed under the EC PHARE program by a consortium of Belgatom/EWN-Germany. The proposed strategy was deferred dismantling after 35 years of Safe Enclosure of the radioactive objects.

This strategy was re-assessed and updated in 2006. The modified strategy is called "Continuous dismantling" and differs from the previous strategy by two main components:

— Reduced scope and duration of the Safe enclosure stage;
— Immediate start of the dismantling of the equipment outside the safe enclosure area.

I.A–3.2 Involvement of the staff of the operator

In 2007, a grant agreement was signed between EBRD and Kozloduy NPP for providing funds from KIDSF to finance decommissioning activities carried out by the Kozloduy NPP personnel. This allows much broader involvement of the plant staff in the decommissioning activities. Currently more than 700 people are involved in different activities including radiological characterization, removal of hazardous and flammable materials, preparation of temporary storage places for the dismantled equipment, overall and specific planning of the dismantling works, etc.

I.A–3.3 Administrative arrangements

No administrative changes are foreseen in the near future, at least before issue of decommissioning permits by BNRA. Nevertheless, several options have been investigated during the process of decommissioning strategy update:

— Establishment of Kozloduy NPP subsidiary company for decommissioning;
— Establishment of small group for project management on the basis of the existing Decommissioning Division and contracting the decommissioning activities; and
— Inclusion of the units to be decommissioned in the existing State Enterprise “Radioactive waste”.

The specific option chosen will depend on the results of the corresponding study that is to be performed.

I.A–4. BULGARIAN NUCLEAR REGULATORY AGENCY AND OTHER REGULATORY AUTHORITIES

I.A–4.1 Nuclear Regulatory Agency

According to the Safe Use of Nuclear Energy Act the State regulation of the safe use of nuclear energy and ionizing radiation, the safety of radioactive waste management and the safety of spent fuel management is implemented by the Chairman of the Nuclear Regulatory Agency (NRA), hereinafter referred to as "the Agency". The Chairman is an independent specialized authority of the executive power and is vested with competencies.

As is stated in the Act [I.A–1], the NRA Chairman shall among other functions:

— Manage and represent the Agency;
— Issue, amend, modify, renew, suspend and revoke licenses and permits for the safe conduct of the activities under the Act;
— Supervise the fulfillment of safety requirements and standards related to the safe use of nuclear energy and ionizing radiation, radioactive waste management and spent fuel management, including the conditions of licenses and permits issued;
— Issue and withdraw individual licenses for employment at nuclear facilities or with sources of ionizing radiation;
— Carry out international cooperation on behalf of the Republic of Bulgaria in the fields of safe use of nuclear energy and ionizing radiation, and safety of radioactive waste management and spent fuel management;
— Organize and coordinate the drafting process and submit to the Council of Ministers implementing national obligations under the Convention on Nuclear Safety and the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management;
— Develop and submit regulations for the application of the Act to the Council of Ministers for adoption;

In the Nuclear Act, specific lower level documents for regulating different aspects of the use of nuclear energy are specified. Two, mostly related to decommissioning, are:

— Regulation on Safety during Decommissioning of Nuclear Facilities [I.A–2]
— Regulation on the Procedure for Issuing Licenses and Permits for Safe Use of Nuclear Energy [I.A–3]

Specific to decommissioning, the NRA issues decommissioning permits for each stage and permits for the individual activities that may affect the nuclear and radiation safety. NRA performs monitoring of the decommissioning process via regular reporting by the decommissioning organization as well as topical inspections on site, usually on annual basis.

I.A–4.2 Other regulatory authorities

The **Ministry of Health** supervises radiation protection at all stages of the NPP life cycle through its “National Center for Radiobiology and Radiation Protection”.

The **Ministry of Environment and Waters** approves Environment Impact Assessment (EIA) Reports, including for decommissioning and monitors the implementation of the specific measures and conditions.

The **Ministry of Regional Development and Public Work** approves design of every investment project with civil works involved and organizes the State acceptance after the completion of the project.

The **Ministry of Internal Affairs,** through the "National Fire Protection Service", monitors the fire safety on site and provides fire extinguishing by the fire brigade on site.

I.A–5. GENERAL PUBLIC

The general public is not directly involved in the decommissioning. However, it is expected that the overall cost of electrical energy in the country will increase due to the shutdown of the four units which produced electricity at very low costs. The shut down units generated approximately 18% of the total country's production. The price increase will directly affect the entire population of the country.

I.A–6. LOCAL AUTHORITIES AND PUBLIC

The development of the Kozloduy region and the town itself is strongly dependent on the Nuclear Power Plant. Activities over the entire plant life, including decommissioning, provides a large number of jobs not only at the plant but also in supporting companies that are located in Kozloduy. The majority of the plant staff lives in Kozloduy and the surrounding villages. This creates new possibilities for the town's infrastructure, development and involvement of a bigger number of local society in the local services. The decommissioning process, which will last more than 25 years, will maintain these possibilities for the foreseeable future.

The plant policy is to keep the local society informed about all major activities that are to be performed, including decommissioning. The preparation of the decommissioning requires implementation of a number of investment projects to complement decommissioning infrastructure. For each significant investment project an announcement is prepared, containing a description of the project and major milestones. The announcement is made publicly available and advertised in the local media. The Environmental Impact Assessment reports are subject to public discussion in the municipality and everybody is invited to participate.

I.A–7. NON-GOVERNMENTAL ORGANIZATIONS

Non-governmental organizations such as Environmental protection organizations are always invited to participate in the public discussions of EIA reports at local and national level.

The Kozloduy NPP management periodically organizes "open doors" days, when each Bulgarian citizen can visit the plant, including units under decommissioning, with proper identification. The frequency of organizing "open doors" days is typically every 2-3 months.

I.A–8. LOCAL AND INTERNATIONAL CONTRACTORS

After establishing KIDSF, a consultancy agreement was signed between Kozloduy NPP and the Consortium of BNFL (UK) and EDF (France) with the local company ENPRO Consult as subcontractor for operation of Project Management Unit (PMU) for the management of projects funded from KIDSF. The PMU has been in operation since February 2003. In 2007 EDF decided to leave the Consortium and currently the PMU is staffed with personnel from British Nuclear Group Project Services, subsidiary of BNFL, together with the personnel from ENPRO Consult and Kozloduy NPP. In the scope of the PMU are 16 specific projects, some of these are completed, some are ongoing and some are at the planning and tendering phase. Also included is the development of the major decommissioning licensing documents – Decommissioning Plan, Decommissioning Safety Analysis Report, Quality Assurance Program, etc.

Leading companies from Germany, Spain, UK, Czech Republic, Austria and the Russian Federation are involved in the implementation of these projects. As a rule, for each project Bulgarian subcontractors are also

involved. One of the projects, split into two sub-projects, have been entirely implemented by two Bulgarian companies, located in Kozloduy.

Different Bulgarian engineering companies are contracted for the preparation of specific studies related to the decommissioning, e.g. study on the free release criteria and methodology.

Open tendering process, according to the EBRD Procurement Policies and Rules and Bulgarian Public Procurement Act, is applied as a rule and only with a few exceptions, for example when it is required that a company be licensed for a certain activity, the single tender process is used. This was the case when the physical separation of units to be decommissioned from units in operation required the contractor to be licensed to work on the plant security system.

The BNRA have been supported by the organization RISKAUDIT under the EC PHARE Program in the licensing of decommissioning and a number of Bulgarian engineering companies has been involved as subcontractors as well. EBRD will provide funds from KIDSF for the continuation of this support for several years.

I.A–9. INTERNATIONAL ORGANIZATIONS

The co-operation of Kozloduy NPP with the IAEA on the decommissioning is organized in two major ways.

First, specialists from Kozloduy NPP take an active interest in the IAEA activities on the decommissioning. They have participated and continue to participate in several major IAEA projects like TEGDE and a number of regional projects on different aspects of decommissioning. Kozloduy NPP uses IAEA publications on the decommissioning as guidance for the decommissioning preparation and planning.

Second, through its technical cooperation programme, IAEA supported the realization of a very important project for the decommissioning of Kozloduy NPP units. In the period 2002–2004, a specialized computerized system for planning and management of the decommissioning (so called "DeManS" system) was developed and supplied with financial support of IAEA.

Concerning other international organizations, the representatives of the plant took part in an organized event by the European Union subgroup to the Atomic Questions Group on decommissioning planning and financing. The subgroup activities were held in the period 2005–06.

As Bulgaria has been a member of the European Union since 1 January 2007, it is expected that the relationships with OECD/NEA will be developed in the near future.

I.A–10. NEIGHBOURING COUNTRIES

NRA is the national authority that performs the functions of a competent authority, a contact point for notification of an accident and for provision of assistance according to the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency.

As the Kozloduy NPP is located close to the Danube river, which borders between Bulgaria and Romania, special attention is paid to the relations of both countries. In particular for the EIA report for the new NPP site "Belene" a public discussion was held in the nearby Romanian town of Turnu Magurele. When the EIA report for Kozloduy NPP units decommissioning is prepared, a similar approach may be used.

I.A–11. CONCLUSIONS AND LESSONS LEARNED

The main lesson learned from the Bulgaria's situation is connected with the financial assurance of the decommissioning. The national decommissioning fund has been established formally in 1995 but effective functioning started only in 2000 after signing an agreement between EC and Bulgaria. This forced the Government to increase the rate of payments to the fund by Kozloduy NPP by up to 15% of the income from the sold electricity.

REFERENCES TO ANNEX I.A

[I.A–1] Act on the Safe Use of Nuclear Energy, Promulgated in the State Gazette No. 63 from June 28, 2002, www.bnsa.bas.bg.

[I.A–2] Regulation on Safety during Decommissioning of Nuclear Facilities, promulgated in the State Gazette No. 73 from 20.08.2004, www.bnsa.bas.bg.

[I.A–3] Regulation on the Procedure for Issuing Licenses and Permits for Safe Use of Nuclear Energy, Promulgated in the State Gazette No. 41/18.05.2004, amended SG No 78/30.09.2005, www.bnsa.bas.bg.

Annex I.B

EXPERIENCE WITH STAKEHOLDER INVOLVEMENT IN THE DECOMMISSIONING OF THE NUCLEAR FACILITIES AT THE RISØ NATIONAL LABORATORY, DENMARK

I.B–1. INTRODUCTION

Risø National Laboratory (RNL) was established in the late 1950s as a Danish research centre for the introduction of nuclear fuelled electrical generation in Denmark. The Laboratory is located about 6 km north of the city of Roskilde (about 40 km west of Copenhagen) at the shore of Roskilde Fjord [I.B–1]. (Fig. I.B-1).

A total of three research reactors and a number of supporting laboratories were constructed. However, Denmark never did build any nuclear power plants, and in 1985 the Danish Parliament decided that nuclear power should no longer be an option in the framework of their national energy planning. Therefore, the facilities at RNL are the only nuclear facilities in Denmark. Subsequent to the Parliament's decision, the research at RNL related to nuclear power was significantly reduced and the utilization of the facilities concentrated on other applications.

Over the years some work had already been accomplished envisioning the need for decommissioning at some point in the future. In 1975, one of the research reactors had been taken out of service for economical reasons and the activities moved to the 10 MW DR 3 materials test reactor. Furthermore, in 1989 the hot cell facility was closed, and over the next four years it was partly decommissioned.

I.B–2. BACKGROUND FOR DECOMMISSIONING PLANNING

In 2000, as a part of RNL's strategic planning, it was realized that the largest of the research reactors, DR 3, was quickly approaching the end of its useful life. Since most of the other nuclear activities at RNL depended on DR 3 being operational, it was decided to decommission all nuclear facilities on the site once that reactor was

FIG. I.B-1. Aerial photograph of Risø National Laboratory. Reactor DR 2 can be seen in the foreground. DR 3 is situated at the left hand side of the peninsula. DR 1 is hidden to the far right in the picture.

finally closed. Therefore, a project was initiated in the spring of 2000 with the goal of assessing the technical and economical aspects of the decommissioning of the RNL nuclear facilities. The scope of this study included the entire process — from termination of operation to the establishment of a 'green field' — assessing the required manpower and economical resources, estimating amounts of radioactive waste that would be generated and other such details for this work. The planning and cost assessment for a final repository for radioactive waste was specifically not included as a part of the project scope. Such a repository is considered a national question, because it will have to accommodate waste from other applications of radioactive isotopes, e.g. medical or industrial uses among others.

In September 2000, Risø's Board of Governors decided that DR 3 should not be restarted after an extended shut-down caused by the suspicion of a leak in the primary system of the reactor. Extensive inspection of the reactor tank and primary system during the shut-down showed that there was not any leak, but at the same time, some corrosion was noted in the aluminium tank. According to the inspection consultant, the corrosion called for a more frequent inspection of the tank. Therefore, Risø's management judged that the costs of bringing the reactor back in operation and its continued operation outweighed the benefits from continued operation in the remaining few years of its expected lifetime.

The closure of DR 3, of course, accentuated the need for decommissioning planning and for the results of the above-mentioned project. By the end of February 2001 the project report [I.B–2] was completed and published. The study was followed by other studies in order to prepare a proposal for legislative action by the Parliament to provide funding for the decommissioning process. Among other aspects, the possible decommissioning strategies were evaluated and two overall strategies were considered: (1) an irreversible entombment where the nuclear facility is covered by concrete and thereby transformed into a final repository for low and medium level waste; and (2) decommissioning to green field where all buildings, equipment and materials that cannot be decontaminated below established clearance levels are removed. The entombment option was rejected rather quickly as not being acceptable, among others for ethical reasons ('each generation should take care of its own waste'). Instead, three different decommissioning scenarios were considered with 'green field' as the end point, but with different durations — 20 years, 35 years and 50 years, respectively.

After thorough preparations, including an Environmental Impact Assessment, the Danish Parliament in March 2003 gave its approval to funding the decommissioning of all nuclear facilities at RNL to a green field condition within the next 20 years. The decommissioning is to be carried out by a new organization, Danish Decommissioning (DD) [I.B–3], which is independent of Risø National Laboratory, thus avoiding any competition for funding between the decommissioning and the continued non-nuclear research activities at RNL.

Actual decommissioning work started in October 2004 with the smallest reactor, DR 1. This project was completed by the end of 2005 and is reported in [I.B–4]. Decommissioning of the next facility, reactor DR 2, started in the spring of 2006 and will be completed in 2008.

I.B-3. STAKEHOLDERS IDENTIFIED

The following stakeholders have been active or identified as relevant for the decommissioning project:
Government and Parliament

— The Ministry for Science, Technology and Innovation;
— The Greater Copenhagen Authority (HUR);
— The county of Roskilde;
— The local municipality;
— Risø National Laboratory;
— Staff at Risø National Laboratory and other institutions at the site;
— The immediate neighborhood;
— Neighbouring countries and international organizations;
— Nuclear regulatory bodies;
— Other authorities;
— Interest groups;

— Media;
— Staff at the facilities during operation and final shutdown;
— Present (and future) staff;
— Families of staff members;
— Archives and museums;
— Contractors;
— Possible future contractors.

I.B–4. INTERESTS AND INTERACTION WITH STAKEHOLDERS

I.B–4.1. Government and Parliament

Because Risø National Laboratory is an institution owned by the Danish State, it will bear the cost of decommissioning of the nuclear facilities. Prior to the closure of the DR 3 reactor in 2000 there had not been much discussion about decommissioning, and no plans for funding had been set up. Therefore, when the issue arose and the cost was not negligible (estimated at ~1 billion DKK), the Parliament had to be involved in order to grant the funding. Apart from some criticism of the magnitude of the cost there was not as much opposition to the decommissioning as one might have expected and, as a matter of fact, the Parliament unanimously passed the necessary decision in 2003. The decision meant that Danish Decommissioning could have an annual base budget for operation and maintenance, and that specific budgets for each decommissioning project had to be granted by the Parliament's Finance Committee.

Individual members of Parliament may become stakeholders on their own if they identify issues which they are particularly interested in or critical to and bring these issues up in the Parliament. This was the case in 2004 when a staff member from Danish Decommissioning (DD) had gone to the press with criticism of the management and the decommissioning plans. Although the allegations were repudiated by DD and by the nuclear regulatory authorities, two members of Parliament required the minister to explain the matter in a so-called open consultation in a parliamentary committee. This led to much work for DD that had nothing to do with the decommissioning task itself, but consumed much time and created frustration among the staff that had been the subject of false allegations.

I.B–4.2. Ministry for Science, Technology and Innovation

Risø National Laboratory is an institution under this ministry and, therefore, the decommissioning of the nuclear facilities also became the responsibility for this ministry. This means that, for instance, annual budgets as well as applications to the Parliament's Finance Committee are passed via this ministry. In some situations the ministry takes on the role of a board of directors due to the closeness to the political world. This may restrict the 'freedom of movement' of the management of DD.

I.B–4.3. Greater Copenhagen Authority (HUR)

The environmental impact assessment (EIA), which according to EU legislation has to be produced for decommissioning projects, was formally carried out and approved by HUR (although Risø National Laboratory and Danish Decommissioning provided the input to the EIA). Apart from this, there has not been – and is not likely to be – any interaction with HUR.

I.B–4.4. County of Røskilde

The county regulates a number of issues concerning environmental and nature protection and preservation. However, so far DD has not had – or needed – any interaction with the county. Environmental issues relating to the decommissioning have been handled by the local municipality, mentioned below. From 2007 the Danish counties were abolished and their activities shared between (larger) regions and the local municipalities (most of which have also become larger than the previous ones).

I.B–4.5. Local municipality

The Risø site is situated in the municipality of Roskilde, which is the authority on environmental issues (except for radiological aspects), and is for instance overseeing the disposal of conventional waste. The interaction with Roskilde, so far, has been without problems and issues are handled professionally on a routine basis. In order to clarify potential questions concerning the release of cleared material from the decommissioning projects, a meeting was held at DD between representatives for the environmental office of Roskilde, the nuclear regulatory authorities, and DD before transportation of cleared material away from the site was initiated. The meeting clarified the rules concerning handling of conventional waste to DD and gave a common understanding between the meeting participants, as well as direct contact points to use in the future.

On a more general basis, information to the citizens of Roskilde and other neighbouring municipalities has been distributed via the local media, and 'open house' arrangements have been carried out. The decommissioning plans have not given rise to much debate in the general population, which has been accustomed to the presence of the nuclear facilities at Risø National Laboratory during almost 50 years without any problems.

As the transition from the operational phase to decommissioning of the nuclear facilities gave rise to only a few job losses, it has not had any significant impact on the employment situation in the local area.

I.B–4.6. Risø National Laboratory

Since Danish Decommissioning is decommissioning the facilities previously operated by Risø National Laboratory, and is going to hand over the cleared buildings and land to the laboratory afterwards, there are close connections and collaboration between the two institutions. For instance, Risø carries out the maintenance of buildings and the surrounding areas and supplies a number of other services, such as library, local area network and IT support. DD supplies, for instance, distilled water to Risø's laboratories (because the production of distilled water takes place at the DR 3 complex). DD also supplies health physics assistance to those departments at Risø that still work with radioactive nuclides. Some of these activities are part of a general agreement on cooperation while others are paid for individually.

One particular area where the interests of the two organizations are conflicting, concerns the Hot Cell facility, which is planned to be decommissioned in 2008-11. The facility, consisting of a row of six concrete cells, is placed inside a building used by Risø for an advanced research project on fuel cells with extensive — and expensive — laboratory and production facilities. Because there is a large economical potential in the project, Risø would prefer the decommissioning of this facility to be postponed to later than 2010, but this conflicts with the sequence that DD has set up for decommissioning of the individual facilities based on, among others, radiation protection considerations for the staff. In order to accommodate, as far as possible, the interests of Risø, DD is planning for decommissioning the row of hot cells without having to evacuate the laboratory facilities in the remaining part of the building. Because the two organizations are both state owned and belong to the same ministry, the solution of the situation may actually involve an overall economic optimization, i.e. it might allow the decommissioning to become more expensive due to the need for special precautions in order to save the expenses for moving the fuel cell laboratory elsewhere.

I.B–4.7. Staff at Risø National Laboratory and other institutions at the site

Apart from Risø National Laboratory itself there are a number of smaller institutions at the site so that the total number of employees is around 1000 – plus DD's own 75. Most of these employees have not worked with the nuclear facilities before and may be anxious about what is going on. However, so far no particular anxiety has been expressed, except from some of the staff working in the building with the above mentioned Hot Cell facility. Special information meetings have been held for these people, and in general DD attempts to keep all staff on the site informed via the local area network, in particular if anything special — and visible — is going on or being planned.

I.B–4.8. The immediate neighbourhood

The closest settlement is situated about 2 km to the south of the site with about 200 single family houses. A number of Risø (and DD) employees live here and most of the other inhabitants are accustomed to the neighbourhood of a nuclear research facility. No anxiety has been registered from here. So far, no particular information effort has been taken towards this settlement, but it is being contemplated.

I.B–4.9. Neighbouring countries and international organizations

Being a member of the European Union Denmark was obliged to supply a so-called "Article 37 report" about the possible impact of the decommissioning in neighboring countries. The report [I.B–5] was issued by the National Institute of Radiation Hygiene, which is the competent authority, but most of the input was provided by Danish Decommissioning and Risø National Laboratory. Since the activity content in the facilities is modest and the nearest neighboring country (Sweden) is more than 50 km away from Risø, the potential consequences of accident- or operational releases are very small, and no reservations were expressed from the neighboring countries or the European Commission.

International organizations, such as the IAEA and the Nordic Nuclear Safety Research organization have shown an interest in the progress of the decommissioning at Risø with a view to conveying the experience gained here to other countries.

I.B–4.10. Nuclear regulatory bodies

In Denmark the regulation of the nuclear area is divided between the National Institute of Radiation Hygiene and the Nuclear Office in the Emergency Management Board. The former is concerned primarily with the radiological aspects while the latter is concerned with nuclear accidents.

During the operation of the facilities the relationship between Risø and the regulatory authorities were good, based on mutual trust and respect for the professional capabilities of the other part. Because the facilities at the Risø site are the only nuclear facilities in Denmark and, consequently, the first ones to be decommissioned, the regulators are also facing a new type of problem. From the outset of the decommissioning planning it was, therefore, agreed — more or less formally — between the regulators and DD (then Risø) that there should be an open co-operation between the parties in planning, regulatory acceptance and execution of the decommissioning projects. In particular the first project, decommissioning of DR 1, was seen as a 'learning piece'. DD has sought to be open and honest about the things that did not work out as well as the positives, and it is felt that this openness has generated and maintained the trust of the regulators. Furthermore, because Denmark is a small country and the sector is small, the professionals from the regulators and from DD inevitably know each other — some have even studied together at university — and they meet in various professional contexts in Denmark or internationally. It is, therefore, easy to contact each other for a piece of informal information.

I.B–4.11. Other authorities

The environmental authorities in the municipality of Roskilde are, as mentioned earlier, a stakeholder with respect to disposal or recycling of the cleared decommissioning waste. Because the staff here does not have any particular insight in the subject area of radioactivity, a meeting was arranged at DD with participation of the nuclear regulatory authorities, as described in section I.B–4.10.

As there is still fissile material on the premises, the police may become alerted by alarms. No particular initiative has been taken towards the police as a stakeholder.

After the buildings of the nuclear facilities have been cleared and handed over to Risø, Risø may come into contact with other authorities if permits are to be achieved for particular applications of the buildings, e.g. production of some kind.

I.B–4.12. Interest groups

The decommissioning of Risø's facilities has not aroused much attention from interest groups. During the early phases of the discussion Greenpeace expressed a positive attitude to immediate decommissioning (as opposed to doing nothing or going for entombment). During the EIA process a representative for a local branch of the Danish Nature Preservation organization took part in a hearing and expressed some concern, but seemed to be convinced by the arguments presented by DD and others.

I.B–4.13. Media

At an early stage of the strategic planning for the decommissioning an information policy was formulated around four core principles: openness, dialogue, professionalism and speed in reacting to the need for information. Core messages as well as target groups and information activities were identified.

When the discussion about decommissioning first emerged, the press showed some interest in the subject, mainly focusing on the cost of decommissioning. When actual decommissioning work was to be started DD prepared press releases and invited the media, both local and nationwide. This gave a number of generally positive articles and TV stories. At a later stage a group of science journalists were invited to visit DD and the facilities. This also provided a few positive stories.

A difficult case was encountered when a staff member from DD went to the press with criticism of the management and the decommissioning plans. Although DD could counter all the arguments and was backed-up by regulatory authorities and the ministry, some damage to the image was experienced.

I.B–4.14. Staff at the facilities during operation and final shutdown

The decision by Risø's management to permanently close DR 3 gave rise to some anger among the staff of the reactor, mainly because they did not find the decision technically justified. During the rather long period that followed, with uncertainty about the future, many staff members felt frustrated. Some chose to leave Risø and find work elsewhere. The closure also gave rise to the dismissal of a number of people; but Risø offered very favorable conditions, including retraining for other jobs. Therefore, there was general satisfaction with the way the situation was handled, once the decision to close had been taken.

I.B–4.15. Present (and future) staff

The majority of the staff at DD today are people who worked at the facilities in ‘the Risø days’. However, a number of people have come from elsewhere, primarily from the civil engineering sector and from ministerial offices, the latter because DD had to establish a new administration of its own. Although people in general get along very well, some cultural differences between these three categories of staff emerge now and then.

Although some generation change has already taken place there will be a number of experienced staff members who will retire within the next few years. There are two challenges in recruiting replacement staff – apart from finding qualified people: persuading the candidates that it is worthwhile to take a job that will cease to exist within the next 10 years or so, and to persuade the key staff members to stay until the end. Even though decommissioning may not be rocket science a considerable amount of education and training has to be invested in new staff on the technical side.

I.B–4.16. Families of staff members

In particular, for staff members who are new to Risø and the nuclear sector, there may be some anxiety on the part of the spouse and family about the possible dangers in the work. In order to alleviate such anxiety DD arranges ‘family days’ where relatives can come and see the work place, meet some of the colleagues, and be informed about the on-going work.

I.B–4.17. Archives and museums

According to the legislation about archives some documentation material for the nuclear facilities, including descriptions and drawings, has to be supplied to the national archive. The amount of material, however, to a large extent can be determined by DD.

A Danish science museum, the Steno Museum [I.B–6], has expressed interest in collecting items from the nuclear facilities and to document the facilities by means of photos and videos. The first recordings were made immediately after the decision to close DR 3 had been taken, and further recordings are planned, provided that funding can be obtained. Danish Decommissioning has donated the control panel from DR 1 and a number of minor items from all three reactors to the museum. The items will form part of a future permanent exhibition describing the 'nuclear era' in Denmark. (Fig. I.B–2).

I.B–4.18. Contractors

Some parts of the decommissioning, for instance concrete demolition, has been and will be carried out by contractors. Of course, the primary objective for the contractor is to make a profit on the job and possibly qualify for the next demolition task. But, given the fact that there may be radioactive material involved, the contractor also needs to be convinced that his staff does not receive too high doses. It therefore has been important for DD to inform the contractor and his personnel about the precautions to be taken and to ascertain that safety rules were not violated and in particular that no demolished material were disposed of from the site before it had been radiologically cleared.

I.B–4.19. Possible future contractors

Once it had become known that funding had been granted for decommissioning the facilities at Risø, DD (and Risø) was approached by a number of consultants, potential contractors and suppliers of equipment who were interested in 'getting a slice of the cake'. It can sometimes be a difficult task to distinguish between those who may in the future become valuable suppliers and those who are not relevant.

FIG. I.B-2. The control panel from DR 1 on its way to the museum.

I.B–5. CONCLUSIONS

A total of 19 distinct stakeholders or groups of stakeholders have been identified for the decommissioning of the nuclear facilities at Risø National Laboratory. With a few exceptions the interaction with the stakeholders has evolved as anticipated without any severe consequences to the safety, progress or economy of the decommissioning. The only real unexpected negative stakeholder interactions have been in relation to the political system. Some events here have been hard to understand for the technical people in Danish Decommissioning. But since both DD and Risø National Laboratory are state owned organizations, it must be accepted that the power lies with the political system.

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[I.B–5] NATIONAL BOARD OF HEALTH, NATIONAL INSTITUTE OF RADIATION HYGIENE, General Data as called for under Article 37 of the EURATOM Treaty. Decommissioning of the Nuclear Facilities at Risø National Laboratory, Denmark. March 2003. ISBN 87-91232-85-6, ISBN 87-91232-86-4. Available as a PDF-file from the website: http://www.sst.dk/upload/artikel_37_rapport_sis_lowres_001.pdf

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Annex I.C

STAKEHOLDERS IN DECOMMISSIONING OF NUCLEAR FACILITIES, ITALY

I.C–1. INTRODUCTION

The peaceful use of nuclear fission for energy supply began in Italy in the early sixties. Three nuclear power plants, 160 MW(e) GCR at Latina, 270 MW(e) PWR at Trino and 160 MW(e) BWR at Garigliano, were in operation in the middle sixties.

In the year 1981, a fourth unit, 882 MW(e) BWR at Caorso, began its commercial operation and, in the years that followed, the construction of two 1000 MW(e) BWR units at Montalto (Alto Lazio NPPs) started.

The nuclear programme, in the middle of the 1980s, foresaw the further realization of at least 61000 MW(e) PWR units, on the basis of a new national project named PUN (Nuclear Unified Project).

In addition, two experimental reactors were developed since the early seventies: the CIRENE reactor (natural uranium, heavy water, 60 MW(e)) and the prototype fast reactor named PEC (Fuel Elements Testing Reactor).

In the same period, fuel cycle activities were developed both at industrial and experimental-pilot scale, such as uranium fuel fabrication (FN, at Boscomarengo, for BWR and PWR assemblies; IFEC, at Saluggia, for MTR and CIRENE fuels), fuel reprocessing (EUREX, at Saluggia, for MTR, CANDU and LWR fuels; ITREC, at Trisaia, for uranium-thorium fuel cycle); plutonium fuel fabrication (Plutonium Plant at Casaccia).

Research reactors were also built, starting with the one in Ispra at the end of the 1950s. Four research reactors are still in operation.

After the Chernobyl accident, a general public debate took place in Italy on the implications of the use of nuclear energy.

In November 1987, a referendum was passed: this vote was formally limited to specific aspects of nuclear legislation in force at that time, but it was still interpreted as negative for existing nuclear technology.

As a consequence, the new National Energy Plan called for the abandonment of nuclear power, and Parliament decision was made to close the Latina, Trino and Caorso power plants, as well as the CIRENE and PEC experimental reactors, and to halt construction of the two 1000 MW(e) BWR units at Montalto, which were 70% complete as well as the construction of the CIRENE and PEC reactors. Garigliano NPP was already in a cold shutdown condition.

At the same time, according to a resolution of the Interministerial Committee for the Economical Planning (CIPE), the National Electricity Company ENEL, that is the national utility, was charged to start the actions for the decommissioning of all its own nuclear power stations.

A presentation of the Italian regulatory regime is given in several available documents such as the Italian Report for the Convention on Nuclear Safety (IAEA).

The main institution which grants the most relevant licenses for nuclear installations, in Italy is the Ministry of Industry, whose name changed along the time, due to some modifications in its competences. In spite of that, in this report that name is taken as a unique denomination. The Italian technical body that gives advices and reviews detailed designs is APAT (Agenzia per la Protezione dell'Ambiente e per i Servizi Tecnici).

The main decisions related to decommissioning are described in the sections that follow, the present status of the Italian nuclear facilities is summarized below:

- Garigliano NPP overall Decommissioning Plan has been reviewed by APAT, but the authorization has still not been granted because of some delay in the Environmental Impact Evaluation procedure which is in progress by the Ministry for the Environment.
- Most of the decommissioning plans of the other nuclear facilities have been submitted or are going to be submitted to it in a short time frame.

The structure of this annex is conceived as an historical perspective, outlining most of the specific issues which arose in the period from the final shutdown of nuclear power plants and fuel cycle facilities to the present situation. It is tailored for the best understanding of the lessons learned as presented in Annex II and gives a

picture of the scenario where the stakeholders operated. The observatory from which the facts are viewed is in the Italian Regulatory Body, which was aware and had to play its role for the resolution of the described issues but, of course, licensees might have different perspectives and more examples to provide.

I.C–2. TRANSITION PERIOD FROM THE OPERATION TO THE FINAL SHUTDOWN AND TO THE DECISION TO DECOMMISSION ALL NUCLEAR FACILITIES

I.C–2.1. The nuclear referendum and extended plant shutdown

As referred above, following the Chernobyl accident and its impact on the Italian public opinion, in 1987 a national referendum was demanded by a number of electors, as suggested by some political parties and by some environmentalist groups. The result of the referendum, although the questions were not explicitly addressed to the decision of shutting down or continuing the operation of the NPPs, was politically interpreted as a clear sign of aversion against nuclear energy.

Political positions, expressed during the debate that followed the referendum and that was reflected in detail in the media, were in favor of a moratorium, but oscillated around its possible extension: to stop the construction of new plants, leaving the operating ones the possibility to continue their operation up to the end of their operational life, or to abruptly abandon the nuclear energy production.

It was a special condition to regulate using the safety authority, because of the prolonged shutdown with limited activities on site, of the continuous extension of the number of systems to be involved in a conservation state, of the presence of the fuel in the vessel and in the spent fuel pools of some plants, waiting for decisions on the destiny of the plant.

The NPPs still in operation terminated the operation cycle and remained for several years after the shutdown for refuelling without receiving the authorization for restart.

Several actors gave their contribution to the debate which lasted several years prior to the final decision.

A prominent role was played by the local communities in the NPP area (either local towns, provinces, regions), that organized meetings and public debates, and by the personnel involved in the operation of the plant that manifested their own concerns in several forms and contexts.

The experience of Caorso in this period can be considered of particular interest.

During the last shutdown, in 1987, important plant modifications were authorized for improving its capability to cope with beyond design basis accident, but they were not fully implemented due to the uncertainty about the continuation of operation.

In July 1990, the Inter-ministerial Committee for Economic Plans deliberated on the final shutdown of the plant. In the subsequent year, following up the deliberation above, the licensee submitted the application to be authorised to bring the plant into a state of safe enclosure.

Further integrations to the documents were submitted up to 1996, but the main obstacles to the finalization of the authorization process was the lack of a clear policy for spent fuel management. Moreover, in 1996, the new nuclear law containing specific decommissioning regulations entered into force. So, in 1997, when the fuel management strategy was defined, a new application was submitted according to the newly issued procedure and, on February 1998, the fuel was removed from the vessel. This operation, usually performed as a routine one, was considered of great importance by the workers and by the local community and many issues relevant also for the management of interfaces with the stakeholders in the subsequent decommissioning phases came out.

I.C–2.2. Stagnation of initiatives and the change of decommissioning strategy

Having observed a stagnation in the decision making and in openly debating relevant issues, the safety authority took several initiatives, the most relevant being outlined in the following:

— **1995** – ANPA (now APAT) organized the first National Conference on Decommissioning and Waste Management. In that context, it was strongly outlined that an outmost national priority was the selection, qualification and realization of a repository for low and intermediate level radioactive wastes.

— **1997** – Italy signed the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. ANPA organized the second National Conference on Decommissioning and Waste Management", in which it was outlined that this kind of activity was considered by utilities as economic. In this context, even the interventions of the safety authority produced limited results; slowing down the activities was not perceived as a problem, the licensees did not feel responsible of the activities and the burden for the safety authority became more and more heavy. Finally, the urgency to realize the national repository was confirmed; the circumstance that there was neither any regulation in place requiring the construction of such facility, nor any institutional body responsible to construct and manage it.
— **2000** – APAT organized an international seminar on NPP decommissioning, in which APAT continued to underline the importance of issuing relevant strategic decisions on waste management.

In this scenario, characterized by long lasting stagnation, it was decided to reconsider the previously chosen 'deferred decommissioning' option by several stakeholders taking, inter alia, the following reasons into account:

— No more significant dose reduction was expected, due to the considerable time already elapsed since the final shutdown;
— Opportunity to take advantage of the expert operating personnel still available at the facilities;
— The local authorities which claimed for an as prompt as possible availability of the site for other possible uses.

Some stakeholders began to demand an active role in the choice of the strategy, not only to be dictated by the needs of the licensees but by more general interests. In addition, in view of the privatisation process, the licensee began to feel the legacy from nuclear past as an intolerable burden.

As a result of such new attitudes, by the end of 1999, the former Ministry of Industry, issued a document providing strategic guidelines for the management of liabilities resulting from past national nuclear activities.

Highlights of this new policy were:

— The commitment for treatment and conditioning of all radioactive waste stored on the sites.
— The start up of a concerted procedure, by means of a specific agreement between the Government and the Regions, for the selection of a national site for the final disposal of low and intermediate level waste and for the interim storage of the spent fuel and the high level waste.
— The adoption of the strategy for an immediate decommissioning of all national shut-down nuclear installations, thus abandoning the previous safe enclosure option.
— The establishment of a new national company, SOGIN (Società Gestione Impianti Nucleari), assignee of all shut-down nuclear power plants, with a mandate to perform their immediate decommissioning.
— The allocation of special funds for all these activities by means of a specific drawing from the electric energy bills.

This policy was confirmed by a Decree of the Ministry of Industry, which provided operative directives to SOGIN for implementing an immediate decommissioning of the four national power stations until an unconditional release of the respective sites, in a time frame of twenty years. Such a Decree provided also directives to SOGIN for the safe management of radioactive waste and spent fuel associated to the power stations.

In August 2000, a new Ministerial Decree authorized SOGIN to execute a few activities for the decommissioning of Caorso NPP, as excerpted from the plans related to the safe enclosure, waiting for new decommissioning plans based on the new strategy. To expedite the authorization process, the Ministry of Industry launched a so called "conference of services" by involving all the Administrations which were called by Law to express their views in the decommissioning process. The outcome proved such conferences as very effective mechanisms for achieving concerted decisions. The authorization granted by the Ministry of Industry was addressed to the dry storage of the spent fuel, the decontamination of the primary circuit, the treatment of

the waste on site and the dismantlement of the turbine building. Unfortunately, the foreseen installation of a vitrificator on site was not authorised due to strong local opposition.

By early 2002, new applications for the immediate decommissioning of the four power stations were submitted by SOGIN to the former Ministry Industry. Their review is in the final stage, the evaluation report of one of them has been issued in 2006, but the environmental impact evaluation is still underway by the special commission of the Ministry for the Environment.

I.C–2.3. Revision of the basic nuclear act to include regulations on decommissioning

A substantial novelty in the regulations was the entry into force, in January 1996, of the Legislative Decree no. 230, which replaced the previous Decree of the President of the Republic no. 185 of 1964 providing for the transposition of six EURATOM Directives on radiation. The Decree also introduced new, specific rules on the decommissioning of nuclear plants and guidance for the clearance of materials.

As a consequence, the Licensees were required to replace or adjust, according to the new provisions, the applications and the relevant assessments produced under the previous rules, as well as to maintain obligations and prescriptions of the previous licences until a new authorization granting.

The scheme in Fig. I.C–1 represents the licensing process of decommissioning nuclear installations in Italy and identifies the main stakeholders intervening in the process. an outline of the relevant major provisions is hereinafter given.

As ruled by articles 55-57 of the quoted Decree, operations for the decommissioning of a nuclear installation are subject to prior authorisation by the Ministry of Industry, acting in consultation with the Ministries of Environment, Interior, Labour and Health, APAT and the region concerned. Such authorisation can be issued for intermediate phases leading up to a planned final state.

Another feature of the Italian administrative system is that a plurality of bodies have a role in the licensing; in fact, each administrative body has to be a guardian of the public interest from its own view point; furthermore, in the Italian system licenses, permits and authorisations are granted by Ministries, even though agencies such as APAT play the role of State instruments to which care and supervision of certain highly technical matters are confided.

On the other hand, the licensing procedure involves the need for APAT to collect the opinion of four Ministries (Environment, Interior, Labour, Health) as well as of the region concerned, integrating all the contributions in its assessment; this procedure must be reiterated twice, before APAT can deliver its assessment to the National Technical Commission, take its advice into account and deliver its comments for the final act to be performed by the Ministry of Industry.

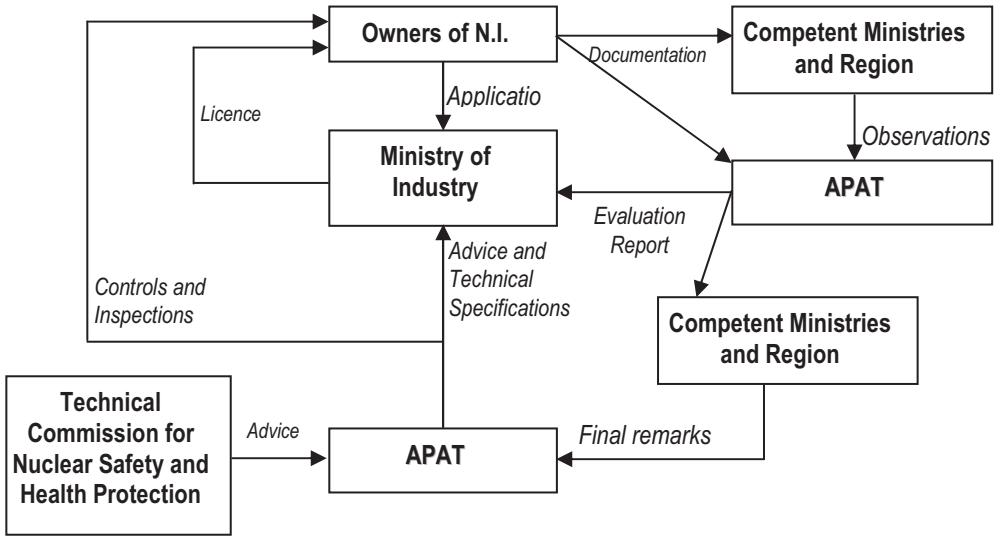

FIG. I.C-1. Schematic representation of decommissioning licensing process in Italy.

One can note that this system provides for a high degree of guaranty even though ways have to be found to make it sufficiently agile and converging, while maintaining its essential feature of seeking the opinion of all public bodies concerned.

I.C–3 EXPERIENCE OF THE "TRANSPARENCY BOARDS"

An early Italian experience in the area of communication with the public was the institution, in the 1970s, of a consulting commission of experts that began its activities on the basis of a result of a convention between the licensee and the local authorities, when the nuclear power plants were in operation. The issues considered by such commission became broader and broader, and the subjects involved became more and more numerous.

More recently, during decommissioning activities, in order to spread the information and to involve local entities in the decision making processes, the so called transparency boards were instituted, mainly by initiative of the Regions hosting the plants, sometimes stimulated by the Ministry of Industry.

I.C–4. ISSUE OF NEW REGULATION OF GENERAL SCOPE

From time to time, after the final plant shutdown and while they were in the process of achieving safe enclosure, it happened that new regulations were issued in the field of conventional safety, workers protection or civil protection. Such new regulations, in most cases were directly or indirectly applicable to NPPs. For instance, a specific Italian Law was issued in 1991, giving prescriptions about how to proceed for handling asbestos (D.Lgs. 277/1991).

It has to be underlined that about 25% of the insulating material in the shutdown nuclear power plants contained asbestos fibres (carbonsilicates enveloped in asbestos tissues, mattresses made by asbestos, enveloped by aluminium or by tissues). On this basis it is easy to imagine the dimensions of the problem.

In relation to the sensitivity of public opinion on these problems, for instance, in the recent past, following the publication of some news in the press related to the dangers coming from the asbestos in the Trino plant, the Prefect of Vercelli was pushed to convene a meeting, in which the following institutional subjects had the chance to publicly explain on what bases the status of the plant had to be considered under control, in spite of the alarms coming from the press:

- Workers' representatives for safety/health matters;
- Regional Agency for Environment Protection of Piedmont Region;
- Local Health Public services, which, according to the regulation have to approve the clean up plans from conventional health protection point of view;
- Trade unions;
- APAT, that was charged with the approval of any plant modification from the safety and radiation protection points of view.

It was estimated that the asbestos clean up in Trino was the largest one performed in the region, considering all the activities in place there and that communication to workers and to public had to be improved, in order not to produce misunderstandings. Many efforts were devoted to performing this activity and the anticipated decontamination of some components was even required in order to perform the cleanup under appropriate radiological conditions.

In 2003, an ordinance was issued by the Presidency of the Ministries' cabinet, giving criteria for updating the seismic classification of national territories together with the technical regulations applicable to the constructions, including industrial ones. In particular, the level of protection to be required against earthquakes has to be graduated taking the possible consequences of the event into account. Further updates and refinements have been published in subsequent years. The specific regulations for the implementation in the individual areas have to be issued by the regions, which are also charged of the other aspects related to the implementation.

No immediate implementation of such ordinance was strictly required for all the constructions. However, the possible impacts of such a general rule to long lasting structures of nuclear installations under

decommissioning (e.g. under deferred decommissioning strategy), and the consequent interventions on it are under evaluation.

A similar situation was related to the issue or the updating of regulations related to the electrical equipments in the working areas. For instance, in 1990 an important regulation was issued (Act n. 46/90), which required the implementation of several modifications on systems such as electrical ones, still not in place on the Nuclear Installations under permanent shutdown. Several installations had to proceed to such an upgrading, without having any chance to simply make maintenance on the existing systems.

I.C–5 EMERGENCY STATUS

I.C–5.1 Emergency status: the origin and the implemented measures

In 2003, due to the worldwide terrorist threat, the Italian Prime Minister promulgated a Decree (DPCM February 14, 2003) declaring an emergency status in those national territories subject to specific risks coming from the presence of radioactive material. Nuclear installations were identified as possible targets for terrorist attacks. The actions required under this status, which has been extended year-to-year towards the end of every year, are implemented in force of Ordinances by the Prime Minister (OPCM).

Among the relevant decisions taken in this frame, the transfer of the licenses of all the interested installation to an unique "Implementer" subject (i.e. SOGIN) has to be highlighted (SOGIN already had the responsibility of the management of the NPPs).

Main objectives of the Prime Minister's Ordinances were the adoption of provisions for protecting most vulnerable plants, and the improvement of radioactive waste storage facilities with prompt, homogeneous and economic interventions. Of course, given the main worry that generated the measures, the improvement of the security provisions was the most important issue to be tackled, but the interfaces with the safety, with waste management and decommissioning became more and more wide and strong.

The main tools identified to reach those objectives timely were the simplification of authorization procedures by repealing in part some Acts[1] and the centralizing of the decision making process. For such a latter purpose, the Prime Minister delegated his own power to a Commissioner (a former General of the Army, at that time president of SOGIN) who, under the control of a Scientific Committee, was charged to issue specific Ordinances aimed at the performance of the necessary actions, primarily in the area of security, by the Implementer. The subsequent Ordinances identified plans of interventions establishing urgent provisions for enhancing both the physical protection and the safety conditions of the installations, with particular regard to the spent fuel and the radioactive waste.

The simplified scheme in Fig. I.C–2 represents the procedure for authorising plans of interventions under the status of emergency, where the main subjects are:

- The Commissioner, who orders plans of interventions aimed at pursuing the established emergency objectives;
- SOGIN S.p.A., as the sole implementer for the referred nuclear installations;
- APAT, the regulatory authority to provide technical advice on the plans of interventions of Commissioner, to review and to approve technical designs, to propose technical specifications and to perform control and surveillance on the SOGIN's activities;
- Technical scientific commission providing evaluation and high level vigilance on the Ordinance objectives, as well as evaluation and validation on the plans of interventions before their submission to APAT;
- Technical commission discharging duties established in the art. 9 of the Legislative Decree 230/95 (to provide independent advice to APAT on the acceptability of technical designs from the nuclear safety and radiation protection points of view).

Other stakeholders, as evidenced in fig. I.C–3, were:

[1] The power to depart from specific Acts has been given the Commissioner, in the first years, subsequently it has been taken by the Prime Minister itself. The concerned matters were related to authorisations, expropriations, tenders.

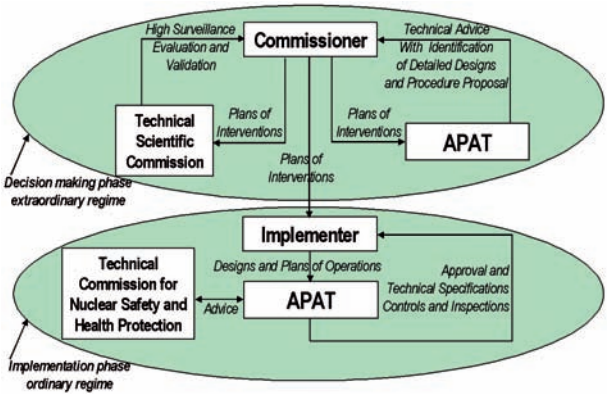

FIG. I.C-2. Generation, implementation and evaluation of the plans of interventions.

- The Civil Protection structure that played the role to operatively fill the area in between the Commissioner and the Prime Minister, given also the need for applying instruments typical of Civil Protection interventions,
- The installations' owners that maintained the rights of property of the installations, even after the passage of the license to the Implementer.

Plans of interventions have been defined, which had mainly a programmatic character and were subject to a prior "evaluation and validation" by the Scientific-Technical Committee. This Committee convened representatives of all the competent Administrations (i.e. Presidency of Ministers' Council, Ministries of Environment, Production, Health), the interested Regions and the Conference State-Regions, which is a specific organization instituted for promoting and stipulating official agreements between the State and the Regions on any aspect of Regional or interregional interest.

As shown above, the Commissioner was allowed to proceed without the authorisations required by the main nuclear acts, but he was required to take the advice of the technical Regulatory Body (APAT) into account. APAT always recommended the interventions to be subject to a review scheme in compliance with the nuclear legislative framework (i.e. Legislative Decree 230/95 and following modifications) of the ordinary regime; most intervention were performed, in fact, by submitting detailed designs for technical review (i.e. assessment of the technical safety aspects of interventions) and authorization by APAT, even with the advice of the Technical

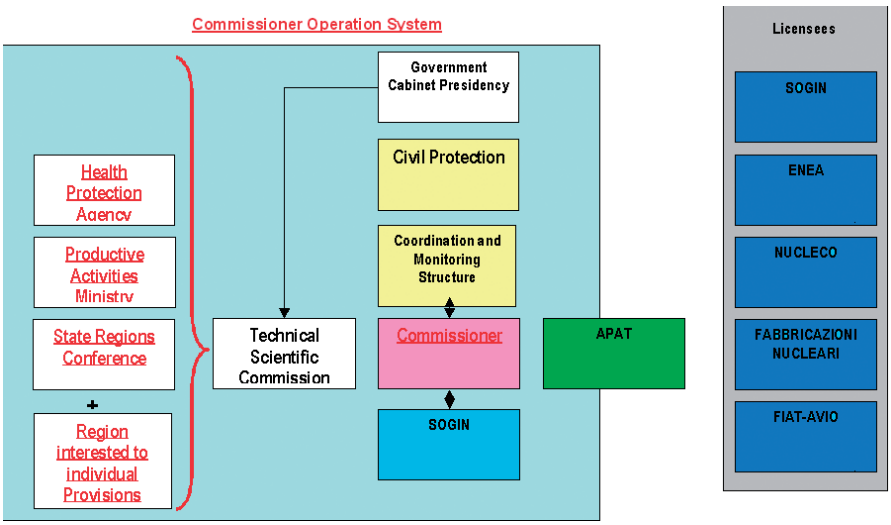

FIG. I.C-3. Stakeholders involved in the process.

Commission. However, a few decisions were taken by the Commissioner, in force of this special power; the main interventions were made to override permissions and authorisations that general legislations require from Mayors and/or other local authorities. This circumstances often caused criticisms and discussions.

Since the final state of decommissioning process represents the safest configuration, the mandate of the Commissioner included also a specific duty of ensuring the expediting of the decommissioning procedures. As a mechanism to cope with such an objective, all the competent Authorities had to commit themselves to an institutional co-operation agreement which established a co-ordination of the authorization processes for the decommissioning of nuclear power plants and the relevant Environmental Impact Assessments (Ordinance no. 13 of November 2003).

The provisions originated from the mentioned "regime of Ordinances", led SOGIN to reconsider the programmes of decommissioning and to consequently update the relevant documents attached to the applications submitted in early 2002. To this aim, on middle 2003, an Addendum to each of those applications was provided by SOGIN aimed at shortening the time schedule of the programmes and at justifying the adequacy of the chosen provisions (e.g. by executing activities in parallel, by using shift working).

On December 2006, the Government took the decision not to prolong the emergency status for 2007. So the Commissioner is no longer in charge and all the activities on the nuclear sites have been set back under the ordinary legislation for any kind of authorisation.

The bases for such a heavy measure against the international terrorism and the interfaces with civil defence responsible organisations are not to be discussed in this context.

However, the need to exit somehow from the stagnation period, in a timely and effective way, was an issue singled out by APAT for a long time (see previous chapter). This was the reason why no strong objection was finally formulated by the Safety Authority regarding such an unusual way to manage the remaining Italian Nuclear Installations. In fact most stakeholders welcome the firm commitment of the Government, to:

— Assign precise responsibility and authority to a high level position (the commissioner) which takes the charge to define the most appropriate planning and actions;
— Identify a proper subject (SOGIN) whom to assign the implementation duties;
— Provide with the needed resources[2];
— Strictly control such subjects in terms of accomplishments.

It has to be underlined that the effective implementation of the measures under the ordinary regime was considered to be not practicable, mainly due to the veto power attributed by the Law to a plurality of subjects, which often have not the capabilities to speed up their decision making processes and which are often strongly promoted by different types of interests.

In spite of the efforts devoted by SOGIN to communication to the public, and in spite of the power to proceed without the ordinary authorisations, the Commissioner was reluctant to make full use of its power without previously resolving the opposing issues. The aim to avoid, as far as possible, institutional conflicts, difficult to be managed, was probably the reason to maintain a prudent and as largely as possible agreed path.

It was possible to perform, in a very timely way, a large number of activities in the area of security protection of all the Nuclear Installation, based on specific vulnerability studies.

Numerous interventions relevant to safety were also performed in the same context, such as:

— The construction of bunkered vessels for temporary storage of high level liquid wastes,
— The application for the construction of temporary storage buildings for solid wastes in the Nuclear Installations' sites,
— The permissions to licensees for making use of the same clearance levels, already defined for Caorso site, to other Nuclear Installations which did not formally receive authorisation for the release of materials,
— Any preparation needed for sending the spent fuel abroad for reprocessing.

[2] The electric tariff as managed by the National Authority for Energy and Gas Management.

Since the Emergency status went to its end in 2006, it is too early to make an exhaustive overall balance. In any case it can be said that:

- The security measures were timely performed.
- It is doubtful that a real acceleration has been obtained for interventions more related to safety and radiation protection than to the security.
- The financial resources invested were really impressive and their management negatively impressed the public opinion.
- The issue of the Institutional Cooperation Agreement has revealed as a positive initiative in view of sharing, among different institutions, a common understanding on the practical implementation of the existing regulations; on the other side, the attempt to shorten the time schedules by fixing limiting time-frames was successful only in technical areas where previous licensing experiences existed or regulated in detail by technical guides, and when good quality and exhaustive technical documents were attached to the applications.

I.C–5.2 Attempt to localize a waste repository in the work of an emergency

Most recent attempts to identify an appropriate site for the national waste repository date back to 1996, when a permanent Commission of the Civil Protection Department decided to set up a Task Force with the main task to develop a method for localizing and qualifying suitable areas for the construction of a national repository for low level radwaste (surface or sub surface with concrete structures) and of an interim storage for high level ones and spent fuel. A final report was issued by such Commission, identifying the most appropriate procedure.

Moreover, an Italian research organization ENEA contributed to the overall task by performing study specifically addressed to the issue. In the years 1998-2000 the first phase was completed, the national territory has been characterized and a data base has been built. On these bases, by using defined exclusion criteria,[3] the areas to be considered for a more in depth analysis were identified.

In particular, 8107 areas have been selected, among which more than 200 (0.6 % of the national territory) with a suitable surface for the localization of the repository (larger than 300 ha).

The further studies led to the identification in 2002 of about 30 areas with suitable geo morphological, infrastructural and population density characteristics.

In the frame of the emergency status, the decision to proceed in a different path was taken: on April 2003 a new commission has been set up by the Commissioner delegated by the Prime Minister. The task was to explore all possible solutions rather than concentrate to surface or sub surface structures; in particular:

— Redefine safety criteria for waste disposal,
— Propose a site selection procedure,
— Perform feasibility studies for different concepts (from engineered near surface to mined cavities),
— Preliminarily identify candidate sites.

The work of the Commission was concluded in August of the same year and a decree to be converted into Law was issued by the Government identifying in Southern Italy the site for HLW, LLW and MLW disposal. The chosen site was a saline formation, 150–200 m thick, with an extension of about 10 km^2, protected by a clay layer, at 600 m depth (similar to the WIPP). This area was located in the proximity of Scanzano Jonico town. The Decree that was issued for this purpose (n. 314 of November 13 2003) had the following main features:

- The national repository had to be considered a military area,
- The Commissioner retained the responsibility to:
  —Validate the site,
  —Build on site all temporary structures to convey all the wastes on the national territory,

[3] Consistent with Siting of Near-surface Disposal Facilities, Safety Series No. 111-G-3.1, 1994, and Technical Guide n. 26 ENEA-DISP (1985).

—To approve the economical and financial plan,
—To identify the appropriate organisations to be charged with the design,
—To approve the designs,
—To assign the construction task

- SOGIN had the tasks to implement the decision in a time frame up to the end of 2008, to inform the population, to finance the activity by using the income from the electrical bill.

The first news about the resolution of the Government appeared in the newspapers just the day after it was decided by the Government Board. The same day, the strong reaction of national and local environmentalist groups was reported in the newspapers. The main arguments against the decision were related to the relevant role agriculture and tourism had in the economy of the region and to recent seismic reclassification of the area. Questions were addressed to the Parliament, statements were submitted to the Regional Administrative Court, and resolutions of the town administration board were issued in the days immediately following. Doubts were publicly expressed by scientists on the results of the technical studies which the decision was based on. Just the day after the diffusion of the news, an organizing committee was established locally to coordinate the opposition to the initiative. Two days after, large local manifestations of students took place, other initiatives led to the intrusion of numerous activists into some town house offices. Many administrative actions were also announced by the Mayors of the town in the surrounding. Refusal by consumers on some agricultural products from the area exacerbated the reactions from the local farmers. Important communication roads, highways and railways were blocked for days (some during days and nights) with relevant impact on the traffic. Attempts were made by the Government to mediate the positions, with no result. A very numerous local manifestation of about 100 000 persons took place few days after, about 3000 persons manifested in Rome. Even one state Agency (ENEA) diffused its opinion criticizing the methods of the studies and arguing on the sufficiency of the available date for the choice. About two weeks after the promulgation of the Decree, the Government was forced to completely change its contents. Finally, at the beginning of 2004, a new Law (Legislative Decree 368/04) was promulgated, with the following main provisions:

— A Commission of 19 experts from different organizations including local stakeholders had to be set up with the purpose of choosing a site for HLW and spent fuel disposal within one year.
— The site had to be validated in one year by APAT, CNR and ENEA.
— The design had to be approved by APAT in 120 days.
— The identified goal was to make it ready for operation by 2009.
— The management and the implementation aspects are still charged to the Commissioner and to SOGIN.
— Until the disposal site will be operative, the local municipalities, where the nuclear installations are presently located, will receive an annual fee based on the radiological inventory of the stored radioactive waste. The inventory will be established by APAT.

In August 2004, a new Law on the rearrangement of the energy sector has been approved, which included some decisions related to waste management. In particular, his new Law establishes that, with the same procedures indicated in the Law 368 for the HLW, a national site for L-ILW disposal should be identified.

Moreover, specific provisions on licensing procedures for radioactive waste disposal facilities are now in a development phase under a ministerial decree foreseen by the Art.33 of the DL 230/241.

Since then and until now no significant advancement has to be singled out.

Annex I.D

STAKEHOLDERS IN THE DECOMMISSIONING OF THE SALASPILS NUCLEAR REACTOR, LATVIA

I.D–1. INTRODUCTION

The IRT research reactor in the Salaspils site near Riga, the capital of Latvia began operation in September 1961. The research reactor was originally built according to Soviet design as a pool type reactor with nominal thermal power 2 MW. Since 1975, after reconstruction of the reactor, the nominal thermal power of the reactor was increased to 5 MW.

On 16 May 1995, the Cabinet of Ministers issued the Order No. 263 to shut down the Salaspils Research Reactor (SRR) following the two remaining years of operation (the decision prohibited obtaining fresh nuclear fuel) and requested the Nuclear Research Centre (NRC) of the Latvian Academy of Sciences to start the preparation for decommissioning. The essential stakeholders — the Government of Latvia, local municipality and different state institutions — were involved in the decision making process for decommissioning.

The technical cooperation project on decommissioning of the research reactor was submitted to IAEA for the period 1997/1998. There were 5 visits from IAEA between July 1997 and June 1998. The IAEA is still an important international stakeholder for the decommissioning of SRR. Due to common efforts together with other international stakeholders — Department of Energy, USA, Russian companies and EUROATOM Supply agency (ESA), the fresh fuel was removed from Salaspils research reactor and transported to the Russian Federation. During implementation of the SRR decommissioning project, other important international stakeholders — the Government of Denmark, Sweden Radiation Protection Institute and EC were involved.

On 19 June 1998, the reactor was taken out of operation and some fuel assemblies were removed from the core. The Salaspils NRC was under the control of the Ministry of Education and Science up to 01 January, 1999. In accordance with the decision made by the Government of Latvia, the Salaspils NRC was re-structured into Reaktors Ltd., comprising the University of Latvia and the Laboratory of Metrology. In 2001 Reaktors Ltd. was renamed and reorganized as RAPA, Ltd, and eventually in 2005 it became the Hazardous Waste Management State Agency, taking onboard responsibility for hazardous (non-radioactive) waste.

The German company PREUSSAG NOELL, another important stakeholder for decommissioning of the Salaspils RR, started decommissioning concept studies in July 1998. The results of these studies [I.D–1, I.D–2] were presented to the Ministry of Environmental Protection and Regional Development (MEPRD). The concepts were used for the Order No. 57 of Cabinet of Ministers in 1999, which accepted the option for the direct dismantling of SRR to "green field". Decommissioning of SRR is further described in another report [I.D–3]. In December 2004 the Government of Latvia accepted the upgraded decommissioning plan for the period up to 2010.

I.D–2. EXPERIENCE OF DECOMMISSIONING

The Planning and preparation for decommissioning were undertaken during 1999- 2005. This preparatory effort was supported by the State budget and the Environmental Protection Foundation (EPF), as well as by international stakeholders. Activities aimed at receiving the license for decommissioning, preparing the Environmental Impact Assessment for decommissioning of SRR, and upgrading of the national radioactive waste repository were undertaken during 2003-2005, which significantly increased the number of stakeholders involved. Several scientific institutions, personally impacted stakeholders, administratively impacted stakeholders and others were involved in the decommissioning processes [I.D–4 to I.D–6].

I.D–2.1. Organization of decommissioning

It is desirable [I.D–7 to I.D–9] that a designated organization is in charge of the planning and implementation of decommissioning. According to the policy of the Ministry of Environment (MOE), the State agency "BAPA" is in charge of decommissioning of SRR. The steering group coordinates and Radiation Safety Centre (RSC)

controls all these activities. All these stakeholders are important for the decision making processes. The organizational scheme of decommissioning is shown in Figure I.D–1. The overall set of roles and functions allows the implementation of all decommissioning activities with the necessary control and optimization of investments.

I.D–2.2. Execution of decommissioning activities

A sampling and characterization programme was performed to complete the radiological information about SRR. All land and buildings were checked for radiation contamination. This data was processed and a database for all buildings and reactor systems is being prepared. All decommissioning activities were performed according to the scheme of Fig. I.D–2. The dismantling of the first and second cooling circuits, and scientific equipment in the reactor building; and the collection and treatment of "historical wastes" (Figs I.D–3 to I.D–5) were performed in this phase.

The total amount of dismantled materials is presented in Table I.D–1.

I.D–3. STAKEHOLDER INVOLVEMENT IN DECOMMISSIONING

All stakeholders involved in the Salaspils RR decommissioning processes can be identified and grouped as described in [I.D–10] and presented in Table I.D–2 :

TABLE I.D-1. MATERIAL FLOW FROM DECOMMISSIONING OF SALASPILS RESEARCH REACTOR

Year	1999	2000	2001	2002	2003/4	Total
Metallic scrap for reuse, tonnes	11	31	48	23	75	188
Concrete for disposal, tonnes	9	64	230	51	39	403
Other materials ,tonnes	3	38	9	11	14	76
Conditioned radwaste, tonnes	2	7	16	16	14	60
Conditioned spent sealed sources and wastes ,TBq	6.2	4.6	1.8	5.2	0.6	18.4

TABLE I.D–2. STAKEHOLDERS' CATEGORIZATION

ISSUES	STAKEHOLDERS
ECONOMIC Overall cost of decommissioning, supply chain making a fair profit, impact on economics of local community	ECONOMIC Government, Customers, Decommissioning/radioactive waste management agencies, Supply chain, Local community
ENVIRONMENTAL Local environmental issues e.g. transport, noise, waste management	ENVIRONMENTAL Regulators, Local community, NGOs, Wider society
SOCIAL Health and safety, jobs, impact on local suppliers, impact on local community	SOCIAL Workforce, Regulators, Local community, Local suppliers, Wider society

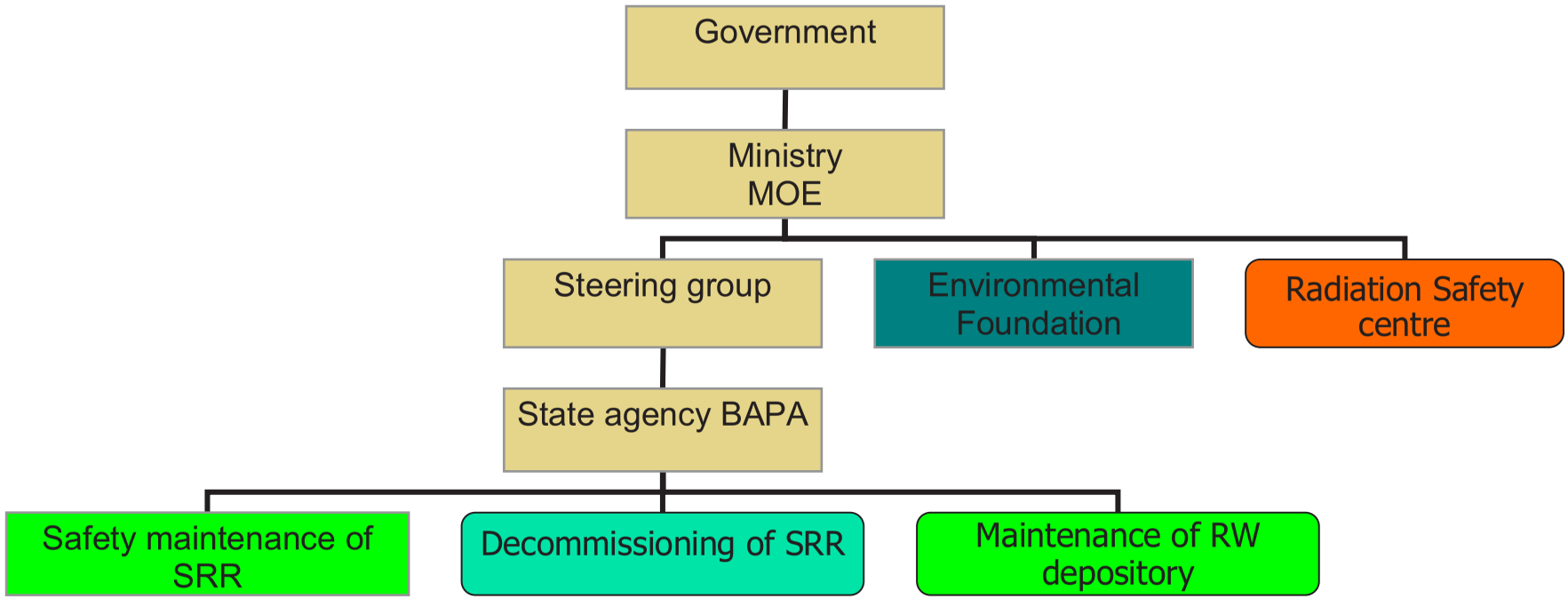

FIG. I.D.1.Organizational scheme for SRR decommissioning.

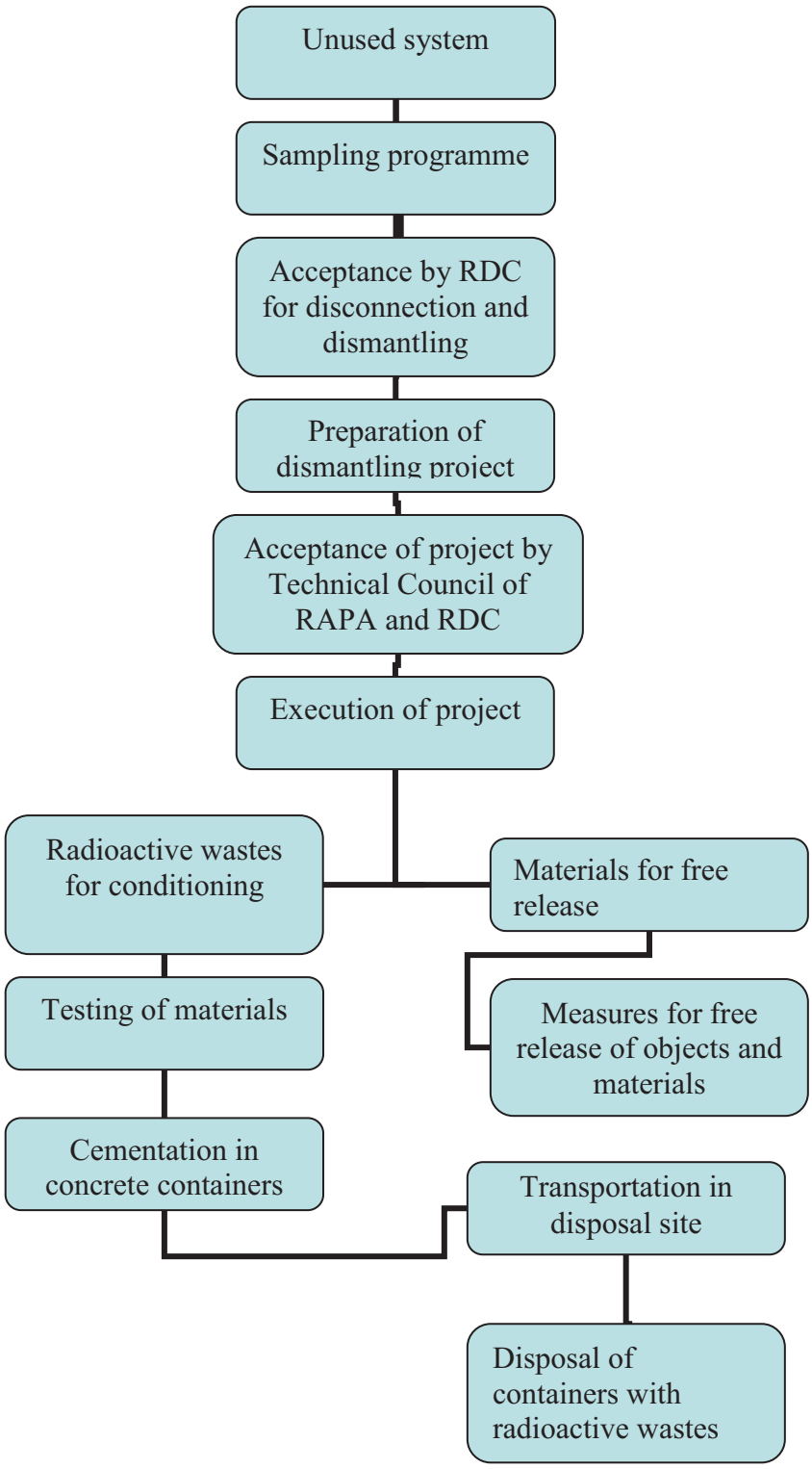

FIG. I.D-2. Organizational scheme for dismantling of unused facilities and reactor systems.

FIG. I.D-3. Dismantling activities in the reactor hall.

FIG. I.D-4. Dismantling of unused concrete tank in the SRR yard.

FIG. I.D-5. Container with radioactive waste being transported to Baldone disposal site.

Taking into account the basic directions of SRR decommissioning:

— Nuclear materials management (NNM);
— Radioactive waste management(RMM);
— Dismantling and decommissioning of SRR(D&D);
— SRR site reuse for installation of National Multipurpose Cyclotron Centre(NMCC)

The involved stakeholders are described in detail in Table I.D–3.

The experience of involving stakeholders in the Salaspils RR D&D project shows that they should be involved at the early stage of project planning and execution. The stakeholder impact on the SRR decommissioning in most cases had a positive effect with the exception of Baldone municipality, which significantly hindered the upgrade of the radioactive waste repository and increased the total cost of the project [I.D–11]. Some negative impact on the implementation of decommissioning was caused by the media, researchers and scientists, and NGOs. These impacts were identified during EIA studies for the upgrade of the repository. The main recommendations of the EIA studies were:

— Increase safety of repository;
— Develop PR activities for education of society;
— Develop compensation mechanisms for local municipality.

TABLE I.D–3. SALASPILS STAKEHOLDERS

No.	Stakeholder	Direction of decommissioning	Functions	Impact on decommissioning
1.	Government	NNM, RMM, D&D, NMCC	Decision making, financial support	Govern D&D process
2.	Radiation Safety Centre	NNM, RMM, D&D	Approval of plans, control of execution	Facilitate SRR D&D
3.	Environmental Protection Foundation	NNM, RMM, D&D, NMCC	Financial support	Facilitate SRR D&D
4.	Environmental Quality Control Bureau	RMM, D&D, NMCC	Approves Environmental Impact Assessment studies and issue permits	Facilitate SRR D&D
5.	Salaspils municipality	RMM, D&D, NMCC	Site municipality , approves EIA results	Facilitate SRR D&D
6.	Baldone municipality	RMM	Repository site municipality, approves EIA results	Hinders SRR D&D, increase expenses
7.	Customers	NNM, RMM, D&D, NMCC	Execution of projects on the Contract basis	Facilitate SRR D&D
8.	Radiation related construction commission	RMM, D&D, NMCC	Construction permits for radiation related projects	Facilitate SRR D&D
9.	International stakeholders (IAEA, EC, DOE, Russian companies, etc.)	NNM, RMM, D&D, NMCC	Implementation and financial support for decommissioning related projects	Facilitate SRR D&D
10.	Researchers and scientists	D&D, NMCC	Site related persons	Facilitate/hinder SRR D&D
11.	Media	RMM, D&D, NMCC	Information supply for society	Facilitate/hinder SRR D&D
12.	NGOs	RMM, D&D	D&D control on behalf of societal interests	Facilitate/hinder SRR D&D

The existing cooperation between the Baldone municipality and repository includes the following measures:

— Preparation and submission of a 3 month activity report for local municipality
— Preparation and submission of annual environment monitoring report
— Participation in the renovation activities of Baldone middle school
— Support of different projects by Baldone municipality
— Developing of waste minimization programme for decommissioning of Salaspils research reactor.

This last issue demonstrates the changes in the planning of decommissioning due to negative impact of the local municipality. Previous plans included the conditioning and disposal of low-level radioactive wastes together with other radioactive materials.

I.D–4. CONCLUSIONS

1. The involvement of stakeholders had an important impact on the decommissioning.
2. Early involvement of a project organization and international stakeholders significantly facilitates decommissioning of the Salaspils research reactor.
3. Additional efforts should be taken to allow cooperation with the local municipality to enhance support for the radioactive waste management system in Latvia.

4. The education of society is necessary for further development of the radioactive waste management system in Latvia.

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Annex I.E

LITHUANIA: EARLY CLOSURE OF THE IGNALINA NUCLEAR POWER PLANT

I.E–1. INTRODUCTION

Lithuania is the largest of the three Baltic States located at the crossroads between Europe and Russia. Facing the Baltic Sea, the country has common borders with the Russian Federation (Kaliningrad region), Poland, Latvia and Belarus. The country became independent in 1990 following the collapse of the Soviet Union. At the break-up of the USSR, Lithuania inherited the electricity generating capacity constructed to supply the northern part of former Soviet Union. Ignalina nuclear power plant (INPP) is located in the north-east of the country, 130 km from the capital, Vilnius, and close to the borders of Belarus and Latvia.

INPP, with two soviet-designed RBMK-1500 (Chernobyl type) reactor units, is the only nuclear power plant in Lithuania and the only one of its type in the European Union. The first reactor unit was commissioned in 1983 and the second in 1987. Ignalina NPP has played an important role in 1990 during the economical crisis of Soviet Union ensuring electricity supply for the country. After Lithuania's independence, Ignalina NPP has contributed more than 70% of the national power supply.Export to the neighboring countries has also played a significant role.

The town of Visaginas (population approx. 30,000) was purpose built to serve the nuclear power plant and staff were brought in from throughout the USSR. With 3344 direct employees (this number is decreasing each year), Ignalina NPP remains by far the largest local employer. Although there are pockets of Russian-speakers in communities throughout Lithuania, Visaginas is the only example of a whole Russian-speaking town.

In 1993 Ignalina NPP received €35 million from the EU to support nuclear safety and agreed not to change the fuel channels after the end of their service lifetime. In October 1999, the National Energy Strategy was approved by the Lithuanian Parliament and included the shutdown of the Unit 1 Reactor at Ignalina NPP in 2004. An updated National Energy Strategy, approved by the Lithuanian Parliament in October 2002, included the shutdown of the Unit 2 Reactor in 2009. This formed part of the agreement for Lithuania's accession to the EU in May 2004. The renewed National Energy Strategy, adopted in 2006, has opened a door for construction of a new nuclear power plant. The law on the construction of a new NPP is under discussions at Parliament (Seimas). In the course of preparation for the decommissioning of Unit 1 of Ignalina NPP, the law on Decommissioning Ignalina NPP Unit 1 was adopted in the year 2000. The Government of the Republic of Lithuania approved the Decommissioning Program. The plan for implementation of the program is renewed each year by Order of the Minister of Economy. The law on decommissioning of Unit 2 is expected to be announced shortly. This decision is vitally important for Lithuania, because INPP even with one unit in operation is a major producer of cheap, clean and reliable electricity. The discussions at different political levels, both inside Lithuania and within the European Commission, relates to the prolongation of the operation of Unit 2 beyond 2009. The lack of a firm decision brings uncertainty in the region because it causes the local community to believe in the prolonged operation of Unit 2 and does not allow clear planning and preparations for post-shutdown activities. The following sections highlight the role of important stakeholders in the context of the INPP shutdown and decommissioning.

I.E–2. LITHUANIAN GOVERNMENT

Once the law for the Decommissioning of INPP Unit 1 had been issued**,** then the Programme for the Decommissioning of Unit 1 commenced. This programme identifies all active stakeholders in preparation for the decommissioning and implementation of necessary tasks and activities. The Commission on the Co-ordination of National Energy Strategy Provisions Related to Ignalina NPP was established to promote better communication between stakeholders.

The key bodies in the Decommissioning Programme are:

The Ministry of Economy - the owner of Ignalina NPP and also the institution appointed by the Government to ensure overall coordination and implementation of the Decommissioning programme and also responsible for EU - and national decommissioning funds including the control and administration of those funds.
Ignalina NPP - as the operator of the nuclear facility, responsible for decommissioning of the nuclear site. Ignalina NPP has established a specialized Decommissioning Service at the plant which manages the decommissioning projects.
Nuclear Safety Regulator – VATESI – responsible for the licensing of decommissioning projects and ensuring nuclear safety
Radiation Protection Centre (RSC) - responsible for the radiation protection of workers and the public.
The Radioactive Waste Management Agency (RATA) - responsible for the disposal of radioactive waste generated by the decommissioning. RATA will own and operate the radioactive waste repositories to be constructed.
Ministry of Social Security & Labor - responsible for the implementation of social measures in the region, and the local authorities are the main players in tackling the economic regeneration of the region.
Ministry of Finance- responsible for the financing issues, related to the structural development at the national level and for EU support for the decommissioning.
Ministry of Environment - responsible for licensing in construction, demolishing and any other aspects relevant to environmental protection (Law on Environmental Impact Assessment).
Ministry of Interior- responsible for the regional development.
Ignalina NPP region's Council and Regional Development Agency- responsible for preparations for decommissioning in the social economical sphere at the local municipal level and facilitating regional restructuring.
Utena's County- administrative body for local development
Technical support organizations- involved in specific issues regarding nuclear safety, environmental protection issues, etc.

Three stages of implementation of this programme have been defined:

- Stage 1 – preparation for decommissioning (2000-2004)
- Stage 2 – preparation for disassembling of the facilities for the long-term storage period (2005-2010)
- Stage 3 – disassembling of facilities and buildings according to the immediate dismantling strategy (2011-2030).

The programme was renewed in 2005 and the implementation plan is renewed yearly under the control of the Ministry of Economy's Commission.

I.E–3. EUROPEAN SUPPORT

I.E–3.1. EU accession support programme — PHARE[4]

Multilateral assistance projects financed by the EC on RBMK NPP decommissioning are either plant-specific or generic. During the period 1995-1999, the EC performed a comprehensive data collection and reviews of the policies and systems for radioactive waste management and decommissioning of nuclear installations, with particular focus on the EU accession countries. A large number of generic constraints and deficiencies were identified. In the past, the production of electricity and design and construction of new NPPs were considered as priority, whereas maintenance, safety upgrading, treatment, interim storage and final disposal of radioactive

[4] The PHARE programme is one of the three pre-accession instruments financed by the European Union to assist the applicant countries of Central and Eastern Europe in their preparations for joining the European Union.

waste were not of the same priority. It was also noted that decommissioning of a nuclear installation depends heavily on local, regional and national factors, leading to the need of specific analysis for each plant. Waste generated by the same type of reactor is influenced by the "history" of each reactor, including incidents and/or accidents, modifications to improve operational safety and its lifetime. Specific criteria defined by each country also influence the amount of generated and classified waste.

The European Commission funded a number of major research programmes in support of decommissioning activities covering a wide range of projects from planning and technology development through to full-scale demonstration decommissioning projects.

Within the framework of the PHARE Programme there have been a number of projects related to preparation to decommissioning of Ignalina NPP which were implemented between 1998–2004. One of the most important PHARE projects was the Preliminary Decommissioning Plan (PDP) for Ignalina NPP [I.E–1]. The objective of this study was to develop a preliminary decommissioning plan and to estimate the decommissioning costs. The decommissioning plan and the cost estimates covered all decommissioning activities before and after permanent shutdown of the Ignalina Units 1 and 2. The total costs of the Ignalina Units 1 and 2 decommissioning (without considering final disposal of spent fuel) were estimated to be in the range between €800 million and €1000 million depending on the choice of the dismantling scenario. These costs include investments of approximately €170–€190 million for pre-decommissioning activities during 2000–2010 and approximately €300 million for decommissioning during 2010–2020. This PDP provided background material for the preparation of the Final Decommissioning Plan (FDP).

The EU PHARE project, "Support to the Decommissioning of Ignalina NPP – Social Costs" [I.E–2] provided support in estimating the social costs arising from the decommissioning of the Ignalina Nuclear Power Plant (INPP) so that strategic choices for public investment programs can be justified. The options for the development of the Ignalina Region are articulated through the Ignalina Region Regeneration Strategy, Outline Development Plan and other similar documents. Although this project did not have an explicit institution-building component, it effectively strengthened the capacity of institutions at the national and regional level to tackle the social and economic issues related to INPP decommissioning. A current project will (2007) take this work further in strengthening the capacity of Government to coordinate and monitor the INPP decommissioning projects.

Support for Lithuania in Decommissioning was provided in 2000–2004 using the PHARE programme. The main recipients of this support were the INPP, regulators, and the non-energy sector. It strengthened the competence of regulatory infrastructure and enhanced institutional building in nuclear decommissioning.

I.E–3.2. Ignalina Programme

In accordance with the EU Accession Treaty and its Protocol No 4, Lithuania committed to the closure of the Unit 1 reactor at the Ignalina NPP, before 2005 and of the Unit 2 reactor at INPP, by 31 December 2009 at the latest and to the subsequent decommissioning of these units. The EU member states have acknowledged that the decommissioning of the INPP will last longer than the approved financial allocations and that the decommissioning is an overly heavy financial burden to Lithuania (given its size and economic capacity), and expressed their solidarity with Lithuania in providing the necessary support to the decommissioning after Lithuania joined the EU.

According to the Protocol, the Community shall provide Lithuania with additional financial assistance in support of its efforts to decommission and to address the consequences of the closure and decommissioning of INPP (hereinafter "the Ignalina Programme"). The Ignalina Programme provided €320 million during the period 2004–2006 and is committed to provide €746 million within the period 2007–2013.

I.E–4. BILATERAL ASSISTANCE

Bilateral assistance has complemented the efforts of Lithuania's Government and the EU in the pre accession period. It filled a gap, where necessary, in support of the establishment of the nuclear infrastructure and was instrumental for local communities to adjust to the regeneration and diversification of the regional economy.

I.E–4.1. Great Britain

The British Government, through its Department of Trade and Industry, established a programme in 1996 to promote the adoption of internationally recognized safety and regulatory standards within Lithuania's nuclear industry [I.E–3]. The programme thus complemented the multilateral actions of the EU and the IAEA which were intended to develop internationally accepted benchmarks for NPP safety and strengthen regulations.

Social mitigation programmes emerged from the measures to enhance safety. The Convention on Nuclear Safety, adopted by IAEA Member States, permits governments to take account of the social, environmental and economic impact in timing the shut-down of a nuclear installation. The Nuclear Safety programme and its subprogramme on social consequences' mitigation helped Lithuania to prepare solving issues such as:

- Planning for the social aspects of decommissioning
- Diversification including NPP spin-outs
- Local economical development
- Community capacity building
- Communication, exchange of experience and dissemination of lessons learned between NPP countries.

The programme ended in 2004, after Lithuania's accession to the EU.

I.E–4.2. Sweden

The Swedish government has a significant bilateral assistance programme in the sphere of nuclear safety. In 2000, the Swedish International Project Nuclear Safety (SIP) and the Ministry of Economy of the Republic of Lithuania agreed to implement a long-term project with the objective of developing a national competence in Lithuania on the disposal of radioactive waste. In 2001, the Radioactive Waste Management Agency-RATA, became the Lithuanian counterpart of SIP in implementing the project.

Supported by Swedish companies, RATA prepared the reference design of a near surface repository for the disposal of short-lived low- and intermediate –level radioactive waste in Lithuania. A multi-barrier design of a mound type has been selected. A repository of such a design would reliably protect the environment from potential contamination for 300 years.

A team of Lithuanian experts-comprising specialists from RATA, as well as scientists from the Lithuanian Energy Institute, the Geological Survey of Lithuania, and the Institute of Geology and Geography - has been set up to analyze different aspects of spent nuclear fuel disposal. Consultants representing the Swedish Nuclear Fuel and Waste Management Co (SKB) offered their assistance.

I.E–4.3. Germany

Germany was a bilateral supporter in decommissioning for Ignalina NPP with its fresh experience in decommissioning of the Greifswald NPP in the former East Germany. Conditions affecting decommissioning were similar in Germany and Lithuania, as were political decisions and economical parameters. East Germany had just joined West Germany. Company Gesellschaft fur Anlagen- und Reaktorsicherheit mbh (GRS) and Energiewerke Nord GmbH (EWN) stipulated a bilateral project with Ignalina NPP for transferring their experience to specialists from INPP and other institutions. The bilateral support ended when Lithuania became a member of the European Union.

I.E–5. IAEA

Being one of the first countries in the region to sign the Country Programme Framework, Lithuania attaches great importance to technical cooperation with the IAEA. For more than 10 years the IAEA has been constantly assisting Lithuania in its efforts to establish, enhance and maintain an effective national infrastructure and capabilities in such areas as nuclear safety, radiation protection, nuclear security, radiotherapy and decommissioning and radioactive waste management. Following the decision to shut down Ignalina NPP, the

safety of the plant during the remaining operational period and during decommissioning is considered as high priority.

Over a number of years IAEA-supported projects have proven to be very effective, providing extremely valuable assistance to the national nuclear safety authority, utility and national technical support organizations. Through these projects national experts were acquainted with advanced experience and techniques in the field of nuclear safety and were given opportunity to share their experience with international peers.

Lithuania has rather limited national capabilities, to maintain nuclear knowledge, to train the staff of regulatory authority and utility and to establish and maintain qualification of experts, therefore IAEA-supported projects on nuclear safety provide a key input.

Similarly, the national project on the "Support for decommissioning" was successfully implemented with the assistance of the IAEA. It played a prime role in the preparation of all necessary planning documents and also of tenders for decommissioning infrastructure.

No issue is more critical to the future of nuclear energy than proper management and safe disposal of radioactive waste. Considering that Lithuania has to deal with radioactive wastes from the INPP operation, as well as radioactive wastes that will originate during decommissioning, establishment of national waste management is an issue of great importance. With the assistance of IAEA and other international partners, Lithuania progressed substantially in pursuing this objective. National legislation was developed and the National Radioactive Waste Management Agency was established. In 2002 the Government of Lithuania adopted the Strategy of Radioactive Waste Management. Furthermore, Lithuania has recently ratified the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.

I.E–6. FINANCIAL INSTITUTIONS

The total cost of the decommissioning of INPP Units 1 and 2 during the period 2001 (start up of preparation for closure of Unit 1) to 2029 (demolition of last decontaminated INPP buildings) is estimated in the FDP at €1337 million (basis 2002) [I.E–4]. In regard to this figure, one should note that the labor cost has a major impact on the overall cost estimation for the decommissioning and the evolution of wages over such a long period is difficult to predict. Assuming all the above factors being kept identical, then the FDP also estimates a total decommissioning cost of €2,019 million when considering an increase of wages from €6 per hour in 2002 to €40 per hour in 2026.

The four financial sources available at the moment for financing decommissioning and waste management projects are:

- Ignalina International Decommissioning Support Fund (IIDSF) — administered by European Bank for Reconstruction and Development (EBRD).
- EU Programmed Instrument — administered through the Lithuanian Central Project Management Agency (CPMA)
- State Enterprise Ignalina NPP Decommissioning Fund (NDF) — administered through Ministry of Economy (MoE).
- State Budget.

Although managing four different sources of funding is not itself a problem, other than understanding and operating different funding and procurement rules, the major challenge is fully defining, justifying and costing the decommissioning projects in advance of their execution. For example, IIDSF Donors and the Lithuanian Government need the funding requirements defined often 7 or 8 years in advance of the actual expenditure. A possible inadequacy of project definition and cost estimates can cause considerable difficulties and delays to individual projects and the overall decommissioning programme. It is essential therefore to continue to review the scope of work and cost estimates as projects progress from the initial idea to a fully defined Technical Specification. Keeping the fund administrators fully informed of any changes is also imperative.

A further lesson learned relevant to stakeholder interactions is that although INPP are responsible for the decommissioning, the decommissioning process is in reality controlled by the Administrators- EBRD and MoE. Strong working relations with the Administrators are therefore essential to quickly and effectively resolve

financial and commercial issues that inevitably arise on major projects. This approach should ensure funds are both sufficient and available when needed. The most complicated issue remains the complex rules for projects financing, implementing and control.

I.E–6.1. International Ignalina Decommissioning Support Fund (IIDSF) — European Bank for Reconstruction and Development (EBRD)

The IIDSF, currently managed by the EBRD, was established on the basis of the Framework Agreement between the EBRD and Lithuanian Government. On 12 July 2001, the Seimas (Parliament) of the Republic of Lithuania ratified the Framework Agreement. The purpose of the IIDSF is to finance or co-finance through specific grants, two main areas of work:

- Decommissioning activities concerning INPP (nuclear projects "window")
- Measures which are consequential to the decision taken to close and decommission the INPP, and which would assist the necessary restructuring.

IIDSF - established by EBRD's Board of Directors on 12 June 2000 - is governed by the Assembly of Contributors providing strategic guidance compatible with the rules of EBRD. The EBRD, as IIDSF manager, provides technical, project management, financial and legal and administrative services. Any member of EBRD and any interested country may contribute to the Fund. The minimum individual contribution shall be at least ?1.5m. Contributions may be earmarked for one of the purposes of the International Fund but not for specific projects. The EBRD's procurement policies and rules are applied to use the funds, with the general rule that procurement will be limited to the countries of contributors or countries of EBRD operation. The International Fund remains in force for a period of ten years. It commenced its operations through the first meeting of its assembly of Contributors held on 5 April 2001. On this occasion, the Assembly adopted the first work programme of the IIDSF. Currently 15 contributors support the International Fund, mainly member states of the European Union as well as other European countries. As a representative of the European Community and the largest contributor to the International Fund, the European Commission chairs the Assembly of Contributors. Since 2000, the Assembly has generally met twice a year.

I.E–6.2. Programmed Instrument

In 2004 a key decision was taken by the Lithuanian authorities. It was requested that the European Commission provide direct support to the staff of Unit 1 who would be involved in the post-closure safe maintenance of the plant. This could only be done through the different financial tool (subsequently referred to as the Programmed Instrument). Having established a precedent for the wider use of the Programmed Instrument, it became clear that other projects could also fit this financing mechanism.

I.E–6.3. National Ignalina Decommissioning Support Fund

The National decommissioning fund (later referred to as Fund) began an accumulation of money in 1992. The main source of the Fund is a levy from the INPP's sold electricity. From the year 1996 it is 6%. The fund now is operating according to the Law on Ignalina NPP Decommissioning Fund adopted in 2001 and amended in 2006. The Fund finances the projects that are in line with the Decommissioning programme but at a smaller scale than the IIDSF and PI: site preparation, infrastructure projects at Ignalina NPP, site selections projects at RATA, co financing non nuclear projects, socioeconomic development projects, etc.

I.E–7. OPERATORS OF NUCLEAR INSTALLATIONS

I.E–7.1. Ignalina Nuclear Power Plant

The decision to shutdown INPP Unit 1 and Unit 2, several years before the end of its normal design life, presented INPP and the Lithuanian Authorities with the challenge of preparing for decommissioning in a relatively short time. The preparation included decommissioning strategies, funding, project development, organizational issues, staff training, and the transformation of INPP from operator into a decommissioning organization.

Under normal circumstances, shutdown and decommissioning of the Nuclear Power Plant would have followed the path of first determining and agreeing with the relevant Authorities the Decommissioning Strategy. The next step would have been to prepare successive Decommissioning Plans resulting eventually in a Final Decommissioning Plan (FDP) to be approved by the Nuclear Regulator (VATESI) and Lithuanian Government [I.E–4].

Pre-decommissioning activities for Ignalina NPP started in November 1999 with the development of first project proposals for:

— The planning of the overall decommissioning process;
— The procurement of the facilities needed to manage and interim store the radioactive waste and the spent nuclear fuel, to secure reliable back-up heat and steam sources and to ensure availability of adequate long term technical archives.

The decommissioning process at INPP is compliant with the chosen Immediate Dismantling strategy and is divided into several phases. The main activities during the first phase following closure (the "defueling phase") are:

— The removal and intermediate storage of spent fuel.
— The retrieval, management and intermediate storage of stored operational solid radioactive waste.
— The system modifications for post-operation conditions aiming at ensuring nuclear safety.
— The isolation/draining down of the systems that are not needed any more.
— In line with the Immediate Dismantling strategy, the dismantling and decontamination of systems, equipment and components no longer needed could start during this phase provided that safety of the fuel was not endangered and that the waste produced could be safely managed.

During the INPP Unit 1 and 2 decommissioning process, safety is the overriding priority. This is ensured by the strong safety culture already existing at INPP, by a clear staff structure and a Quality Assurance System ensuring that all staff understands their roles and duties, and ensuring that the whole process complies with the regulatory framework set up by Lithuanian legislation.

The manpower required for decommissioning of INPP (including the modification of the systems to cope with the new status of the Units, post-shutdown operation of the Units, fuel removal, the implementation of decommissioning, operation of the existing waste treatment facilities, operation of the new facilities under the Investment Support Packages and operation of the radioactive waste repositories are estimated in the FDP as indicated in Fig I.E–1. The manpower that can be globally considered as available for decommissioning is estimated as indicated in upper curve. Taking retirement into account the INPP manpower actually available for decommissioning activities is indicated by the lower curve.

I.E–7.2. Radioactive Waste Management Agency

The decommissioning process will generate large volumes of very low, low, medium and high-level radioactive waste. The estimated volumes of unconditioned waste produced by decommissioning are as follows: Group 1 (low level waste) 75,000 m^3, Group 2 (intermediate level waste) 25,000 m^3, and Group 3 (high level waste) 5,000 m^3. The indicated volumes arise from dismantling of equipment and materials contained in the INPP facilities. After decontamination of the emptied INPP facilities, final dismantling of the building structures

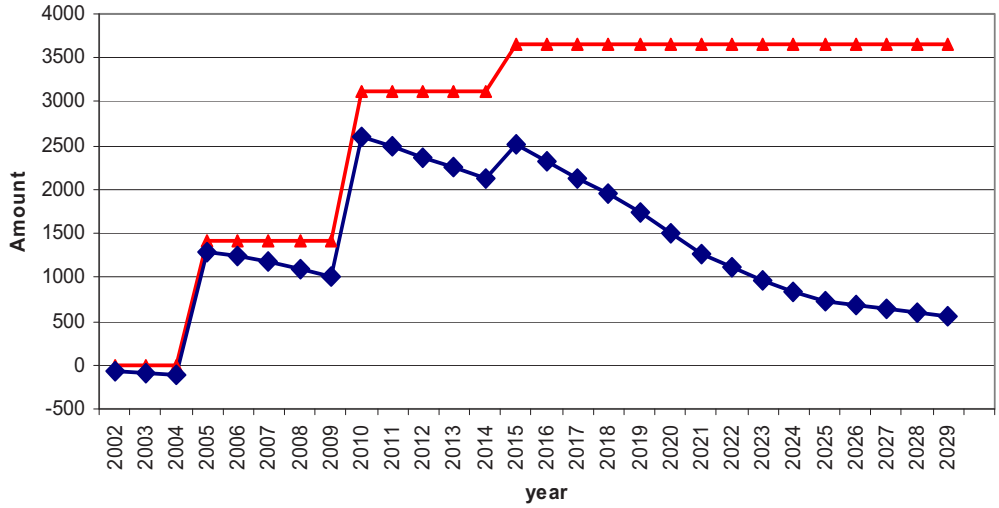

FIG. I.E-1. Personnel profile in the course of INPP decommissioning.

will in addition generate some 1,000,000 m^3 of concrete and 200,000 t of steel for free release. These waste volumes will be processed and temporarily stored on site, as Lithuania has currently no available facilities for final disposal. This will require maintaining at INPP site waste storage facilities over a long period of time waiting until a landfill site, near surface repository and deep geological repository are operational in Lithuania

The new Solid Waste Management Storage Facility (SWMSF) will allow management of the solid radwaste from operation and decommissioning. The SWMSF facility is also foreseen to interim store the above waste once managed and until the national repository (NSR) becomes available.

Once the NSR is available (early 2012 as estimated in the FDP), the SWMSF interim storage will act mainly as a buffer storage for the waste pending transport to the NSR for disposal. By this time part of the decommissioning waste could be sent directly to the NSR.

The Lithuanian Radioactive Waste Management Agency (RATA) drafted the general Waste Acceptance Criteria (WAC) for NSR, these have been approved by the Lithuanian Nuclear Safety Authority (VATESI)**.** RATA also manages the NSR site selection process (soil investigations and preliminary Environmental Impact Assessment). Due to the fact that earlier sites envisaged were questioned by Belarus and Latvia, one additional repository site in the vicinity of INPP is currently under review.

I.E–8. REGULATORS

Recognising that the decommissioning of INPP will, at each stage, present new and unfamiliar challenges to the two regulatory bodies, VATESI (nuclear safety) and RPC (radioprotection), both of which have a key role in the approval of decommissioning projects, the EC under the PHARE programme provided targeted technical assistance. This practice is continuing under the Ignalina Programme.

I.E–8.1. State Nuclear Power Safety Inspectorate (VATESI) [I.E–5]

The functions of state regulation are fulfilled by VATESI set up on 18 October 1991 by the Resolution of the Government of the Republic of Lithuania.

To decommission a nuclear power facility, adequate preparation is necessary, and all kinds of organizational and technical measures need to be implemented. The principal function of VATESI in preparation for decommissioning of the Ignalina NPP is to analyze and approve the documents submitted by INPP. International experts assist Lithuanian regulators. VATESI has been implementing the PHARE project *Support to VATESI and Lithuanian TSOs in licensing activities related to decommissioning of Ignalina NPP* with

a view to obtaining support from skilled, experienced experts. Implementation of the project began on December 26, 2001, after the implementation agreement had been signed with the SKI-CP/RISKAUDIT consortium. SKI is the Swedish Nuclear Inspectorate and RISKAUDIT is the French-German TSO-management organization formed by IRSN - Institut de Radioprotection et de Sureté Nucléaire and GRS - Gesellschaft für Anlagen und Reaktorsicherheit organizations. The consortium also subcontracts technical support from organizations within Belgium, Finland, UK and Lithuania to provide experienced experts, in the field of decommissioning NPPs and radioactive waste management, to support VATESI in the licensing of INPP decommissioning related activities. Experts from Belgium (AVN), France (IRSN), Germany (GRS), Finland (STUK), the United Kingdom (Serco Assurance) and Lithuanian and Swedish Technical Support Organizations participated in this project. The project is being implemented in stages.

The Decommissioning and Radiation Protection Department control the radioactive waste disposal, license the spent fuel storage facilities, control the level of INPP preparedness for emergencies, notify international organizations and neighbouring countries about nuclear accidents.

I.E–8.2. Radiation Protection Centre (RSC)

The assurance of radiation protection of the Lithuanian population is a continuous process. The mission of the Radiation Protection Centre (RPC) is to:

- protect the public and workers from the impact of radiation;
- to organize and carry out the radiation protection supervision and control;
- to conduct monitoring and expert examination of occupational and public exposure.

During preparation for the decommissioning of INPP, changes in INPP structural departments are proceeding. A growing part of the work conducted at INPP falls on external workers. In order to ensure radiation protection of these workers, the Lithuanian Hygiene Standard HN 83:2004 “Radiation Protection of External Workers” was prepared. This Standard will help to better organize the radiation protection of workers, either during normal INPP operation (as long as Unit 2 is in operation) and during its decommissioning.

I.E–8.3. Ministry of Environment (Environmental Protection Agency)

The preliminary Environmental Impact Assessment shows that, with appropriate care, Immediate Dismantling is feasible. From a nuclear safety standpoint, the activities involving a more significant risk are concentrated in the first 7-8 years after the reactor final shutdown (spent fuel handling, decontamination, systems modifications and isolation etc.). These activities will be prepared and carried out by the skilled INPP teams that will be still available at INPP for the Immediate Dismantling. The same will apply to the qualifications and experience required of the Licensing Authority.

I.E–9. MINISTRY OF SOCIAL AFFAIRS AND LABOUR

The Law on Additional Employment and Social Guarantees for the Employees of the State Enterprise Ignalina Nuclear Power Plant (adopted in April 2003) establishes additional employment and social guarantees for INPP employees, who are being or have been made redundant as a result of shutdown/decommissioning of the INPP, as well as for their family members. The Law seeks to mitigate the negative social consequences and to ensure safe and uninterrupted work at INPP pending the end of operation.

It is expected that the Law on Additional Social and Employment Guarantees and other relevant legislation adequately address the following issues:

- Professional training (change of qualifications, additional training and education, decommissioning training, languages, etc.)
- Employment support (compensation for employers creating new jobs for INPP personnel and their families)

- Public works (sufficient funding of public work programme in the region for unemployed INPP personnel)
- Family support (additional social benefits, compensation of expenses for INPP personnel, children university studies)
- Re-allocation support (compensation of expenses for INPP personnel and their families relocating to other regions)
- Pre-retirement compensation (for personnel whose retirement age will be reached in 5 years until they are entitled to a pension)
- Dismissal payments (for INPP personnel dismissed from the plant due to its closure).

In 2001 Lithuania started to develop a personnel-retraining program in accordance with the Unit 1 decommissioning program and a program for the creation of new businesses at Visaginas. A number of training courses will be in place during next few years preparing personnel for the plant decommissioning.

I.E–10. IGNALINA NPP REGION

The Ignalina NPP decommissioning will have an impact on the town of Visaginas as well as the districts of Ignalina and Zarasai. The INPP Region was formed on 26 February, 2002 by Government decision. However, the greatest social consequences will affect Visaginas, which was built for the power plant employees. The earnings and jobs of most of the population in Visaginas and the Ignalina district, and to a smaller extent in the Zarasai district, depend on the NPP, which is the major employer and the largest customer in the region.

Plans for regional development of this region have been developed using EU Structural Funds, Employment Strategy, Program for Development of Small and Medium Business, etc. A regional development agency was created and supported from the National Decommissioning Fund.

In developing the action plan for implementation of the employment strategy in the Ignalina NPP region, efforts were focused on identifying specifics of the region and tackling specific problems.

Specific elements in relation to social economic development are as follows:

— Functioning of the nuclear power plant;
— Prevalence of one production infrastructure (specific and unique with regard to the country);
— Geographical location;
— Specifics of qualified labor force.

The nuclear power plant and decommissioning prospects are a key feature of the region. It is a fact that construction and maintenance of the Ignalina NPP facilitated economic development of the region. Therefore, even decommissioning might have a largely positive effect on the economy and labor market of the region. Accordingly, the basic tasks are as follows:

— Firstly – to ensure further safe maintenance of the INPP in decommissioning using as much local labor force as possible, including all re-training means. This perspective is apparent at international level in countries embarking on decommissioning.
— Secondly – to improve the business environment and increase employment of the population in activities not related to servicing of the NPP.
— More active integration of the region and local qualified labour force into the national economic system could be identified as a separate task.

Taking into consideration the above mentioned tasks, the recommended solutions can be divided into the following categories:

— Stabilization of the labour market of the region;
— Improvement of the business environment;
— Improvement of human resources and social environment;
— Social services;

— Development of the local community.

In conclusion, in tackling problems related to social and economic development of the Ignalina NPP region, it is necessary to ensure a coordinated and consistent approach.

I.E–11. NEIGHBOURING COUNTRIES

Ignalina NPP is very close to the borders of Latvia and Belorussia. There are some tensions with these countries and the municipalities in adjacent regions. These reactions became more acute when Lithuania informed these countries about the new facilities according the Espoo convention on Environmental Impact. Strong reactions from Belarus were in relation to the spent fuel storage facility and the near surface repository for low and intermediate level waste. The relationships with Belarus improved when a joint working group was established at the ministerial level.

I.E–12. LOCAL COMMUNITY

The term "Community" means different things to many people. Defined in its broadened terms, community, like other social institutions, is not merely a collection of individual persons: it is a changing set of relationships, including the attitudes and behaviour of members. Communities speak rarely with one voice and are often full of fractions, struggles and conflicts, often arising from differences in access to resources and opportunities [I.E–3]. When a community receives a message of major social changes, it becomes more organized and ready to fight, later on facilitating the changes, if they are subsequently persuaded that the Government initiatives are in their interest.

The Visaginas community is very specific. Mostly Russian speaking, it is very reactive and emotional. 95% the population of Visaginas depends on the Ignalina NPP. In 2000 when the closure of Unit 1 was decided, open opposition came from the population. After seven years of efforts from the authorities' side, the local community believes in the new initiatives after the final shutdown of Ignalina NPP, but it is still resistant to the closure.

Since the establishment the Regional Development Agency provided support for small businesses and non- governmental organizations (NGO's) to tackle social problems and to improve their relationship with local government. There are three support programs facilitating the positive atmosphere in the:

— INPP Region Small and Medium Size Enterprise (SME) Development Programme;
— Local Initiatives Programme;
— Youth Programme.

I.E–13. MEDIA

Ignalina NPP is in the spotlight of the Lithuanian media. There is an emphasis on controversy and sensationalism. Huge efforts are needed to present a positive message to the public. Nevertheless, two big conferences on the decommissioning of Ignalina NPP took place in 2000 and 2007. But typically, it is very difficult to present everything about decommissioning as positive.

I.E–14. CONCLUSIONS

The political negotiations to close a relatively new NPP have become an object of political debates and speculations. Significant discussions have been held with a variety of stakeholders including the employees of INPP and Members of Parliament which have taken place before and after accession to the EU. The local

community has been keen to believe that the decision to shutdown the INPP can be reversed. This belief has negatively impacted the decommissioning process.

REFERENCES TO ANNEX I.E

[I.E–1] Preliminary Decommissioning Plan for INPP Phare Project No. PH4.08/94, Final Report NIS/SGN/SKB, Document No.: C – 0015.00, December 1999

[I.E–2] EUROPEAN COMMISSION, Phare project LI9806.02 ”Support to the Decommissioning of Ignalina NPP – Social Costs”

[I.E–3] DEPARTMENT OF TRADE AND INDUSTRY, Building Blocks for Regeneration, Achievements and Lessons Learned form UK Programme Addressing the Social and Economical Consequences of Nuclear Power Plant Closures in Central and Eastern Europe, DTI, London, February 2007

[I.E–4] URBONAVICIUS, S., Lessons Learned from Preparation for Decommissioning of Ignalina NPP, Proc. International Conference on Lessons Learned from the Decommissioning of Nuclear Facilities and the Safe Termination of Nuclear Activities, Athens, 11-15 December, 2006, IAEA, Vienna, 2007 (CD-ROM).

[I.E–5] VATESI website http://www.vatesi.lt/en

Annex I.F

STAKEHOLDER INVOLVEMENT IN DECOMMISSIONING IN SLOVAKIA

I.F–1. INTRODUCTION

The Czechoslovak atomic energy history started in the 1950s with the construction of the pilot plant NPP A1 with HWGCR at Jaslovske Bohunice. This nuclear power plant was commissioned at the end of 1972 and shut down after the accident (IAEA accident scale – level 4) in 1977.

The final decision to decommission this plant was issued by the Czechoslovak Government in 1979. So Czechoslovakia was one of the first countries facing decommissioning of large nuclear installations. As the shut down was not anticipated and the Soviet design of the NPP assumed that waste management should be conducted only at the end of the NPP's life cycle, the State was not prepared for decommissioning including all its aspects- funding, waste management, infrastructure and technologies.

Later NPP V1 and NPP V2 – both PWR with WWER 440 were commissioned at the Jaslovske Bohunice site and another NPP with WWER 440 at the Mochovce site. NPP V1 will shortly reach its planned 30 years of operation and although successfully refurbished recently, it is in the process of final shutdown on the basis of a political decision (in 2006 -1st unit and 2008 -2nd unit).

The list of stakeholders involved in the decommissioning, originally very short at the beginning of the nuclear era, is under continuous change with the increase of the "decommissioning industry" and the pressures of new economic and political conditions. The history of stakeholders is described in the following chapters, more from the point of view of problems faced and solved in Slovakia than from the point of view of international progress and changes occurring in other nuclear countries.

In general, it is possible to divide Slovak decommissioning stakeholders into the following categories:

— Owner, operator and licensee;
— Public;
— Government and Regulatory Bodies, European Union (article No. 37 of EURATOM);
— Contractors;
— Media;
— Environmental organizations;
— Public opinion movements;
— International organizations as IAEA, OECD/NEA, institutions of the neighbouring countries.

All these stakeholders played an important role during the process when the decommissioning infrastructure was built. Fig. I.F-1 shows a well attended stakeholders' meeting about the decommissioning of NPP V1.

I.F–2. OWNER, OPERATOR AND LICENSEE

The first Czechoslovak nuclear installation (NPP A1) is owned by the state and was operated / is decommissioned by state organizations. The Investment Company in the 1950s and 1960s was called NPP A1.

SEP (Slovak Electrical Enterprises) was established in 1969 as a trust company; NPPA1 was since this year the subsidiary of SEP. Later (1988) the status of SEP was changed into a state owned company.

The Investment Company for both NPP with VVER 440 (NPP V1 and NPP V2) was IVES. Both NPPs were after the start of the operation, together with NPP A1, integrated to a new organization EBO (Elektrarne Bohunice), the subsidiary of SEP.

After Czechoslovakia was split to form the Czech Republic and the Slovak Republic in 1993, SEP was transformed to a joint- stock company – SE a.s. (Slovenské elektrárne a.s.) owned by the state with subsidiaries EBO (operator) operating all Nuclear Installations at Jaslovske Bohunice site and EMO (NPPs in Mochovce

FIG. I.F-1 Stakeholders meeting about decommissioning of NPP V1 (NPP organization, majors, Nuclear Regulatory Authority, VUJE).

site). In 1996 the new subsidiary VYZ, was established to manage decommissioning and waste management, including disposal and spent fuel management.

Licences for operation and decommissioning of NI were (re)issued by the Nuclear Regulatory Authority on the basis of the Atomic Act [I.F–1] to SE a.s.

SE a.s was under privatization, subsidiaries VYZ (including NPP A1), and NPP V1 were not involved in the privatization process.

A new independant owner/licensee/operator COVCO was established (April 1, 2006) to integrate VYZ and NPP V1 and to operate the WM and Spent fuel Management facilities of VYZ and NPP V1 and to decommission NPP A1 and later NPP V1. The state company GOVCO, was later renamed to JAVYS. JAVYS is the owner, licensee and operator of five nuclear installations 4 nuclear installations at the site Jaslovske Bohunice and a repository close to NPP Mochovce.

EBO, operating NPP V1 and NPP V2 with a number of departments common for both NPPs, was divided into two parts. One of these NPP V2 ("new" EBO) as well as NPP Mochovce (EMO) remain under SE a.s. SE a.s. is partially owned by the state and by the company ENEL (Italy) starting May 2006.

Licences for operation and decommissioning of NIs were (re)issued by Nuclear Regulatory Authority on the basis of new version of Atomic Act [I.F–2].

I.F–2.1 Management of decommissioning

Management of the NPP A1 decommissioning started on a case by case basis, and only individual steps with significant regard to nuclear safety were planned and discussed. This was due to NPP A1 being shut down after a serious accident. The first environmental impact assessment (EIA) required by EIA Act 127/1994 [I.F–3], was developed only for the first stage of decommissioning. The original approach based on deferred dismantling after 70 years changed, due to the growing availability of decommissioning infrastructure, to continual dismantling [I.F–4].

The time schedule is very sensitive to funding, so the scope of decommissioning works increased significantly after the Decommissioning Fund was established in 1995 [I.F–5]. However, the rate of work decreased to half when the Government (Ministry of Finance) temporarily determined the limits for annual

decommissioning budget in relation to the Fund. Due to budget restrictions, some planned and approved activities cannot be implemented even in the case that the work is supported by all stakeholders.

The first decommissioning study, developed for decommissioning of the VVER-440 units, envisaged deferred dismantling for 70 years [I.F–6]. Later, conceptual decommissioning plans were based on dismantling after 30 years [I.F–7]. Documents are now under preparation to consider earlier dismantling based on long term storage of waste being unacceptable for near surface repository. In all cases, the period of deferred dismantling was arbitrarily assumed by the operator; it did not result from analysis of waste management and funding availability

The project management unit (PMU) for the NPP V1 decommissioning, working now under JAVYS, was established to prepare and manage NPP V1 decommissioning.

I.F–2.2 Operational Staff

Because of the recent history of SE a.s., it required many organizational and legislative changes, and therefore the formation of the new company was delayed several times. To prepare for privatization, extensive re-organization was recently undertaken by EBO and VYZ bringing significant reductions of staff. The legal basis for retirement age limit and other pension criteria also significantly changed. On the other hand, companies focusing on decommissioning were established or increased the range of their activities.

It is clear that recent changes brought a lot of uncertainties and strongly influenced the attitudes of decommissioning stakeholders.

I.F–2.3 Visitor Centres

Two Visitor Centres were established originally for EBO (1993) and EMO in several steps on the respective sites Jaslovské Bohunice and Mochovce. Centers were transferred under the SE a.s. umbrella in 2006, Bohunice Visitor Center works also for JAVYS. The Jaslovske Bohunice site Center was completed in 1993 and since that time the number of visitors has increased 10 fold.

The emphasis of the Centers focuses mainly on the operation of nuclear installations, including waste management facilities (information for politicians, cultural celebrities, journalists, public, students, annual sessions for mayors). The Visitor Centers issue monthly information about environmental discharges. Information is available for mayors in printed form and for the public also in electronic form (website).

The Centers also organize events in schools, namely “We are living close to a NPP” and “Energy for life” as well as anniversary events and exhibitions for experts and the public - some of these are focused on the NPP A1 decommissioning. Centers take part in several photographic publications (focused also on NPP A1) dedicated to the public. No regular information is supplied to the media; however, a spokesman/press agent will respond to questions if required. Fig. I.F-2 shows school students at the Visitor Center.

Although NPP A1 construction started in the 1950s and Czechoslovakia was in this respect one of the pioneering nuclear countries, no effort to publicize this fact is visible. The NPP A1 shut-down after an accident and this is probably the reason for public awareness; nevertheless the NPP A1 operation and decommissioning bring great experience and challenge for nuclear and supporting industries in Slovakia**.**

I.F–3. PUBLIC

Until 1976, no legal basis existed for public involvement in the decision making process regarding the nuclear industry. No public hearings were performed for the siting of NPPs at Jaslovske Bohunice. Nevertheless, the management of A1 (later EBO) and EMO was, on a case by case basis, in contact with mayors and the residents of the surrounding municipalities, and they financially supported some small improvements in the community. In 1976 the public began to be informed about safety (safety report) before any construction, change or reconstruction approval on the legal basis of the Act on Civil Structures [I.F–8]. Still no systematic strategic information was available for the public, but EBO and EMO management were in regular contact with mayors twice a year on a voluntary basis.

FIG. I.F-2. School students at the Visiting Centre.

Since 1994, the public have been involved on a legal basis (Act on Environmental Impact Assessment [I.F–3]) with the decision making process even for decommissioning. Regular meetings, between mayors and EBO, EMO, VYZ management focused mostly on the operation of nuclear installations, decreased to once a year, as it was felt that the EIA public hearings gave sufficient information to the public.

The attention of the public around Jaslovske Bohunice, from the point of the view of NPP A1 decommissioning, is focused on the following points [I.F–9]:

- To stop the radioactivity storage on site e.g. disposal of radioactive waste would be preferable to storage on site and spent fuel interim storage at both Slovak sites would be preferable to one interim storage facility at Jaslovske Bohunice;
- To reduce tritium contamination of underground water;
- To remediate extant Cs137 contamination of channel and river banks;
- To reduce radioactive waste transport from the site to repository through the municipalities (for example railway would be preferable to road transport).

The last item is a very good example of views coming from the public and implemented by operator and regulators. The change of the transport mode, from the Bohunice Conditioning Centre to the repository, was requested by the inhabitants of Jaslovske Bohunice during an EIA evaluation meeting for NPP A1 decommissioning, in order to decrease the amounts of radioactive waste transported through the municipalities. Originally, the waste packages were transported by truck. As a railway is connected with the Bohunice site, a cost benefit and safety study [I.F–10] was developed for combining the transport – railway and road. Special railway wagons were designed, constructed and tested; the licensing process was finished, including inactive testing in 2006. Waste packages will be transported to the closest railway stop near the repository and then by truck to the repository.

Public attitude was significantly influenced by the financial support from the nuclear installation in the municipal vicinity. During Bohunice site history, this support was given as follows:

- No financial support to the municipality was legally due till 1992. The operator voluntarily reconstructed some buildings belonging to the municipality. Indirect benefits were acquired in terms of employment, purchasing power, quality of roads and transport. At the beginning of the NPP operation, land/house prices decreased (later they stabilized). On the contrary, more recent efforts of employees to move closer to the NPP site increased the prices.
- Taxes from real estate have been paid since 1992 to municipalities hosting nuclear sites. This is now based on the Municipal Taxes Act [I.F–11]. These payments represent the main income into the municipal budget for four villages close to the Bohunice site.
- Taxes related to nuclear installations are paid to the municipalities up to 30 km from Jaslovske Bohunice or 20 km from Mochovce and the tax amounts are determined on parameters such as distance, size of municipality and number of operators in accordance with the Decommissioning Fund Act [I.F–5] since 2000 and also the Municipal Taxes Act [I.F–11] since 2004.

Before financial support to municipalities was legally based, any support was voluntary and the debate with the public was influenced by the efforts of municipalities to achieve support or to increase its amount. For this reason, municipalities asked Greenpeace and other environmental organizations to take part in discussions with the operator and to pressurize them, although their goals were different. Nowadays there is not a need for such involvement since the public is more informed (a proportion of the residents work at the nuclear site) and less cautious about nuclear safety. Discussion is mostly focused on technical/practical and time schedule aspects of decommissioning. Good co-operation between the public and operators was reached.

As the taxes represent an important part of the budget for several of the local municipalities, the residents main concerns are that the size of the nuclear site is not reduced and the number of nuclear installations or number of operators are not reduced either.

I.F–4. GOVERNMENT, REGULATORY AUTHORITIES AND LEGAL BASIS

As the state was, and still is, the owner of nuclear installations, the government administers NPPs through various institutions: Central Energy Administration (1950s), Main Energy Administration, Ministry of Industry (since 1968), Federal Energy Administration, Federal Ministry of Fuel and Energy (since 1978). After the Slovak Republic was established in 1993, Ministry of Economy of Slovak republic started to play this role.

I.F–4.1. Ministry of Economy, Ministry of Finance, Decommissioning Fund Act

A systematic governmental approach to the end of the fuel cycle including decommissioning started in 1994, when the Government required changes of the decommissioning and waste management infrastructure, and documentation development (not legally required) including the estimating of decommissioning funding [I.F–12]. The need to establish a Decommissioning Fund became obvious, and was also necessary to solve the problem of historical legacies for NPPs operations before the Fund was established (A1-100% of its operational period, V1-80%, V2-30%). The first statutory text of this Act [I.F–5] did not fully solve this problem. The Fund was state-owned, common to all nuclear facilities in Slovakia and the historical legacies were covered by the option (not mandatory) to replenish the Fund from the State budget. In the next two years this option was used (spent fuel transfer to Russia was partially paid from the State budget), but later no funding was available in this way. No feedback mechanism was involved, and therefore no check of the efficiency of the financial resources used was performed.

With the oncoming partial privatization of nuclear installations, the weaknesses of the funding system re-surfaced and the privatization process was delayed. It was under significant revision based on separate sub-budgets for each nuclear installation or main activity, with mechanisms established to cover the historical legacies and use the resources efficiency. The new Act was issued in March 2006 [I.F–13].

Government, through the Ministry of Finance, has a relatively strong power to determine the annual budget of the Fund. For example in 2006 the budget was significantly curtailed (nearly half from the previous year) on the grounds of the overall public budget. Consequently, nearly all contractor activities for NPP A1

decommissioning were stopped regardless of safety requirements. If prolonged, this situation can cause deterioration of nuclear safety, loss of efficiency and loss of experienced staff.

I.F–4.2. Ministry of Environment, Civil Act and the Environmental Impact Assessment Act

Safety documentation for the licensing process of nuclear installations has been required since 1976 [I.F–8]. The Environmental Impact Assessment Act, issued in 1994 [I.F–3, I.F–14], establishes the responsibility of the Ministry of the Environment to evaluate the proposals for all new facilities which may affect the environment, as well as to approve decommissioning options before commencement. These include all direct and indirect impacts, resulting from decommissioning and related new activities, on the urban structure, health, living conditions and well-being of people including personnel are assessed. This also involves the assessment of strategy documentation, including Strategy of Spent Fuel and Radioactive Waste Managements.

The environmental impact assessment process includes hearings of citizens in local and neighboring municipalities, local initiatives and associations. Local authorities, individual citizens, and public institutions may express their comments and opinions in public hearings and/or as written statements. A positive statement by the authorities (Nuclear and Radiation Protection Regulatory Bodies, Ministry of the Environment) is a binding prerequisite for the acceptance of the recommendation by Government. The stakeholders' involvement is presented in Fig.I.F-3.

I.F–4.3. Regulatory bodies

Historically, two basic Regulatory Bodies were established for the supervision of nuclear installations – the Czechoslovak Commission for Atomic Energy (CSKAE) and radiation protection bodies under the Ministry of Health established in the Czech and Slovak parts of the Republic. After Czechoslovakia was split to form the Czech and Slovak Republics in 1993, CSKAE was replaced by the Nuclear Regulatory Authority of the Slovak Republic. An expert group initiated discussion to join both bodies into one (as it is in the Czech Republic) and remove any possible gaps and overlaps between their competencies, but all discussions failed. A special committee was established comprising experts of both Regulatory Bodies to regularly discuss potential problems.

I.F–4.3.1. Ministry of Health, Radiation Protection Regulatory Body, Regulations on Radiation Protection Act

Radiation Protection was supervised and regulated by the Regulatory Body under the Slovak Ministry of Health since the beginning of the nuclear era in accordance with good international practice. The first Regulation was issued in 1972. The Protection of Public Health Act, was established in 1994. [I.F–15]. This Act establishes the responsibility of the Regulatory Body and the requirements for radiation protection. From the point of the view of decommissioning, the Act and the respective Regulation No. 12/2001 provide the material and site release criteria, dose limits and remediation criteria, as well as the rules for de-licensing. To harmonize the Slovak legal basis with that of the EU, the new Public Health Care Act was issued in 2006, [I.F -16] including respective regulations. A new version of this Act was issued in 2007 [I.F–17].

I.F–4.3.2. Nuclear Regulatory Authority, Atomic Act and respective regulations

The strategy and implementation of decommissioning safety aspects are supervised by the Nuclear Regulatory Authority (ÚJD SR) on the basis of the Atomic Act [I.F–1, I.F–2] and related regulations on decommissioning, waste management, transport, safety documentation etc. The act specifies responsibilities associated with decommissioning and requires relevant documentation; details are given in respective regulations issued in 2006.

ÚJD SR issues permission for each decommissioning phase based on the review and approval of safety documentation. All changes concerned on the basis of the Civil Structures Act [I.F–8] as amended and the Atomic Act [I.F–2] are approved by UJD SR in co-operation with Ministry of Health (radiation protection), Ministry of Interior (fire protection) and Ministry of Labor, Social Policy and Family (general safety). ÚJD SR issues the decision on license termination, or in the case of reuse of nuclear installation, for other nuclear

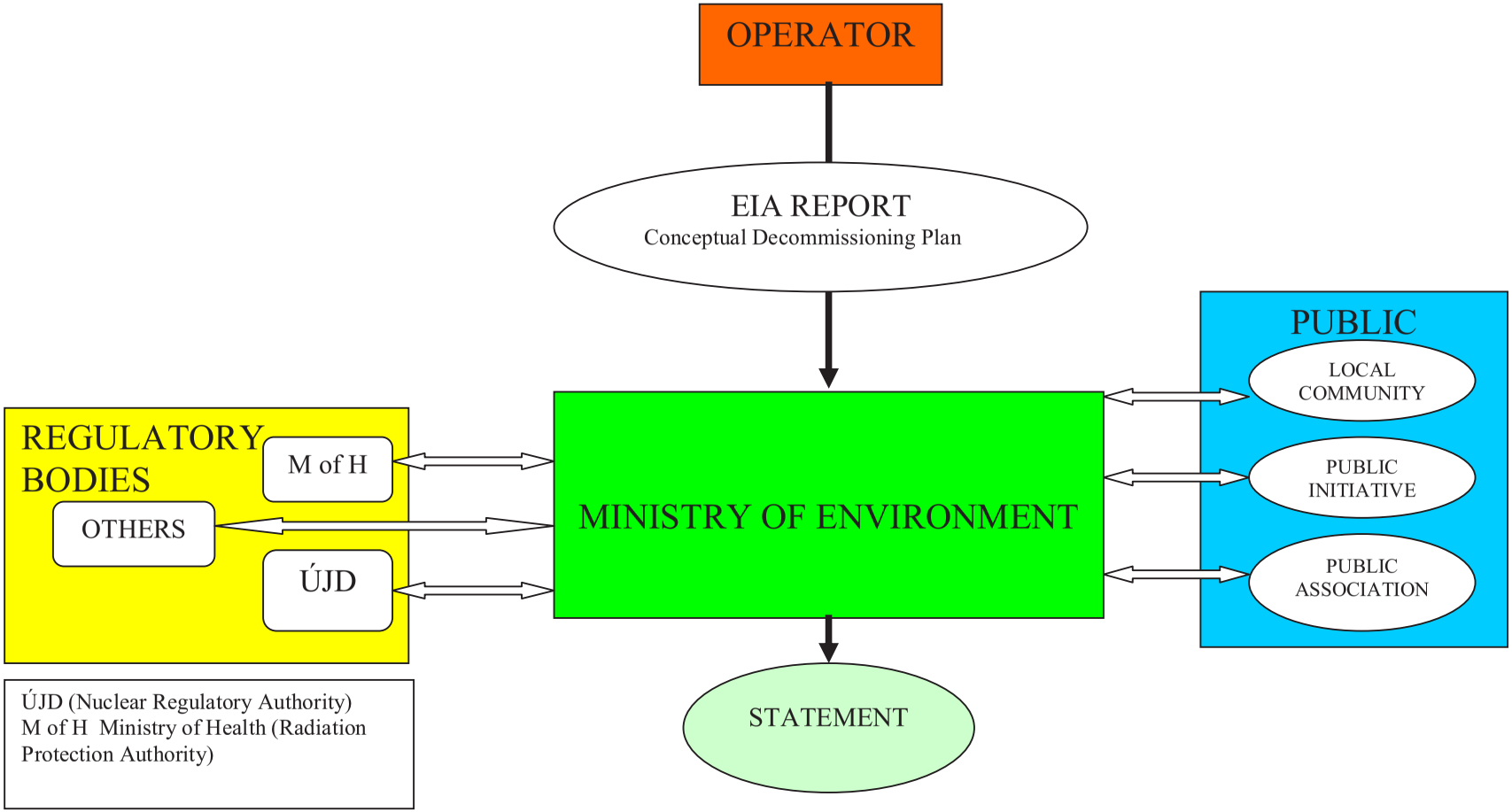

FIG. I.F-3. Environmental Impact Assessment – decommissioning option (Act 127/1994), Slovakia.

purposes the relevant permission on the basis of the final decommissioning report. The amendment of the Atomic Act and the Decommissioning Fund Act, issued in 2007 [I.F-18], established funding of the Nuclear Regulatory Authority.

It was the initiative of the Nuclear Regulatory Authority to undertake regular bilateral meetings with institutions (regulator, scientists, governments) of neighbouring countries. The respective Slovak institutions are involved. The information exchanged relates to the status of decommissioning and preparation for the next decommissioning phases.

I.F–5. CONTRACTORS

Local contractors were established as supporting research and engineering organizations during operation or start of decommissioning of the NPPs. They are focused on development and implementation of techniques for waste management, decontamination and dismantling. With the establishment of a special supporting fund for NPP V1 decommissioning by EBRD (BIDSF), the range of work performed by international contractors significantly increased.

I.F–5.1 VUJE

The Nuclear Power Plant Research Institute (VÚJE) was the first local contractor created in 1977 from the research department of EBO as a State organization. VÚJE was transformed to a joint-stock company owned by employees at the beginning of the 1990s. This contractor is mostly focused on the operation of nuclear installations and the development of waste management and cutting technologies and procedures. VÚJE with subcontractors (INMART) designed, constructed and commissioned several such facilities, including equipment for the decommissioning of NPP A1. VÚJE was also the general contractor /manager for the first phase of NPP A1 decommissioning. VÚJE is now involved in the preparation of documentation for the shut down of NPP V1.

I.F–5.2 DECOM

DECOM was established in 1989, on the basis of an initiative by Russian NPP Voronezh and ROSATOMENERGO, as a joint venture focused on decommissioning planning and implementation for Russian, Bulgarian and Czechoslovak NPPs. In 1993, Russian and Bulgarian branch offices ceased their activities and the Slovak branch office was transformed to DECOM Slovakia Ltd. owned by SE a.s, VUJE and ÚJV ?ež (Czech Nuclear Research Institute).

DECOM Slovakia prepared decommissioning studies and first versions of decommissioning plans for Slovak, Czech and Hungarian NPPs. The computer code OMEGA, developed at DECOM Slovakia under co-operation with EU, is an option oriented calculation and optimization code which is intended to be used in the decommissioning planning phases of NPPs in Slovakia for:

- Assessment of alternative decommissioning options, including costs;
- Multi attribute analysis of the optimal decommissioning option.

DECOM had limited use of this computer code being owned by SE a.s. (the same owner as for NPP V1) and it could not take part in tenders prepared by PMU and paid from BIDSF. This led to diversification of activities and reduction of staff. DECOM return to the competition by tenders will be possible after COVCO becomes the beneficiary of BIDSF (e.g. after involves NPP V1). A new subsidiary organization of VUJE, named DECONTA, was established with staff leaving DECOM. DECOM is also the subsidiary of VUJE since 2007.

I.F–5.3 AllDeco

AllDeco Ltd. was established in 1992. It is a company specializing in procedure development, equipment design, construction and implementation, supplies, performance and service in the following areas:

- Regular decontamination of different parts of NPP with VVER (reactor pressure vessel, steam generator, valves, pressurizer);
- Decontamination of NPP A1 equipment including parts contaminated by beta-gamma and alpha nuclides to high level (remote control equipment);
- Radioactive waste management (solidification of sludge, ion exchange resins);
- Dismantling and reconstruction of equipment, electro-polishing;
- Optimization of procedures;
- Radiological and video monitoring including use of remote operated vehicles;
- Monitoring prior to material release.

AllDeco was a sub-contractor of VUJE for the first phase of NPP A1 decommissioning and prepared under PHARE several projects for NPP A1 decontamination of coolant and moderator systems including management of resulting waste andfor separation of those systems from the reactor.

AllDeco also performed NPP V1 monitoring programes (storage tanks) paid by BIDSF.

Up to 2005, more than 60% of company activities have been focused on decommissioning; instability in decommissioning financial flow, may lead to more diversification of AllDeco activities.

I.F–5.4 International contractors

International contractors (British, German and Belgian companies) joined the Slovak decommissioning market with the implementation of decommissioning work mostly through special EBRD fund (BIDSF) for NPP V1 decommissioning and with PHARE projects. They are not broadly involved in the decommissioning stakeholders' interactions; mostly they act through local subcontractors, due to language problems and lack of detailed knowledge of local conditions. When Slovakia became a member of the European Union in 2005, it became possible to increase the involvement of international contractors (especially European contractors). On the other hand, local contractors started to perform some decommissioning work within other EU countries (AllDeco‘s monitoring equipment at Belgoprocess).

I.F–5.5 Other contractors

There are also other contractors who are involved partially in decommissioning. WERT is focused on the determination of radionuclide content in waste samples.

EKOSUR has performed tritium determination in underground water since 1991 and the removal of contamination by pumping this water from onsite wells since 1999. Although the contamination level in water wells was low, these works were required by the public from the concerned municipalities,

STM was established recently with former DECOM staff to take part in tenders for planning of NPP V1 decommissioning.

I.F–6. MEDIA

The media are not particularly interested in NPP decommissioning, and gave minimum attention to selection and implementation of decommissioning options. Their main interest lies mostly with the commissioning of nuclear installations and to Greenpeace activities against the nuclear industry. The press and television informed the public about the decommissioning budget and funds created for decommissioning, and recently about the new version of the National Decommissioning Fund Act .

I.F–7. PRESSURE GROUPS, ENVIRONMENTAL ORGANIZATIONS

Environmental organizations take part in all public hearings concerning nuclear installations, including hearings about the environmental impact assessment of decommissioning. The goal of Greenpeace (the most

active organization) presentations is mostly to express their opposition to the nuclear industry, to delay projects and to show what is formally defective in EIA documentation or process.

Under this pressure, formal quality of EIA documentation and the quality of presentations of technical options to the public have significantly improved.

The results of a common view by all stakeholders, including the environmental organization, "not to burden future generations with the consequences of current activities", led to significantly shorter periods of deferral before final dismantling.

I.F–8. CONCLUSIONS

Good stakeholder cooperation focused on the interest of the public to technical solutions and time schedule of decommissioning

The period of deferred dismantling was significantly reduced after waste management infrastructure improvement.

Instability in decommissioning financial flow, caused by political decision contrary to approved decommissioning plans, may lead to an increase of total costs and financial instability of operator and contractors.

REFERENCES TO ANNEX I.F

[I.F–1] Act of Slovak Parliament No. 130/1998 Coll. issued April 1, 1998 on Peaceful Use of Nuclear Energy, valid since July 1, 1998.

[I.F–2] Act of Slovak Parliament No. 541/2004 Coll. issued September 9, 2004 on Peaceful Use of Nuclear Energy, valid since December 1, 2004.

[I.F–3] Act of Slovak Parliament No. 127/1994 Coll. issued April 29, 1994 on Environmental Impact Assessment, valid since September 1, 1994, as amended.

[I.F–4] DECOM SLOVAKIA, Environmental Impact Assessment for Decommissioning NPP A1 after first stage, 2001.

[I.F–5] Act of Slovak Parliament No. 254/1994 Coll. issued August 25, 1994 on State Decommissioning Fund, valid since January 1, 2005, as amended.

[I.F–6] DECOM SLOVAKIA, Feasibility study, NPP V1 Jaslovské Bohunice Decommissioning options, 1992.

[I.F–7] DECOM SLOVAKIA, Upgraded conceptual decommissioning plan for NPP V1 Jaslovské Bohunice, 1999.

[I.F–8] Act of Czechoslovak Federal Parliament No.50/1976 Coll. issued May 7, 1976 on Civil Structures and site planning, valid since October 1, 1976, as amended.

[I.F–9] BURCLOVA, J., personal communication of M. Laraia, IAEA, 21 May 2006

[I.F–10] NUCLEAR POWER PLANT RESEARCH INSTITUTE (VUJE) Feasibility study for transport of waste packages to repository Mochovce by railway, Trnava, 1999.

[I.F–11] Act of Slovak Parliament No. 582/2004 issued September 23, 2004 on Municipal taxes and taxes for waste, valid since November 1, 2004.

[I.F–12] DECOM SLOVAKIA, Preparatory Documentation 1994 for the Governmental Decision 190/1994.

[I.F–13] Act of Slovak Parliament No. 238/2006 issued March 16, 2006 on National Nuclear Fund for NI Decommissioning and Spent Fuel and Radioactive Waste Management, valid since July 1, 2006.

[I.F–14] Act of Slovak Parliament No. 24/2005 issued December 14, 2005 on Environmental Impact Assessment, valid since February 1, 2006.

[I.F–15] Act of Slovak Parliament No. 272/1994 issued August 24, 1994 on Protection of Public Health, valid since January 1, 1995.

[I.F–16] Act of Slovak Parliament No. 126/2006 issued February 2, 2006 on Public Health Care, valid since June 1, 2006.

[I.F–17] Act of Slovak Parliament No. 355/2007 issued June 21, 2007 on Public Health Protection and Care, valid since September 1, 2007.

[I.F-18] Act of Slovak Parliament No. 94/2007 issued February 7, 2007 on the amendment of Atomic Act and Act on Decommissioning Fund, valid since January 1, 2008.

Annex I.G

UNITED KINGDOM

I.G–1. INTRODUCTION

This annex describes the policy and practice for Stakeholder engagement being developed by the Nuclear Decommissioning Authority (NDA) in the UK. It is too early to report upon the success or otherwise of the approach so this is provided as 'work in progress' which can be further tracked via the NDA's website at www.nda.gov.uk

The Nuclear Decommissioning Authority is a non-departmental public body, set up in April 2005 under the Energy Act 2004 to take strategic responsibility for the UK's nuclear legacy.

Its core objective is to ensure that the 20 civil public sector nuclear sites under our ownership are decommissioned and cleaned up safely, securely, cost effectively and in ways that protect the environment for this and future generations. It will lead the development of a unified and coherent decommissioning strategy, working in partnership with regulators and site licensees to achieve best value, optimum impact on local communities, and the highest environmental standards.

The text in Annex I.Ga provides a brief background to the role of the NDA, then it considers NDA's policy towards stakeholder engagement. It then goes onto report upon how this policy is being implemented with active engagement of stakeholders.

Annex I.Ga

NUCLEAR DECOMMISSIONING AUTHORITY (UK)

I.Ga-1. ESTABLISHING A POLICY

The Nuclear Decommissioning Authority (NDA) has been established to ensure that the nuclear legacy is cleaned up safely, securely, cost effectively and in ways that protect the environment for current and future generations. To accomplish this remit the organization recognizes the need to establish an open and interactive relationship with its stakeholders, as encapsulated in the following charter.

I.Ga-1.1. NDA Stakeholder Charter

- The NDA is committed to the establishment of an open and transparent relationship with its stakeholders. It will strive to set the highest standards in openness and transparency to inspire public confidence.
- The NDA will adopt a proactive communications style, making information freely accessible by means of a web site, routine publications and reports. It will respond promptly to individual requests and ensure that the information is provided in plain English.
- NDA will welcome and listen to comments from stakeholders on the activities, performance and achievements of the organization and its contractors.
- The NDA will engage with stakeholders and consult widely to ensure there is ample opportunity to understand, comment on and influence its strategies and plans
- The NDA will establish a national stakeholder group to enable stakeholders to explore issues and submit proposals for consideration by the NDA and/or its contractors.
- At local (site) level the NDA will require its contractor to establish and support engagement processes to satisfy stakeholder needs. Stakeholders will be able to review performance, comment on strategies and plans as well as inform NDA decision-making. These processes will include the ability to establish local working groups and to hold public meetings as necessary.

- To ensure stakeholders are able to engage effectively, the NDA and its contractors will ensure that relevant briefing, training and information is provided to support stakeholder involvement and enhance levels of understanding. Due consideration will also be given to requests for access to specialist inputs and advice.
- To minimize barriers to engagement, the NDA and its contractors will hold meetings in public places, including some held outside normal business hours. They will respond positively to any requests for additional information or dialogue. Due consideration will be given to any claims for reimbursement of reasonable expenses incurred as a result of engagement

I.GA-2. TURNING POLICY INTO PRACTICE

The Government's White Paper "Managing the Nuclear Legacy – a strategy for action", published in July 2002, stated that it expected the NDA's operating strategy to include detailed proposals for stakeholder engagement. A first draft of a suggested framework for stakeholder engagement and transparency for the NDA was published as a consultation paper on 22 December 2003. The consultation period closed on 31 March 2004 and the draft was been updated to reflect comments received. Overall, the draft framework was welcomed as being a document that was heading in the right direction. However, stakeholders were clear that several creases still needed to be ironed out. This document should be read in conjunction with the ***NDA Arrangements for Stakeholder Engagement*** document that seeks to explain how the NDA will put this framework into practice. This document is summarized in the following sections.

I.Ga-2.1. Framework for Stakeholder Engagement

I.Ga-2.1.1. Why Engage?

It was felt that only by hearing and considering a range of views would the NDA be in a position to meet its remit and take balanced, well informed decisions on major issues. In addition, transparent decision-making and accessibility of information were seen as key to building public confidence and establishing the credibility of the NDA as a body that can deliver and make a difference. This suggests that the NDA should:

- Involve stakeholders as fully as possible in all matters related to legacy management;
- Ensure the timely input of local and national stakeholder views, advice and
- recommendations into NDA and licensee decision making;
- Ensure that communities affected by work carried out at the NDA's sites can input into the development of site clean up plans;
- Build stakeholder and public confidence;
- Provide effective liaison and interaction between national and local levels of engagement and between sites;
- Clarify upfront what it expects from engagement and ensure that stakeholders clearly understand the level of involvement they can expect from the process, how they can expect to influence the NDA and to understand clearly the structure in which they are participating;
- Ensure there are no surprises;
- *Explain and help stakeholders understand each others perspectives;*
- To clarify the reasons for disputes and seek resolutions where possible.

I.Ga-2.1.2. With Whom?

All agreed with the basic principle that the NDA should:

Engage with everyone who has an interest in a manner that enables the stakeholder concerned to participate in a constructive and positive way.

I.Ga-2.1.3. On What?

The key issues identified by stakeholders as being those that they would like to actively engage with the NDA on were:

- Site end points
- Waste storage and management plans
- Selection of contractors and contract terms
- Plans and targets
- What work and how it should be done
- Use of supply chain
- Standards of safety and environmental performance
- Prioritization of work and the time-scales over which it is to be completed
- Criteria for decision making including funding
- Socioeconomic impacts
- Maintenance of a skill base
- Case for continued operation of THORP, SMP and the Magnox stations
- Liability estimation and funding security

I.Ga-2.1.4. On the Basis of What Information, and How?

This section looks at what information should be made available by the NDA; how the NDA should make this information available; and what information might reasonably be withheld by the NDA.

What should be made available?

Some of the specific pieces of information requested by stakeholders are listed in sec. I.Ga-2.1.3. Particular issues that stakeholders wished to monitor or scrutinize were safety and environmental performance, performance against plan, incidents and accidents, openness and transparency, hazard reduction and the use of funds.

How should information be made available?

It is suggested that the NDA should:

- Make information available in plain English;
- Ensure that information is accessible to all stakeholders, even those with no access to the internet;
- Make information available in a timely manner, so as to allow reasonable opportunity for comments or questions;
- Utilize a variety of communication techniques, including a website, electronic mail and postal mail.
- Make information available with different levels of technical content to enable stakeholders to engage with the debate at the level they feel comfortable.

What information might reasonably be withheld?

While all agreed that some information could justifiably be withheld, the overall operating principle must be that information should only be withheld by exception. Legislation like the Freedom of Information Act must be used to support openness and transparency and not as an excuse to withhold information. It is therefore suggested that the NDA should:

- Agree with stakeholders a process for deciding whether or not information could reasonably be withheld;
- Explain the rationale behind any decision to withhold information;

- Agree an appropriate mechanism, which is consistent with the Freedom of Information Act, for dealing with appeals against decisions to withhold information.

I.Ga-2.1.5. How to Engage?

The NDA will need to engage with stakeholders on national and local issues.

Local Level

It is recognized that there may be significant variations in the intensity and indeed the nature of engagement from site to site, dependent on the scale, nature and strategic significance of the local clean up task, and the requirements of local stakeholders.

Nonetheless, whatever structure is devised for local engagement, it is considered that it should be:

- Sponsored by the NDA, but independently chaired or facilitated;
- Given a proper level of guaranteed resourcing (financial, technical and training);
- Made up of participants drawn from a wide range of local stakeholders, including the site licensee, site workers, the regulators, all tiers of local government, community groups and NGOs;
- Input timely advice and recommendations;
- Able to set up working groups to develop draft advice and recommendations;
- Able to fulfill a scrutiny role in relation to site activities, including the performance of contractors;
- Able to set up wider community engagement mechanisms;
- Open and transparent so that those not directly involved are assured that it is working effectively;

National Level

It is suggested that whatever structure is devised for national level engagement, it should:

- Input timely advice and recommendations into NDA decision making on strategy, priority and work programmes;
- Be sponsored by the NDA, but independently chaired or facilitated;
- Be given a proper level of guaranteed resourcing (financial, technical and training);
- Have clear links to the local level engagement mechanism to enable two way flow of information;
- Include representatives from the local level engagement mechanism, and from national stakeholder groups including the regulators, local government bodies, trade unions and NGOs;
- Include a representative(s) of the NDA Board;
- Be able to sponsor time-limited bodies (e.g. to look at specific issues) and wider public engagement processes;
- Be able to fulfill a scrutiny role in relation to the NDA's performance.

I.Ga-2.1.6. Barriers to Engagement

It was recognized that several issues could be barriers to engagement, including timing and style of meetings, lack of technical understanding, lack of influence, loss of earnings from attending meetings, perception that someone is just going through the motions and so on. The key thing is the NDA must recognize that any barriers, either perceived or otherwise, must be overcome. Therefore, it is suggested that the NDA should:

- Ensure that participants in local and national level engagement are given appropriate induction training;
- Provide access to technical experts and additional training as necessary;
- Compensate stakeholders for necessary travel and subsistence expenses arising from engagement activities;

- Agree a process for deciding with stakeholders how much (if anything) participants will be compensated for loss of earnings or other non-standard expenditure.
- Ensure that any meetings take place at a time and in a location that suits as many stakeholders as possible, and that additional meetings are scheduled at different times for dealing with important issues.

I.Ga-2.1.7. Other Issues

Evaluation

The importance of evaluating the NDA's stakeholder engagement process was made clear by all who commented. It will obviously take time for the NDA to develop a track record, but it is key that evaluation is built into the stakeholder engagement framework from the outset. Some of the suggestions received include asking the general public, logging the number of complaints/successes, media coverage, Parliamentary Select Committee reports and so on. This suggests the NDA will therefore need to:

Build an evaluation process into the stakeholder engagement framework that clearly feeds into and impacts on the development of the framework itself.

Dispute Resolution

The expectation is that differences of view will be resolved through discussion in the local or national engagement mechanisms, and that only as a very last resort would a specific mechanism be used. Feedback received indicated that an appeal mechanism of some description would be required and that it needed to be independent of the NDA itself. Notwithstanding the fact that decisions are ultimately the responsibility of the NDA and/or site licensees, it is suggested that the NDA should develop and agree with stakeholders a mechanism for seeking to resolve differences of view between the NDA and its stakeholders.

What information should be made available?

Again, this list is a compilation of the information received by the DTI and is in no order of priority.

- For each £ spent by how much have liabilities been reduced
- For contractors and potential future bidders – Reasons why a contract was awarded to one contractor and not another
- Annual report published
- Site restoration plan (Life Cycle Baseline)
- Near Term Work Plan
- Performance Based Indicators (PBI's) for contractors and NDA
- Progress against PBI's for contractors and NDA
- NDA Safety and environmental performance
- Contractor track record in safety and environmental performance
- Agreements between the NDA and the Regulators
- Objectives for openness and transparency and performance against them
- Allocation of funding
- Action plans for skills
- Impact on the community of job losses
- Employment of contractors - local/national
- Objectives, targets and performance measures which the Government sets for the NDA
- Board's terms of reference
- Safety cases
- Environmental impact assessments
- Doses, discharges and safety performance
- Budgets and costs

- Full audited accounts
- Provisions for incentives written into contracts
- Hazard reduction
- Contact information for NDA and contractors
- Organizational structure, terms of reference
- Emergency arrangements
- Corporate social responsibility framework
- What decisions were made
- Why and how decisions were made
- What the liabilities are
- Opportunities for employment and contracts
- Regulator reports
- Successes and failures
- Forward plans and costs
- NDA Strategy
- Board minutes and papers and the future decision-making timetable of the Board;
- Progress reports;
- Information on engagement activities and stakeholder representations
- An inventory of liabilities (covering type, scale, location, management programme;
- costs, funding, safety issues and environmental impacts);
- Reports of assessments of options for dealing with specific clean-up work streams;
- A skills and contractor database, including progress in developing the supply base and the status of contracts;
- Updates on site remediation plans, specific clean-up work streams, costs and funding, incidents, regulatory developments, and stakeholder engagement outputs.

I.GA.3. NDA ARRANGEMENTS FOR STAKEHOLDER ENGAGEMENT

I.Ga-3.1. Introduction

This section sets out the arrangements for NDA engagement with its stakeholders at both the local and national level. It is based on what participants said during the regional stakeholder consultation workshops held during 2003, and reflects the draft stakeholder engagement framework as amended following public consultation between December 2003 and March 2004.

I.Ga-3.2. Local (near site) engagement

The NDA will conduct its business in an open and transparent manner, allowing stakeholders the opportunity to understand plans and receive reports on the progress of work. As part of this process regular meetings will be held in public locations near each of the NDA sites. The local body will be called the "Site Stakeholder Group" (SSG) which will hold meetings that are open to the public and press. Opportunity will be given to the audience to table questions, but the meetings will not allow public debate. Such opportunities may be provided by means of public meetings organized by the NDA, as necessary, to address specific issues of particular local interest.

The SSG will not have a formal decision making role in respect of site activities, but it will be responsible for reflecting local views by inputting advice, expressing views and commenting on the progress of work on site. Building on the experience of the existing Local Liaison Committee/Local Community Liaison Council structure, the NDA Site Stakeholder Group (SSG) will have the following role and remit:

- To provide an active, two-way channel of communication between the site operator, the NDA and local stakeholders.
- To give an opportunity for questioning the operator, the NDA and regulators.

- To represent local views and input timely advice to the NDA.
- To comment on the performance of NDA and its contractor with regard to achievement of plans, value for money etc.
- To commission and receive reports about activities and their impact on for example safety, the environment and health.
- To review arrangements for such matters as emergency response.
- To scrutinize and input into the prioritization of work programmes.
- To provide views and comments to the NDA on the future of the site.
- To provide views on the NDA contract with, and the performance of the operator.
- To set up sub-groups to address specific issues relevant to the clean up programme.
- To set up wider local consultation via public meetings and other mechanisms as required.

I.Ga-3.2.1. Membership

Membership of the SSG will include elected representatives of the local community such as Parish, Borough and County councils. It will also include nominated Council officers, the Emergency services, the Health service, regulators, the site operator, union representatives, the NDA and other stakeholders as appropriate.

In particular, opportunity will be given for a representative of local non-governmental organizations (NGOs) to be a full member of the SSG. All members of the SSG will be appointed to serve for a period of up to 5 years, subject to renewal by agreement. The Chair and deputy chair (independent of both the contractor and the NDA) will be elected from the main body of the SSG and be subject to re-appointment every year. It will be the responsibility of the SSG to keep committee membership under review to maintain a correct balance of interests, experience and expertise as the site changes during decommissioning. Similarly each SSG will be required to agree (with the NDA) and publish its constitution, detailed terms of reference and code of conduct for meetings. As representatives of their constituents, SSG members will be expected to fully represent their views and will be accountable for communicating both ways with their constituencies.

I.Ga-3.2.2. Funding of SSG activities

In order to carry out its role effectively, the SSG will be funded by the NDA through the site contract (and budget) as an identified allowable expense, including the provision of secretarial/administrative support. SSG activities and their associated costs will be included in the Near Term Work Plan and be subject to review as with all other planned activities on site. To reduce barriers to engagement, members of the SSG will be entitled to claim out of pocket expenses to attend meetings. NDA will consider reimbursement of other expenses on a strictly case by case basis.

I.Ga-3.2.3. Frequency and location of meetings

The SSG will meet at least twice per year but depending on site circumstances and the wishes of the meeting itself, the SSG may decide to meet more frequently, for example during periods of rapid change on the site, or to deal with specific issues. Depending on the needs of the local community, current issues and the status of the site, the SSG Chairman will be expected to convene special meetings at different times and in different locations to allow wider input of local views.

I.Ga-3.2.4. Building capacity

In order for the SSG to function effectively, members will be given induction training to understand site activities and the processes used to manage decommissioning. In the event that the SSG decides to set up working groups to consider specific topics on behalf of the SSG or if there is a need to refresh member's knowledge, additional support or training will be given as necessary.

I.Ga-3.2.5. Representation at National Meetings

Each SSG will nominate two members to formally represent the SSG at the NDA National Stakeholder level. Although this would normally be the Chairman plus one other member, each SSG will have the ability to nominate whom so ever they like. The arrangements for these meetings are described in the following paragraphs.

I.Ga-3.3. National Engagement

The national arrangements must reflect NDA's responsibility to be an open and transparent organization at both national and local level, and must include the ability to resolve tensions or any issues that may arise. The national body will be named the "National Stakeholder Group" (NSG) and act as the main interface between stakeholders and the NDA at Board level. In addition to representatives from SSGs, the NSG will also incorporate other stakeholders that have a legitimate interest in the work of the NDA (including foreign governments). On that basis it is likely to involve large numbers of people, at least initially.

I.Ga-3.3.1. NSG terms of reference

The NSG will provide an opportunity for stakeholders to question/challenge representatives of the NDA Board and input their views. It will also allow interaction with site contractor management, local, national and international stakeholders.

Operating under the sponsorship of the NDA, the NSG will be independently convened and facilitated, and will have clear links to the SSGs to ensure 2-way flow of information. Its terms of reference will reflect the national responsibilities of the NDA but also take into account interests of the local representative bodies.

In broad terms, the NSG will:

- Give an opportunity for stakeholders to question the NDA about performance and achievements.
- Provide opportunities for stakeholders to input advice and comment on the NDA strategy and plans before they are submitted to the Secretary of State for approval.
- Allow stakeholders to input their views on prioritization of work programmes.
- Have clear links to the local arrangements to allow 2-way flow of information.
- Receive and consider reports from SSG sub-groups that have relevance to national considerations.
- Sponsor sub groups to address specific national issues for the NDA.
- Review the performance of NDA stakeholder engagement at both the local and national level.

I.Ga-3.3.2. Membership

The NSG will include at least one representative of the NDA Board as well as nominated representatives of the site stakeholder groups as previously stated. Membership will also be open to application from any national (or international) organization or individual that can demonstrate an interest in the activities of the NDA and its success. Although membership will be open to all legitimate interests, considerations relating to the expenditure of public funds may require some restrictions to be placed on individual membership in favor of representation from bona fide organizations. In this case individuals may be referred to a relevant SSG as a means of getting their views reflected nationally.

I.Ga-3.3.3. Funding of NSG activities

All activities and meetings of the NSG will be centrally funded by the NDA, who will also provide a secretariat to support the NSG.

In common with the arrangements at local level, attendees at NSG meetings will be entitled to claim out of pocket expenses. Again, NDA will consider reimbursement of other expenses on a strictly case by case basis.

I.Ga-3.3.4. Frequency of meetings

The NSG will meet at least once per year in a location that is consistent with the NDA's role as a national organization and its status as a non-departmental public body.

I.Ga-3.3.5. Co-ordination of stakeholder activities

Recognizing the overall complexity of NDA stakeholder engagement, it would be helpful for the national (and local) bodies to have support from a co-ordination group. This group would be sponsored by the NDA Board to oversee the relationship between the NDA and its stakeholders as well as to review the processes being used. Meeting at least quarterly, the remit of this group would be:

- To ensure smooth running of the whole process.
- To manage emerging issues and co-ordinate the setting up of working groups at both local and national level.
- To monitor overall performance of the process and its achievements.
- Membership of the co-ordination group would include a senior representative from the NDA, agreed representation from NDA sites, regulators and other stakeholder organizations.

I.Ga-3.3.6. Additional considerations

To maintain an adequate understanding of local issues, it is likely that the NDA will wish to meet regularly with SSG representatives. On that basis the NDA will hold an annual SSG Chairman's meeting to discuss and share issues that have arisen at the local level. Membership of this meeting will comprise the Chairman (or nominated deputy) of each site SSG and a representative of the NDA Board.

I.Ga-4. CONCLUDING REMARKS

The NDA's approach to Stakeholder engagement set out above is an attempt to create a comprehensive national framework for Stakeholder engagement in nuclear decommissioning. As stated in the introduction it is too early to draw any lessons from the process, however so challenges are already emerging. These can be summarized as follows;

- The integration of local and national stakeholders whose perspectives and motivations may well be radically different.
- The need to sustain engagement over a long period of time both in terms of stakeholder motivation and institutional capacity.
- The challenge to develop an organization, the NDA, that has stakeholder engagement at its core and where all staff are willing and able to engage.

For further information visit www.nda.gov.uk

Annex I.Gb

MAGNOX NUCLEAR POWER STATION DECOMMISSIONING DIALOGUE — LEARNING REPORT (UK)

I.GB-1. INTRODUCTION

This Annex attempts to draw lessons, from the Magnox Decommissioning Dialogue that was held in the UK between 2000 and 2004, and translate it into things that can (and probably should) be done in future large scale, long-term stakeholder engagement processes related to decommissioning.

The aim of the Magnox Decommissioning Dialogue was to bring together the range of stakeholders to identify and explore the various decommissioning options and their implications, associated with Magnox power stations. This is in order to inform the development of strategic decision making on Magnox power station decommissioning.

The dialogue was first convened in 2000 by The Environment Council (TEC) and funded by the British Nuclear Group (the body holding responsibility for decommissioning) and commenced its current programme of work in September 2003, when approximately 50 participants affirmed their participation and commitment to helping achieve its aim. The sectors represented by participants include community, company, expert, government, regulatory, NGO and workforce.

A Working Group of participants from the dialogue was mandated to undertake a Strategic Action Planning (SAP) process. This was used to explore the assumptions and uncertainties surrounding Magnox decommissioning options in order to identify possible actions and contingencies around the issues.

The main group of the dialogue met for the last time in December 2004, when the output of the SAP process was considered and incorporated into a final report published in early 2005. Subsequent to the last main group a Recommendations Monitoring Group was established by the Dialogue to ensure an effective handover to the new Nuclear Decommissioning Authority, the body now responsible for decommissioning.

I.Gb-2 ANALYSIS

The Magnox decommissioning dialogue was long and characterized by a high level of conflict. Before the dialogue, the participants talked about it to each other and had a mode of interacting with each other that they described as “being at war”. This characteristic of interaction they referred to as having been the norm for some 30 years.

TEC may have taken on the dialogue with the hope of resolving their dispute but in hindsight this was never likely to be realistic. Not only because of “their 30 year war” but because of the complexity of the problem and the amount of uncertainty surrounding it.

However, what was achieved was remarkable given this starting point. By the end of the process not all participants agreed, but disagreement was over details such as the timing of when actions should take place. They had effectively agreed with each other on the overall strategic direction to follow. Moreover, with a few exceptions probably due to personalities, the stakeholders were relatively comfortable talking and communicating with each other. Some of the stakeholders from the “campaign side” were in tears of gratitude at the end!

Due to the high level of contention and at times conflict, TEC, with its convening and facilitating team have had to continually re-examine the process and make changes consistent with progressing the dialogue to its desired end point. Important learning has emerged from what has been a difficult process. Lessons learned are discussed further in the following sections.

The responsibility for decommissioning in the UK has now shifted from the company to the newly established Nuclear Decommissioning Authority (NDA). The NDA Chief Executive was present at the last main group meeting of the Magnox dialogue to receive the recommendations direct from the stakeholders. In the NDA’s draft strategy set published in the summer of 2005 there was a stated preference for short time scale decommissioning which was one of the options that the Magnox dialogue stakeholders concluded required serious

consideration. The NDA has clear remit set out in its terms of reference to engage stakeholders throughout the decommissioning process and has commissioned this report to ensure that it can learn from previous processes.

I.Gb-3. STAKEHOLDER ANALYSIS

There was a need to gather information and understand the range of stakeholders and their issues and the interconnectedness of these. What follows is a suggested checklist as a stakeholder analysis tool (with stakeholders one to one):

Motivations

- Understand stakeholders issues/starting positions/aspirations
- How do they articulate what they think is possible to achieve?
- What do they understand as the boundaries to the project?
- How do they characterize the issues and the main players?
- What is their understanding of process?

Accountability

- Who are their constituents? How did/do they get nominated?
- Ask how accountable they are to their group or a network
- Checking stakeholders represent a group by asking how they will communicate with them and how they were selected to participate.

Practicalities

- Ability to attend regular meetings
- What resource needs do they have
- How confident to they feel in participating

I.Gb-4. DIFFERENCE BETWEEN LOCAL AND NATIONAL STAKEHOLDERS

The process involved engagement with local organizations and the integration of their views and concerns about local issues was often problematic in what was a national, strategic process. It is important to be aware of the particular needs that such participants have and support they may require:

- The need for funding to enable people to participate – people from local organizations are not funded by their organization.
- Communicating the dialogue's progress to their constituents – recognising that representatives and/ or their constituents may not have access to communication mechanisms and facilities that national organizations have or may be less experienced at doing so - they may need communications support.

I.Gb-5. PROBLEM HOLDER COMMITMENT

Another key group of people in the conduct of the dialogue was the representatives of the company (BNG). Senior level commitment that is visible at different stages of the dialogue is very important as is the skills and personality of the representatives involved. The ability to listen, understand others view points and communicate technical concepts in non-technical language are three attributes (and there are others) that are key a successful engagement. Problem holders should be encouraged to field the person most suitable for the process rather than necessarily the expert or person responsible for that particular area of operation.

Dissemination of and more importantly embedding any work/outcomes from a process can be problematic for the participants who are also the Problem Holders. More discussion with them at the beginning of a process to encourage them to think early on about how practically they will be able to do this and what it will involve and what mechanisms will be needed would be beneficial.

I.Gb-6. SIGN-UP

This is a crucial stage of a process and there is a need to ensure it is rigorous: A sign up process that means that future participants understand that dialogue is about leaving campaign or corporate positions outside of the room; and understand that dialogue is premised on developing an understanding of multiple perspectives and attempting to synthesize these.

There needs to be a form for people to physically sign to make it feel real and tangible These are the sorts of things that they need to explain/demonstrate in the form:

- that they are part of a network
- that they commit to attending [x] number of days/month etc
- how important the issue is for them
- that they are prepared to be non-adversarial

Stakeholders need to be visited for a meeting or called during the sign up phase especially in a contentious process, this cannot be skimped on. The sign up forms need to be returned before stakeholders meet for the first time. Part of sign up is accepting the convenor's right to decide who participates and who doesn't.

Future dialogues may also want to address how people who are not coming from an organization, but reflect a particular interest, can demonstrate that they do actually represent a special interest. For example, do they have a network that they participate in? And is this auditable?

This could include getting 'expert' participants to substantiate their expert status; just as other stakeholders would need to substantiate that they have been mandated or delegated by their organization to participate in a dialogue. Following on from this are issues of accountability. Are stakeholders representing organizations or viewpoints that are more than individual perspectives? How can an auditable and fair process be established to ensure accountability and review communication with 'constituents' or 'networks'?

I.Gb-7. SHAPING THE PROCESS AT THE FIRST MEETING

There is a need to cover some of what was covered on a one to one basis with stakeholders in a first meeting. For example:

- What are the common understandings of both process and content?
- What is the range of concerns/issues and practicalities?
- What power issues exist? How can they be ameliorated?
- What are the agreed ways to proceed?
- Who wants to leave? Who else needs to join in?
- What's the common aspiration for an end point?
- Make clear to the participants that they have the power to say they don't accept the behaviour of another participant.

There is also a need to explain what we mean and understand by such an engagement process. For example:

- Ensure we give all participants a learning session on PIN, conflict cycle model, uncertainty etc. at the start of a process

- Ensure we are clear with participants from the start about what consensus means – it doesn't have to be everyone agreeing but that no-one organization/individual can veto a group decision etc.
- Ensure stakeholders understand that they are participating by invite – and that this can be withdrawn if they don't adhere to the ground rules/ways of working.

I.Gb-8. WAYS OF WORKING

During the course of the dialogue a quantity of guidance material was produced, usually by the co-ordination group in response to concerns raised by stakeholders. A range of these documents can be found in the Appendices. In hindsight the production of a 'ways of working' document to explain how the process will function could have avoided some if not all of this work.

Such a document should include the following:

- What dialogue is and why it is different
- How to work collaboratively
- Roles, responsibilities of convenor, facilitator, problem holder, stakeholder.
- Ground rules, their purpose and implementation
- Communications within the dialogue and with wider constituents
- Openness, accountability and confidentiality.

This document could have some standard material but then be adapted for specific dialogues, reflecting the issues and stakeholders involved. We need to recognize that people have different ideas about what they think dialogue involves.

There is the need to clearly explain and coach what the process is about and what is expected from participants.

I.Gb-9. DECISION-MAKING TOOLS

The use of Strategic Action planning helped the progress of the dialogue considerably. However it was not without it problems as it is a fairly complex process to explain and understand. The Working Group put a lot of time and effort into developing this understanding and was justly proud of the end result. However, the impact was reduced by the fact that members of the main group struggled to gain the same level of understanding. As a planning tool it works well, as a communication mechanism it is problematic. If used in the future more time and effort needs to be put into explaining it to the wider audience and communication/ editorial experts employed to ensure that the end result has a wide applicability.

I.Gb-10. PAPERS

Throughout the Magnox dialogue the status of written material presented to the group and generated by the group was an area of confusion and contention.

Uncertainty around the implications of the Freedom of Information Act and the Access to Environmental Information Regulations did not help but the questioning of the origin and status of papers was a physical manifestation of the lack of trust present at the time. The important learning point is to be clear about the purpose and status of all paper work produced

Type: There are likely to be principally 2 types of Papers:

- **Submitted** as information for the group
- **Contributed** for / on behalf of the group (with the intention that it will be modified/changed/developed etc by the group and eventually owned by the group as a group paper/output).

It should be up to the group to decide which category the paper falls into.

Status: Papers should be labelled with one or more of the following:

- **Submitted** (as information for the group)
- **Contributed** (for further development)
- **Work in progress** (draft / in development)
- **Confidential to ["group name" members**] until complete

If the paper has been contributed then it should have the following text in a box

> This paper has been contributed to [group name] with the intention that it will be developed by [the group] and that it will eventually be a [group name] output if/when it is agreed/signed off by [appropriate group/name]

Identity: Papers should also have the following:

- Date of first version
- Current version date
- Current version number
- Original author(s)
- Group name (if appropriate)
- Paper/file reference number (allocated by convenor)
- Web link (if appropriate)
- Appropriate contact information (author(s)/convenor/other)

Filing: All papers should be filed/archived by the convenor

Distribution: They are distributed to and within the appropriate group until that group decides it is ready to go further e.g. to any main group or public domain.

I.Gb-11. OVERNIGHT STAYS AND SOCIAL EVENTS

Stress to participants that they are seen as an integral part of the meeting/process and that therefore people should attend. Appreciate that these are work for the facilitators and the team.

I.Gb-12. KEEPING WIDER STAKEHOLDERS INFORMED AND ENGAGED

A communication strategy was developed so all participants knew what/how they could expect to be updated. Use of the web to make the updates more widely available was helpful. Generally the use of a Working Group report writer to perform a dual task of producing two reports, one for dissemination to the wider group of stakeholders (summary) and one for the Working Group's benefit (detailed) was helpful for all participants.

The summary report was a particularly useful mechanism. Problems had arisen earlier in the dialogue because the wider group had not had enough information between Main Group meetings. The summary report was a tool for encouraging dissemination of progress among participants. Participants did not have to spend additional time preparing separate written communications. It was helpful too for Working Group members – because there was no doubt about what the group as a whole was happy to share more widely. A common update report is also something that can be included on websites more easily. Expectations must be managed though; such a summary tends to convey headlines rather than a high level of detail.

When bringing together local and national stakeholders there will always be an imbalance in understanding, knowledge and resources. Dialogue process should help to address this but more explicit mechanisms may be required. In the case of the Magnox dialogue provision was made to employ external

expertise to help local stakeholders access information and reports. It is important that the brief for this input is clearly agreed with the wider stakeholder group, including the use that any report the external expert may provide is going to be put to.

I.Gb-13. THE CONVENOR

The Convenor also has to have senior staff commitment on tap if project is likely to be contentious and its team needs to be populated with staff that can deal with conflictual situations.

The Convenor may be seen by many stakeholders as the administrator of the process. This is the wrong image to convey when a firm hand is required to guide the process. There is a need to set out the role of the convenor clearly at the start of the process and ensure that stakeholders understand the framework within which the Convenor operates and the boundaries to the role. This should be included in the 'ways of working' document described above.

The Convenor must have the confidence and ability to walk away if it does not deem progress possible. In the case of the Magnox dialogue TEC had prepared an internal document that set out the trigger points that would have initiated a withdrawal from the process. Prepared statements and press releases to ensure that the withdrawal was handled as professionally as possible accompanied this.

I.Gb-14. FACILITATORS

Longer term/large scale process will benefit from two facilitators (due to high volume of meetings, possible conflict, amount of work/coordination, planning). Facilitators have different skills and approaches, some dealing with high conflict situations better than others. It is important to identify and use selection criteria that match the right person to the right role and that these facilitators once selected are involved early on in the project planning.

I.Gb-15. RESOURCES

Funding as always is a difficult process to manage. Convincing the funding bodies that flexibility in the budget is required to accommodate extra meetings, external expertise etc if the process requires them. At the same time, managing expectations of stakeholders as to budget limits without it being seen as attempts to marginalize their interests.

There are other resource issues that need consideration: For example do less resourced organizations need to have technical or financial experts to help them to respond to developing work? Do unpaid stakeholders need to be paid to input their perspectives? What are the issues surrounding this?

Two ways in which this Dialogue has been able to address some resourcing issues have been:

- Stakeholder Support Fund: a stand alone Fund which some stakeholders have been able to access for reimbursement for loss of earnings/dependent care from attending meetings if they are participants who are not paid by their organization to attend meetings.
- Funding for additional work which has been taken up at the request of a Group, above and beyond the standard activities of that group for participants who are not funded by their organization e.g. taking on drafting work on behalf of the Working Group.

Annex I.Gc

PUBLIC PARTICIPATION AT UKAEA, DOUNREAY

I.Gc-1. INTRODUCTION

This paper sets out UKAEA's approach to public participation and explains the steps taken to establish an open and honest process which involves stakeholders. It then describes how this process was used to establish the physical condition (the end state) of the Dounreay site once decommissioning is complete.

I.Gc-2. UKAEA, DOUNREAY – BACKGROUND

Dounreay was Britain's experimental centre for fast reactor research and development from 1954 until 1994. Today, Dounreay represents the single largest nuclear decommissioning project in Scotland and the second largest in the UK. Dounreay has been at the heart of the Caithness and North Sutherland economy for more than 50 years. One of every 5 jobs supports the decommissioning of the Dounreay site and it is estimated that £80M is injected into the local economy per year.

I.Gc-3. INVOLVING STAKEHOLDERS

Since the 1990s UKAEA has been committed to being open and honest and in 2002 launched a public participation process to allow members of the public to engage directly in the decision-making process for sensitive projects.

For a major environmental project, where society may have an interest and where there could be a number of possible outcomes, UKAEA follows international best practice by carrying out a Best Practicable Environmental Option (BPEO) assessment. This approach considers a range of assessment criteria to consider against each option to determine which option performs best.

Before the process of consultation was developed, efforts were made to engage with those who had an interest in the activities of the site. This was done by encouraging people to sign up to register their interest and was advertised in the Scottish press, on websites, posters in public areas (dentists, doctors, libraries), through email registering, and mail drops of a newsletter outlining the site's commitment to consulting where there were genuine reasons to do so. Numbers of registered stakeholders rose from 250 to over 1000 as a result, and continues to grow.

It is recognised that internal communications are equally important, to ensure the workforce is aware of the issues on the site; information is disseminated internally which provides information to around 2000 people who work on the site.

I.Gc-4. COMMUNICATION TOOLS

UKAEA Dounreay is fully committed to keeping stakeholders informed of the activities of the site. This is done through a number of different media.

I.Gc-4.1 Internal communications

A **team brief** is issued to all staff (and contractors) and is verbally cascaded via line managers to their teams on a weekly basis. This allows a two way flow of information, key issues are highlighted via the brief and staff, through their briefing session, have the opportunity to raise any issues that are of interest to them. The team briefing system is supplemented by an electronic feedback system to allow questions to be raised and responses provided.

Senior management presentations are regularly held with all UKAEA staff being invited to attend. This is generally carried out when there is announcements being made of a strategic nature.

Lunch-time presentations are held for staff to attend on a voluntary basis on different topics such as progress against the decommissioning programme, socio economics update, etc.

Dounreay news is the site magazine which is issued on a monthly basis and features information on safety, environment, decommissioning progress and the like.

Electronic messages are used to cascade important, timely messages which need to reach staff as quickly as possible.

I.Gc-4.2 External communications

Dounreay bulletin is an electronic summary of site activities which is distributed on a fortnightly basis to all internal and external stakeholders. The media also receive copies. The information is usually a brief summary of the topic which links to further information on the website.

The **Dounreay Stakeholder Group** (DSG) is an independent group, comprising community representatives/organisations. Meetings are held four times a year in public. The media is also invited to attend. The DSG has also formed four sub groups – site operations, environment, socio-economics and admin/ procedures. While the sub group meetings are not held in public, all information is available on the DSG's website to ensure transparency.

An **Annual Review** is published highlighting progress throughout the year.

Presentations and/or briefings on various topics are given within the community on an ad-hoc basis and communications with enterprise companies, community councillors, Highland Councillors, MSPs, and MPs are provided to ensure all elected representatives are up to date with the activities of the site.

A **Visitor Centre** based near the site has been available since the 1960s providing information on the operational activities of the site and more recently the decommissioning story. The centre attracted over 7000 visitors per year. Due to storm damage it was closed prematurely. A new facility – **Caithness Horizons -** is due to open in 2008. Caithness Horizons will provide modern facilities for community use, the refurbished buildings will contain a high quality museum telling the story of the area and building on existing exhibitions owned by Thurso Heritage Society and the UKAEA`s Visitor Centre at Dounreay. The main permanent exhibition will include an interactive display to promote the tourism attractions and places of interest to visit throughout the North Highlands.

A **Public Information Office – Dounreay.com -** has recently opened in the town of Thurso. This allows the NDA and the site licence company to continue an open dialogue with the local community and visitors to the area.

I.Gc-5. PROCESS FOR PUBLIC PARTICIPATION

A newsletter is distributed to all registered stakeholders, via team brief for internal communication and is available electronically on the UKAEA's website, linked to the bulletin. It sets out the background to the issue, the options available for consideration, and invites people to play an active part.

Two stakeholder workshops are organised.

- An internal panel comprising of people who work on the Dounreay site who are not directly involved with the particular project. Members are selected randomly and are wide-ranging, selecting people of different grades, disciplines, ages, home addresses and the like.
- An external panel of people with different priorities, interests and opinions.

Both panels are taken through the issues by the project team with an independent facilitator presiding over the discussions. In most cases UKAEA (with external consultants) have scored the options against the assessment criteria which covers environment, health and safety, technical, socio-economics and cost. While the options are scored they are not weighted (to normalise the scores as per BPEO guidance) and the workshops allow people's views on what is important to them to be explored.

Following the workshops independent reports are written and workshop members have the opportunity to comment before these are made available on the website.

The preliminary BPEO is revised to take into account views received from the workshop and a summary document addressing the issue is distributed to the wider stakeholder list taking readers through the issue, the options and the output from the panel workshops. There is a 12 week period of consultation where people are encouraged to complete a questionnaire or submit a written response which is considered further before completion of the BPEO.

It is recognized that some projects may require different approaches. For example when consulting on radioactive particles, a number of additional steps were incorporated into the process. An approach adapted to the circumstances has been taken and the process adopted allows the flexibility to include extra stages in the consultation phase, dependent on the issue.

I.Gc-6. NUCLEAR DECOMMISSIONING AUTHORITY

In April 2005, the Nuclear Decommissioning Authority (NDA) took over the strategic responsibility for 20 nuclear sites in the UK, which includes the Dounreay site. UKAEA continues to manage the decommissioning on the NDA's behalf.

The NDA has a charter for stakeholder engagement and the Dounreay Stakeholder Group is primarily the link between the site and the community. The role of the NDA and its stakeholder engagement programme is described in an annex of this report (Annex I.G.A).

I.Gc-7. CONSULTING ON THE END STATE OF THE DOUNREAY SITE

To allow the NDA to understand its full liability, it was essential to define the site end state for Dounreay. Recognising that stakeholder views would form a part of the decision-making the NDA asked the Dounreay Stakeholder Group (DSG) to consult with the community to review the options and come forward with a recommendation by March 2007.

The DSG agreed that UKAEA, with its consultants, would manage the process and technical work on their behalf but that the DSG Environmental sub group would be kept regularly updated. Therefore while UKAEA's process was adopted to progress this consultation, a number of other steps were included to ensure the DSG had transparency of the process throughout.

During the consultation programme, a number of events were organised to allow stakeholders to record their views on proposed end states. These included:

- An options assessment workshop (consisting of a range of specialist UKAEA staff, consultants and the DSG Environmental sub group chairman). An internal panel comprising a cross section of Dounreay employees and contractors.
- An External panel comprising DSG members and others which covered a range of expertise.
- A regulatory workshop attended by Scottish Executive, Regulators and Enterprise agencies.
- A presentation to local councillors.
- Updates at Dounreay Stakeholder Group meetings.
- Information flow via newspaper features, electronic bulletin updates, website updates, internal briefings, etc.
- Drop in session and exhibition.
- Decision conference.
- Approval of recommendation.

I.Gc-7.1 The Options for the Site End State

A series of possible end states were identified, representing broad restoration philosophies. The options were intended to be representative of a large number of ways that the site could be restored and included taking no or minimal action, through to maximum amount of clean-up effort.

I.Gc-7.1.1 The long list of options

The BPEO assessment process generated seven candidate options to be taken forward to the next stage. In order to be viable, the options had to:

- Be technically feasible.
- Comply with current UK Government policy and regulations.
- Meet the NDA's priorities of nuclear safety, industrial health and safety, security, protection of the environment and value for money.
- Meet the NDA's objectives of decommissioning and site clean up.

Of the seven options identified two of the candidates failed to meet the criteria and were screened out as they were judged to be impracticable, unacceptable to the regulators, likely to increase hazards, disproportionately expensive or destructive to the current environment. Those screened out at that stage were:

- Leaving the site as it is now (essentially 'do nothing' option).
- Returning the site to a pre-industrial pristine state.

I.Gc-7.1.2 The short list of options

The NDA's guidance recognised the interaction between a desirable end state and the complexity and cost of achieving it as well as possible preferences for potential site re-use. The guidance suggested that a range of possible end uses should be considered and a view taken on how these would impact on the end state.

At Dounreay the future use of the site is a complex issue and it is unclear whether there would be demand for long term socio economic activities on the site itself. Because of the major impact to the economy of the area regeneration will not concentrate specifically on the site but will be regionally focussed. However, within the options there is potential to re-use the site for a number of nuclear or non-nuclear activities.

One constraint on re-use of the site (or parts of the site) is the amount of radioactive and chemical contamination that might remain on the site at the end point. The site has been used for a number of industrial purposes for well over 50 years and a number of contamination events have occurred. Many have been cleaned up but some contamination remains and it is planned to continue the clean up and raise the standard of the ground to an acceptable level as part of the remaining decommissioning programme.

Government policy recognises this and acknowledges that a restored site might have different levels of residual contamination at its end point, depending on the end state chosen.

I.Gc-7.1.3. Common assumptions

Dounreay is due to be decommissioned in 2032 – a 25 year programme of work and because of the timescale involved will inevitably bring uncertainties. Assumptions were made to underpin the current baseline and were also *common* to each option considered. These were:

- The site will be decommissioned as far as reasonably practicable following closure of the operational facilities and the required technologies are available to allow the safe decommissioning of all facilities.
- Waste in the shaft, silo and LLW pits (historical facilities which do not meet modern standards) will be retrieved.

- Conditioned ILW and packaged nuclear material will remain on site, in safe storage, until a national repository becomes available. The current plan assumes transfer off site between 2050 and 2076. The land on which the stores are located will remain licensed until then.
- Transfer of packages nuclear material will remain on site beyond 2076, pending a national solution.
- A new LLW disposal facility will be located adjacent to the site and will be subject to institutional control for a period of up to 300 years.
- PFR and the fuel cycle area will be demolished and all DFR buildings will be demolished apart from the DFR sphere and the associated access area.
- Final demolition will take place by 2076.
- The infrastructure required to support management of stored ILW and packaged nuclear material will remain until no longer required. The police command and control building will remain until there is no longer a requirement for a police presence.
- The security fence continues to mark the licensed site boundary.
- Decommissioning Vulcan (the naval site next adjacent to Dounreay) will be integrated into the site's plans.
- The outcome of the radioactive particles consultation will be integrated.
- All work will be undertaken in line with current Government policy and regulatory requirements.
- There will be no significant change to existing Government policy and regulatory requirements.
- Funding will be available to deliver the end state.

I.Gc-8. OPTIONS

Full details of the options can be found in documents available on the website. In summary the options considered were:

Option 1, minimal restoration of the site will be undertaken, with no effort being made to remediate the site beyond what is necessary to meet licence conditions.

Option 2 follows the same philosophy as Option 1, but more effort will be made to remediate the site and preserve items of the site's infrastructure that could be of use to new site tenants, if this became part of the future plan.

Option 3 is geared towards preparing the site for ultimate de-licensing, making use of radioactive decay and natural attenuation during an extended period of institutional control.

Option 4 is geared towards clearing and de-licensing the cleaner areas of site on an early timescale. The remaining area would contain the stores, which would be emptied by 2076 and the higher levels of remaining residual contamination, which would be managed in-situ through natural attenuation and radioactive decay.

Option 5 is geared towards restoring the site on the earliest practicable timescales, to a standard that allow the removal of the nuclear licence control from all areas of the site as soon as decommissioning is complete.

The options which were not taken forward for in-depth review were:

Option 0 would mean no restoration work will be undertaken, with the site being maintained in its current state. There would be no effort made to decommission or remediate the site beyond what is necessary to meet licence conditions.

Option 6, considerable effort would be expended to remove all traces of the nuclear and industrial activities undertaken on the site, beyond what is necessary to meet delicensing criteria. This would result in a fully de-licensed site by ~2050.

I.Gc-9. COMPARING THE OPTIONS

In order to assess the pros and cons of each option a range of assessment criteria was established to allow the options to be compared in a comprehensive and understandable way. For this study 9 criteria and 26 sub-criteria were identified as follows:

(1) Public Health and Safety
— Conventional safety during site restoration
— Contaminant exposure during site restoration

— Risks to future site users / neighbours
(2) Worker Health and Safety
— Conventional safety
— Contaminant exposure
(3) Security
— Vulnerability to malicious disturbance
(4) Environmental Amenity
— Air quality
— Water quality
— Land quality
— Visual amenity
— Noise levels
(5) Flora and Fauna
— Potential habitat disturbance
— Species conservation
(6) Technical Feasibility
— Reduction of hazard
— - Proven technology
— Regulatory acceptance
— Flexibility of site re-use
— Consistency with regulatory and national policy
— Minimising waste management requirements
(7) Community
— Local employment
— Blight
— Educational and training opportunities
— Infrastructure
— Radioactive waste materials transport
(8) Intergenerational Equity
— Reduction of burden
(9) Minimising Costs
— Total cost

The options were assessed against the criteria at a scoring panel meeting which consisted of members of the UKAEA project team and industry experts, with the DSG Environment Sub Group (ESG) chairman playing an active role. A report describing the outcomes of the scoring panel is available.

After scoring was completed, each group of criterion was given a 'weight' to reflect the relative importance between each criterion. By weighting the score against each criterion ensures that they can be converted into a common value and when added together, produce an overall score for the relevant option.

The weights are inevitably a matter of judgement – for example some people may feel that the socio-economic aspect of the project is more important than say, cost. The relative importance of criteria was the subject of consultation with stakeholders to allow the site to consider these when applying the final weighting.

I.Gc-10. STAKEHOLDER ENGAGEMENT

The Dounreay Stakeholder Group wanted to ensure the views of stakeholders were obtained. Two panel workshops were held (as described earlier).

Both workshops followed the same approach with the project team providing the background information, an overview of technical information and the preliminary BPEO.

I.Gc-10.1 Internal panel

The main points from the internal panel were:

- The BPEO process was structured, transparent and open.
- No new options were identified.
- While agreeing that the list of criteria was acceptable, other criteria were identified for consideration.
- There was an interest in understanding the underlying assumptions.
- There were mixed views regarding whether nuclear controls would be seen as a national asset.
- The influence on the end use on the end state was recognised.
- Whatever option was recommended would need to be kept under review with changing circumstances.
- There was a general need for greater clarity regarding what the NDA meant by 'finished its business'.
- The uncertainties in the cost data presented were recognized.
- While there were differences of opinion the workshop was largely supportive of Option 4 being a realistic objective. Option 3 was seen as 'not going far enough' with Option 5 being an aspiration.

I.Gc-10.2. External panel

The views from the external panel were:

- There was support for the BPEO process.
- There was broad agreement that the options chosen were appropriate, although some members felt it would have been useful to include the extreme options (Options 0 and 6).
- There was agreement that it was important to tease out broad themes – the opportunity for re-use, the costs associated with achieving the end states and the employment opportunities they offered.
- Some questioned some of the common assumptions – in particular the assumption that conditioned ILW would remain on site beyond the interim end point.
- One member was strongly opposed to the extension of the licensed site to accommodate a new LLW disposal facility.
- Additional information was required on key characteristics of the options, specifically profiles of cost and employment, volumes of waste generated, the transportation impact, and the range of future uses that would be viable.
- Members welcomed the opportunity to assess the workshop scores.
- The general view was that indefinite retention of the licensed site was impractical, and the options offering early release of land from nuclear controls were desirable.

Full reports of the stakeholder workshop were published.

I.Gc-11. INPUT FROM GOVERNMENT AND REGULATORS

To ensure a comprehensive consultation, the end state project needed to link to the work of elected bodies, councils and enterprise agencies with an interest in the decommissioning and eventual closure of the site. It also needed to consider the range of regulations that could impact the end state possibilities.

To address this, a workshop was held in Edinburgh at which DSG and UKAEA representatives provided a briefing of the work done so far. Detailed minutes were published.

I.Gc-12. WIDER CONSULTATION

The results of the preliminary options assessment, together with the outcome of the internal and external stakeholder workshops, were used to produce a summary document which formed the basis of the wider consultation.

The summary document was sent out to registered stakeholders and was made available on the website. The consultation stage ran for a 12 week period and a range of supporting documentation was published on the website, including more details on the options assessment, workshop information packs, and feedback from workshops and meetings.

From the 1200 documents sent out, 22 responses were received mainly from private individuals, although they also included submissions from Nuclear Free Local Authorities (Scotland), Scottish Natural Heritage and Shetland Islands Council.

Consultees were invited to comment on the options assessment process itself, the prioritisation of the assessment criteria, and the preliminary conclusions from the workshops regarding a preferred option. Key messages from the 12 week consultation were:

- There was broad support for the options evaluation process, although some doubts were expressed regarding the wider context in which recommendations on end states are being sought by the NDA.
- Questions of detail were raised relating to how the options were screened, and the basis for some of the scoring attached to the options.
- There was a majority preference for restoration options offering early release of land from nuclear controls; however, it was also recognised by some that emergence of a definite plan for nuclear (or some other significant industrial activity) re-use of the site could have practical implications for what was done.
- There was recognition that the end state was conditional on assumptions (common to all feasible options) relating to disposal facilities on the site as well as uncertain timescales for a national facility for ILW and spent fuel.
- Better information on costs would be helpful in making value judgements, especially in terms of determining the preference between options 4 and 5.

A more detailed analysis of the outcome has also been published.

I.Gc-13. DECISION CONFERENCE

The DSG Decision conference was held on the 15th February 2007 to allow DSG members to review all the consultation evidence and consider the views of the various stakeholders, with the aim of formulating a recommendation on the end state.

The conference was preceded by an afternoon session to allow those with an interest to view information on the work carried out so far and to clarify any issues they wished to raise with the project team.

I.Gc-13.1. Exhibition/drop-in session

The exhibition ran from 1400 to 1700 hrs on the afternoon of the decision conference. The UKAEA project team, consultants and a member of the DSG were available to respond to questions or issues raised. Over 40 people attended during the afternoon session.

I.Gc-13.2. Decision conference

All members of the DSG were invited to the Decision conference, along with observers from a range of organisations including Nuclear Installations Inspectorate, Scottish Environment Protection Agency, NDA, UKAEA, Scottish Executive, Highland Council (Planning), MoD Vulcan, Historic Scotland and Nuclear Free Local Authorities (Scotland) and those who had either attended the panel workshops or responded to the wider consultation. In addition, the conference was advertised in the local press and members of the public were invited to attend. Over 100 people attended the meeting in an observer capacity.

The evening was chaired by the DSG Chairman and was independently facilitated. To ensure the Decision conference ran effectively, the DSG members were provided with a briefing pack well in advance, collating all the evidence available from the various steps in the process. The independent facilitator clarified the objective of the end state project and explained the role of the conference to help DSG members fulfil these requirements.

DSG members agreed that consensus amongst all participants was the objective, but formal decisions at the conference on this and any related issues would be made by those DSG members present, according to DSG procedures.

DSG members were then presented with a review of the evidence. External participants were invited to contribute to provide information on the strategy for the area in terms of Highland Council planning and the local enterprise agency's socio-economic activity. This was followed by an overview of the end state options, the technical assessments and an overview of the outcomes of consultation. A short question and answer session followed each presentation.

The conference ended with a facilitated review of the process which concluded that the option assessment and consultation carried out on behalf of the DSG had – with some minor reservations – been appropriate, inclusive and transparent. Strengths and weaknesses of each option were discussed and participants had a chance to voice individual preferences.

Overall, option 4 was the best supported option, embodying the philosophy of active, early remediation rather than relying on natural attenuation (as is generally the case with option 3), along with the flexibility provided by areas of site remaining licensed.

Minutes of the decision conference were recorded and published after endorsement from the DSG.

I.Gc-14. THE RECOMMENDATION

Following the Decision conference, minutes of the proceedings were drafted and distributed to DSG members for comment. This allowed the preparation of a draft recommendation which was presented to the DSG Environment sub group on the afternoon of the 14th March. Following discussions, a number of minor amendments were made and the modified version was presented to the DSG meeting in the evening.

At the full DSG meeting, held in public, members were given a final opportunity to comment on and modify the recommendation. A number of suggestions were raised and the recommendation was then fully endorsed by the DSG. The formal minutes of the DSG recorded the discussion on the recommendation.

I.Gc-14.1 Summary of recommended way forward for the Dounreay site

(1) Options screened out: The screening out of options 0 and 6 on the basis of feasibility is supported.

(2) Options considered to be unacceptable: Option 1 offers no advantages and suggests that the site's owners and operator will have ignored their responsibility for clean-up.

(3) Options considered to be aspirational: Option 5 is aspirational, but perceived benefits may not justify the additional cost over Option 4, or the increased waste volumes (which would need to be disposed of locally). However, this option should be kept under review.

(4) Options considered to be acceptable: Options 2, 3 and 4 have sufficient benefits such that the DSG could accept any one of them under certain circumstances:
   - Option 2 could be acceptable if there were to be a new nuclear power facility or other significant nuclear activity on the site, but not otherwise.
   - Option 3 is representative of the current plan and could be acceptable in the case of certain end states and if the majority of the cost savings relative to Option 4 were re-invested into the local community.
   - Option 4 was the best supported option at the DSG Decision conference, embodying the philosophy of active, early remediation rather than relying on natural attenuation. The arguments in favour of Option 4 were:
     - it gives maximum flexibility, having both licensed and non-licensed areas of site available at a reasonable cost.
     - it addresses the aspiration for planned and comprehensive clean-up of the site and helps promote the perception of a clean environment.
     - it does not generate unduly high levels of waste.
     - it could be implemented in a way that would allow some of the infrastructure to remain in place for potential re-use by future tenants.

- if necessary, the nuclear licensed part of the site could be retained over an area large enough to accommodate new nuclear build or other nuclear activities.

I.Gc-14.2. Preferred option

The DSG recommended option 4, conditional on the following:

— The NDA has identified Caithness and North Sutherland a 'priority area' for socio-economic activities and must work with the agencies responsible for regeneration to maximise the exploitation of the skills and assets of the Dounreay site.
— The Enterprise Agency should consider site re-use as part of any regional development.
— The NDA should not encourage site operators to accelerate decommissioning to such a level that future re-use of potentially suitable existing and planned infrastructure is effectively ruled out.
— The end state for radioactive particles in the environment (outside of the site boundary) and the end state for the neighbouring MoD Vulcan site should be recognized.
— There must be a degree of flexibility in defining the end state to ensure that the community can capitalise on any opportunities that may arise in the future. As a minimum, the end state should be reviewed routinely alongside the NDA strategy.

I.Gc-14.3. Way forward

The DSG have asked to see formal actions placed on both NDA and the site operator, including:

— Preparation of a detailed programme for achieving the above aims.
— Incorporation of option 4 into the 2008 Lifetime Plan.
— Assurance of appropriate levels of funding to implement the chosen end state.
— An open and transparent decision on the future of the DFR dome taking into account its national heritage significance.

I.GC-15. DELIVERABLES TO THE NDA

2.2. Two deliverables, one from DSG and one from UKAEA, were submitted to the NDA on the 30th March 2007.

The DSG deliverable consisted of:

- A letter from the DSG chairman summarising the DSG's recommendation.
- A full report detailing the process followed to arrive at a preferred option.
- A portfolio of evidence.

The UKAEA deliverable consisted of a development report, detailing the feasibility of each of the options under a range of headings, including environmental impact, social impacts and technology issues.

I.Gc-16. NEXT STEPS

The NDA has 20 sites under its ownership and each site has carried out a stakeholder consultation of some sort. NDA will now undertake a reconciliation process which started in April 2007 and is expected to be complete by August. The NDA will carry out the following:

- An independent group representing stakeholders (regulators, local authorities) will review the end states for the 20 sites.

- Consider the end states from a national perspective.
- Feedback to site stakeholder groups, sites and regulators the outcome of discussions.
- Finalise a recommendation.

The End State recommendation will go to the NDA board for approval in September 2007 and will be incorporated into the NDA strategy in the latter part 2007. The site operator will then implement the approved end state recommendation in its 2008/09 Lifetime Plan.

I.Gc-17. REFERENCES TO THIS ANNEX

A number of documents which provide much more detail of each stage of the consultation have been prepared. These can be found on the websites below.

Websites

NDA: www.nda.gov.uk
Dounreay Stakeholder Group: www.dounreaystakeholdergroup.org
UKAEA: www.ukaea.org.uk/sites/dounreay/dounreay_end_state.htm
All documents, going through the process, can be found on
http://www.nda.gov.uk/stakeholders/site-end-state/index.cfm.

Documents available on UKAEA website:

- Assessment of End State Options, October 2006, QRS-1324B -1.
- Internal Stakeholder Panel Report, October 2006, QRS-1324B -2.
- External Stakeholder Panel Report, October 2006, QRS-1324B –3.
- Minutes of the Regulatory Workshop, December 2006, SES(06)P014.
- Defining the Dounreay Site End State, November 2006.
- Questionnaire responses to public consultation, January 2007.
- Wider Consultation on the End State Options Assessment, February 2007, QRS-1324B – TN13
- Minutes of Site End State Decision Conference, March 2007, DSG(2007)C020.
- Recommendation for the End State of the Dounreay Site, March 2007, DSG(2007)C031.
- Minutes of the Dounreay Stakeholder Group, March 2007, DSG(2007)M010.
- DSG – Recommendation for the End State of the Dounreay Site, March 2007, DSG(2007)P039.
- Site Licence Company Development Report, March 2007, SES(07)P03.

Annex 1.Gd

UKAEA, WINFRITH SITE CLOSURE PROGRAMME, STAKEHOLDER COMMUNICATION PLAN

I.Gd-1. INTRODUCTION

This model is based on the UKAEA site at Winfrith [I.Gd-1]. It is an excellent example of a stakeholder management plan and incorporates many examples of best practise and could be used as a model approach to be adjusted to suit local conditions. The programme, which is known as the Winfrith Site Closure Plan (WSCP), is currently planned to be the first UK site, which will be de-licensed. A variety of processes which were carried out on the site included several reactors, fuel handling, laboratories, waste management and effluent treatment. More information on Winfrith transition from operation to decommissioning is given in [I.Gd-2].

This document below identifies the Winfrith Site Closure Programme Stakeholders, both internal and external. It describes actions to be taken by UKAEA management to provide effective communication with those Stakeholders.

The project objective is to decommission the Winfrith Site area and demolish where necessary, then de-license the site and return it to the public domain for unrestricted use. To achieve this, the site facilities and land must be decommissioned, demolished and the land remediated in such a way so as to meet the requirements of the NII, the EA and any potential developers. For further information, Fig I.B-1 highlights the features of the Winfrith Technology Centre including borderlines with UKAEA, Sites of Special Scientific Interest (SSSI) and other areas being re-developed.

This process will therefore obviously involve interactions with regulatory Stakeholders as well as internal Stakeholders. The project will also raise the public profile of the Winfrith UKAEA Site and so it is appropriate to develop this Stakeholder Communication Plan.

I.Gd-2. OBJECTIVE

The objective of this plan is to ensure that Stakeholders are informed positively, effectively and in a timely manner about the programme. This will promote confidence and understanding about the project and will portray UKAEA in a positive light. It will also provide for demonstration of UKAEA control and competence and Contractor competence.

To be effective, communications must be:

- Open and honest
- Clear and concise
- Relevant
- Direct
- Truthful
- Sensitive
- Balanced
- Timely
- Informative

I.Gd-3. OWNERSHIP

The Winfrith UKAEA Head of Site is responsible for managing communications on behalf of UKAEA on site. He takes advice from the Corporate Communications Department. A Winfrith site stakeholder database is maintained on his behalf which holds a full list of stakeholders and their owners of which this WSCP programme is a part.

This Communication Plan will be managed and implemented by the Programme Manager, the Programme Director and the Winfrith Public Relations Officer on behalf of the Project Sponsor.

The Stakeholders identified for the Winfrith Site Closure Programme are listed in the table below.

The Appendix to this Annex details the Stakeholder Communication Plan. It lists all of the above and identifies their areas of interest and likely concerns, the management actions required, the timing of communications, and the UKAEA person(s) responsible.

I.Gd-4. MEANS OF COMMUNICATION

Below is a list of the communication tools which can be used. The list provides examples and is not exhaustive.

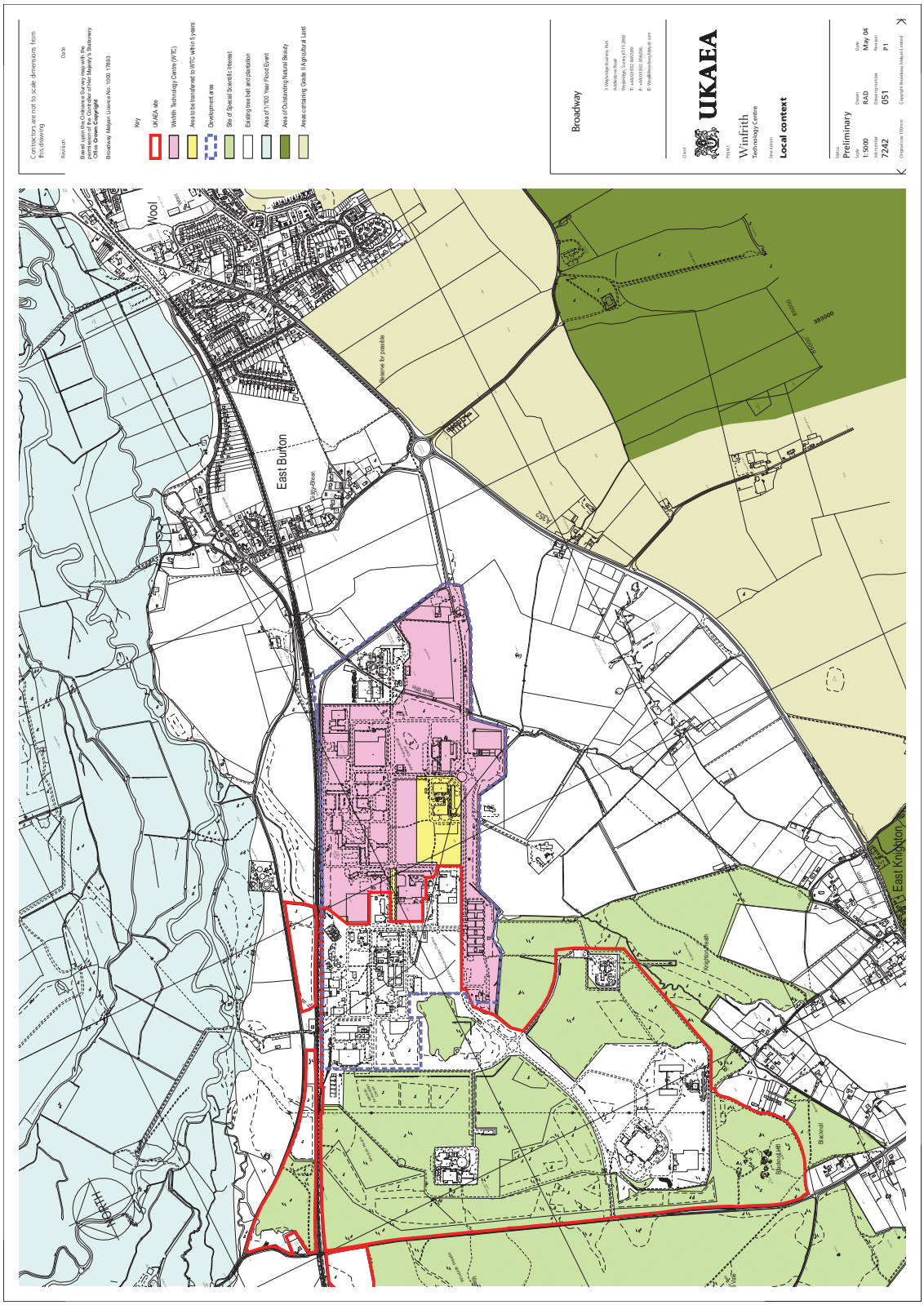

FIG. I.Gd-1 Winfrith Technology Centre.

STAKEHOLDERS	
Internal	External
UKAEA Board	Department of Trade and Industry (DTI)
UKAEA Executive	Liabilities Management Unit (LMU) / Nuclear Decommissioning Authority (NDA)
SIRC	Nuclear Installation Inspectorate (NII, for purposes of Nuclear Licence Compliance and Industrial Safety)
Staff	English Nature
Unions	Office for Civil Nuclear Security (OCNS)
	Nuclear Industry Radioactive waste EXecutive (NIREX)
	EURATOM
	Office of Government Commerce (OGC)
	Dorset Local Authority (LA)
	PurbeckLocal Authority (LA)
	Local Liaison Committee/Local Public
	Member of Parliament
	Opposition Party Member
	Land Owners and tenant farmers
	South West England Rescue Association (SWERA)
	Local Winfrith Technology Centre Tenants and
	West site Tenants
	English Partnerships
	AON (Consultant in risk management, insurance broking, employee benefits and HR consulting services)
	Contractors
	Media
	Police
	Dorset Fire and Rescue
	Wessex Water
	Service Suppliers

- Formal and informal meetings
- On and off-site presentations
- Site visits
- Memos (internal) and letters (external)
- Brochures
- Interviews and press briefs
- Articles in Winfrith Journal and UKAEA Today

The most appropriate means of communication and the stakeholders contacted will be dictated on a case-by-case basis based on considerations around the content and subject matter of the communication. Items for consideration will include:

- Importance
- Urgency
- Relevance
- Potential effect on/reaction by stakeholder
- Potential effect on UKAEA and/or its contractors

REFERENCES TO ANNEX I.Gd

[I.Gd-1] UKAEA, Winfrith Site Closure Programme, Technical Note, Stakeholder Communication Plan, Project Ref: 52612.02, Document Ref: WSCP 0172, Issue: 2, UKAEA, Winfrith, 24 June 2004.

[I.Gd-2] LARAIA, M., GORDELIER, S., NEAL, A., Transition from a Nuclear to an Industrial Site- Managing Change in the Re-Use of Sites Including a UK Example, a NEA Int. Workshop on Safe, Efficient and Cost-Effective Decommissioning, Rome, 6-10 September 2004, SOGIN, Rome, 2004 (CD-ROM).

Appendix to Annex I.G

INTERNAL AND EXTERNAL STAKEHOLDERS FOR THE WINFRITH SITE CLOSURE PROGRAMME – COMMUNICATION PLAN

The following table gives the fundamentals of a stakeholder communication plan and indicates the areas which should be covered .The plan should be maintained as a live document and frequently reviewed to accommodate changing perceptions and requirements. The individual columns indicated below are:

- CATEGORY; Whether the stakeholders are internal or external to the organization.
- STAKEHOLDER; Who the stakeholders are? Note the diversity of interests which will develop related to a particular site.
- OWNER; Person in the organization who has responsibility for the interaction.
- CRITICAL SUCCESS FACTORS; What are the critical success factors associated for this stakeholder.
- POSSIBLE CONCERNS; An indication of areas of possible concern related to the individual stakeholder.
- COMMUNICATION PLAN; The frequency and method of communication.

CATEGORY	STAKE HOLDER	OWNER[a]	CRITICAL SUCCESS FACTORS	POSSIBLE CONCERNS	COMMUNICATION PLAN
Internal	Board	Stan	Improved chance of remaining the 'Supplier of Choice'.	Too ambitious a programme Funding requirements Effects on other sites	Agreed programme Sep 2003. Regular mandatory reports.
	UKAEA Executive (UEX)	Stan	Improved chance of remaining the 'Supplier of Choice'.	Too ambitious a programme Funding requirements Effects on other sites	Agreed programme April 2003. Regular mandatory reports.
	Social Issues Research Centre (SIRC)	Paul	Good use of public funds	Not value for money against 3.5% discount rate	Sanction papers at stages.
	Unions	Alan	Improved confidence that members will continue to be employed by UKAEA	Members job losses before they retire	Quarterly Local Joint Council meetings
Sponsors	Department of Trade and Industry (DTI)	Alan	Successful and safe site closure	Funding requirements	Quarterly visits
	Liabilities Management Unit/Nuclear Decommissionin g Authority (LMU/NDA)	Paul	Earlier decommissioning and de-licensing	UKAEA as a supplier of choice	Monthly formal meetings
Regulators	Nuclear Installations Inspectorate (NII)	Gordon	Earlier hazard reduction	NII resource implications	Monthly videoconferences. Regular interaction
	Environment Agency (EA)	Gordon	Earlier hazard reduction	Contamination in ground water. Unauthorized discharges.	Monthly videoconferences. Regular interactions.

CATEGORY	STAKE HOLDER	OWNER[a]	CRITICAL SUCCESS FACTORS	POSSIBLE CONCERNS	COMMUNICATION PLAN
	English Nature	Mike	Possibility of SSSI becoming accessible to public	Damage to SSSI during decommissioning and demolition	As required.
	Office for Civil Nuclear Security (OCNS)	Alan	Early removal of Special Nuclear Material (SNM) from site	Security using new guard force.	Regular interactions. Annual inspections.
	NIREX	Andy	All Intermediate Level Waste (ILW) correctly treated and stored.	ILW incorrectly treated	Applications to NIREX for Letters of Comfort as required.
	EURATOM	Andy	Security of all accountable material	Storage plans	Quarterly visits to site.
	Office of Government Commerce (OGC)	Paddy	Reviews of Winfrith Site Closure Plan (WSCP) at appropriate times		Gateway Reviews
Local	Dorset LA	Alan	Earlier hazard reduction Early removal of 'eyesores' More development space	Future of the English Partnerships (EP) site and UKAEA site. Local housing and transport plans.	As required
	Purbeck LA	Alan	Earlier hazard reduction Early removal of 'eyesores' More development space	Future of the EP site and UKAEA site. Local housing and transport plans.	As required
	Local Liaison Committee (LLC)	Alan	Earlier hazard reduction Early removal of 'eyesores' More development space	Traffic on Gatemore Road	Quarterly meetings
	Local Public	Alan	Earlier hazard reduction Early removal of 'eyesores' More high quality jobs	Traffic on Gatemore Road	Regular briefings through LLC and parish councils
	Jim	Alan	Earlier hazard reduction Early removal of 'eyesores' More development space More high quality jobs	Traffic on Gatemore Road Constituents' jobs	Annual Meeting and as required.
	Ian	Alan	Earlier hazard reduction Early removal of 'eyesores' More development space More high quality jobs	Traffic on Gatemore Road Potential constituents' jobs	Annual Meeting and as required.
	Land Owners Welds, Hydes, tenant farmers	Alan	Removal of pipeline	Disruption during the removal of pipeline	As required

CATEGORY	STAKE HOLDER	OWNER[a]	CRITICAL SUCCESS FACTORS	POSSIBLE CONCERNS	COMMUNICATION PLAN
	South West England Rescue Association (SWERA)	Mike	More development space		As required
On site	Tenants (East)	Mike	More development space	Lack of access to West Gate	Limited meetings after 1 April 2005
	Tenants (West)	Mike	More development space	Access to facilities on east of site	Monthly meetings
	AEA Technology (AEAT)	Alan and Gordon	Possibility of more work	End of their operations on the Winfrith site	Monthly meetings
	EP	Mike	More development space Earlier hazard reduction	Possibility of contamination of east site due to decommissioning activities	Monthly Meetings. 04//05 UKAEA Manager.
	AON	Gordon	Possibility of selling their services to new implementation contractors	Loss of a customer in the longer term	As required
Contractors	Contractor A	Andy	Consolidate existing contracts Possibility of more work under the Term Contract Possibility of new contracts	Being excluded from bidding for new implementation work	Regular Meetings. Project review meetings (PRM).
	Contractor B	Andy	Maintenance of staff under contract.	Loss of longer term opportunities	Regular Meetings. Facility Management Contract meetings.
	Others	Karen	Winning contracts	Level playing field	Contracts Bulletin and OJEU (Official Journal of the European Union)
Media		John	Good News Stories		Public Relations (PR) Briefs
Local Services	Police	Paul	Minimum disruption to the public	Traffic on Gatemoor Road	As required
	Dorset Fire and Rescue	Gordon	Fire Safety	Fire and other hazards during decommissioning work	As required
	Wessex Water	Mike	No radioactive discharge into their sewage system	Future drainage system for Winfrith Site Closure Plan (WSCP) site	As required
	Other	Terry	Minimal disruption to their supply	Future plans for the site and their requirements	As required

[a] Names in this column are fictitious

Annex I.H

MISCELLANEOUS EXAMPLES OF STAKEHOLDER MANAGEMENT PLANS AND PROCESSES

This annex is intended to give examples of Stakeholder Management plans and processes, which may be useful to organizations about to embark on stakeholder interactions.

I.H-1. STAKEHOLDERS' ENGAGEMENT IN DECOMMISSIONING WASTE MANAGEMENT AND CLEARANCE

Gaining public acceptance of an option for the disposition of materials arising from the decontamination and decommissioning of nuclear facilities will play a role in the successful implementation of that option. As an example, recycle/reuse outside the nuclear industry and disposal/replacement each present different public acceptance issues. Gaining public acceptance of the practice of recycling materials containing traces of radionuclides may be problematic because of the stigma associated with the nuclear industry in most industrialized countries.

Since recycling of components arising from decommissioning or refurbishment of nuclear installations is not a routine activity at present, considerable public concern may be anticipated in the case of unrestricted release of substantial amounts of material. Even if the radiological risks from unrestricted release is negligible, public and government concern may force nuclear operators to recycle for restricted use or alternatively to dispose of the items. Recycling for restricted use should not experience the same level of opposition [I.H-1].

In this regard, it is noteworthy that in Spain, an agreement (in Spanish: protocol) was established between the government, the regulatory body, the decommissioning organization (ENRESA) and scrap dealers and smelters to accept materials released for unrestricted use from nuclear sites [I.H-1].

In Slovakia, a law supporting derived limits for metal scrap release was issued in 1996 [I.H-2]. The clearance levels for conditional release (re-melting of metal scrap with other non contaminated metal scrap) were also classified. They were based on the fact of metal activity reduction (the radioactive nuclides are mostly remaining in slag) and dilution of remaining activity by melting with non-contaminated metal scrap. This allowed for re-smelting and consequent reuse of the metallic scrap with the specific activity 10 times higher than required for direct unconditional release. The total activity of materials allowed for re-smelting from one site was less then 1 GBq/y. Since the public was not prepared to accept such a principle and a facility for re-smelting of metal scrap was not found, the above described "dilution approach" was later abandoned [I.H-3] and new clearance levels only for unconditional release were issued [I.H-4].

Plans of repositories for disposal of radioactive wastes are subject to similar public scrutiny and heightened sensitivity. Disposal options for the large amounts of decommissioning waste may present requirements for increased disposal capacity in excess of the capacity of currently operating facilities. Moreover, siting and licensing of radioactive wastes disposal facilities have been the subject of intense political opposition.

While there is no universal answer to securing public acceptance, the following considerations would contribute to creating an appropriate climate of opinion:

- A simple unified clearance system for deciding whether material is subject to regulatory requirements;
- Widespread international acceptance of such a system;
- Clear separation of political judgments (including cautionary conservatisms) from technical assessments: if political inputs into the clearance regime are necessary they should be explicit and not hidden in technical assessments;
- Further consideration of the potential recycling within the nuclear industry and for maximizing disposals on nuclear sites, although on the basis of standard clearance criteria;

In general, it is not essential for clearance levels to be exactly equal among various countries or international organizations as long as they are harmonized to a sufficient degree, say, within the same order of magnitude. There is of course still the aspect of credibility and public opinion. Numerical differences in

clearance levels between countries or international organization leave room for malevolent misinterpretation [I.H-1]. This is an area where international stakeholders may have a say on decommissioning projects being carried out in other countries.

One example in this domain is the UK SGHWR decommissioning project. Although not currently used within the UK, there is no inherent reason why very low level waste should not be sent for burial on existing land burial sites. Initial discussions with the regulators have confirmed that this is an option, but drawbacks are the anticipated costs and the public relation difficulties of disposing of power station/research wastes (perceived as bad wastes) in this way, as opposed to hospital wastes (perceived as good wastes) which are currently subject to this route. The two problems are inter-related in that the operators of the sites could be expected to charge a premium as compensation for the anticipated adverse publicity. In the event, the potential difficulties of securing agreement and achieving a satisfactory price convinced the decommissioning team that this was not a satisfactory route to follow [I.H-1].

Ultimately, public perceptions regarding the acceptability of both radioactive material management alternatives will significantly influence the implementation of either alternative. Consequently, provision of additional information on the relative risks of both management alternatives could be a determining factor in the formation of public opinion and in the decision making process. The implementation of any disposal option is highly dependent on making information available.

Ref [I.H-5] expands on the role of SD: SPUR, a UK-based stakeholder dialogue, in assessing sustainable approaches for the management of large volumes of construction material wastes arising from decommissioning.

I.H-2. OFFICE OF GOVERNMENT COMMERCE GATEWAY REVIEW PROCESS, UK.

While not exclusively nuclear, the Office of Government Commerce (OGC) does review nuclear projects for UKAEA on behalf of the UK Treasury, which has the responsibility of ensuring that public funded works are run according to “Best Practise” in procurement and project management terms. UKAEA is a non-departmental public body (NDPB) so it is required to undertake a series of project reviews known as “The OGC Gateway Review Process” according to OGC principles. There are six stages of review:

- Strategic, Gate 0. This looks at the strategic need for the programme including identifying the main stakeholders and interviewing them to establish their support.
- Business Justification, Gate 1. Project options are identified to establish affordability, achievability and value for money. Stakeholders are approached to establish continued support and what the critical success factors are.
- Procurement Strategy, Gate 2. Establishes the procurement strategy
- Investment Decision, Gate 3. Evaluates bids, selects or confirms supplier or partner, update business case and confirm stakeholder continued support
- Readiness for service, Gate 4. Plant ready for service
- Benefits realization, Gate 5. Establish benefits realized: is there an exit strategy or defined/achieved end point?

For this document the importance is that these reviews and underlying procedures incorporate stakeholder management as a key activity integrated into the project management approach. Competent and respected experts in the field of business and project management carry out the reviews at senior level. Because of this, the advice is likely to be listened to by both the governance and the approval /scrutiny communities. The advice should be treated seriously by the sponsors and acted on if deemed appropriate. However, this process is intended to identify strengths, weaknesses, opportunities and threats at key stages throughout the project and to give the project and its sponsors (stakeholders) confidence in the project. It is not an audit or a burden - it should be an asset. Note that the Stakeholder Communication Plan (Annex I.Gd) was reviewed at gate 0 level and in excess of fifteen stakeholders, internal and external, were interviewed to determine any outstanding issues and risks to the project It is important to have widely experienced reviewers, who have skills appropriate to particular stage of the gate process, not necessarily from the nuclear business, as many issues including stakeholder management have common failure modes with other industries. More information can be found in [I.H-6].

I.H-3. THE SAFEGROUNDS LEARNING NETWORK

SAFEGROUNDS is a forum for developing good practice guidance on the management of radioactively and chemically contaminated land on nuclear and defence sites in the UK [18A]. It provides detailed advice on good practice in stakeholder involvement in decisions relating to contaminated land and subsequently during project implementation. The SAFEGROUNDS forum has established a number of principles. Principle 2 applies to stakeholder involvement and states "Site owners/operators should develop and use stakeholder involvement strategies in the management of contaminated land. In general, a broad range of stakeholders should be invited to participate in decision-making" [I.H-7]. The use of peer reviewers/facilitators independent of both the nuclear site and the environmental agencies was extensively used during the stakeholder consultation to give oversight and independence to the process. See also [I.H-8 and I.H-9].

I.H-4. FOSTERING COMMUNITY PARTICIPATION IN DECOMMISSIONING MAINE YANKEE, USA

Maine Yankee's Principles of Citizen Outreach known as Community Advisory Panel (CAP) has developed a series of checklists and reasons for stakeholder engagement [I.H-10]. The approach originated in 1997 with 14 citizens, empowered to form a committee to debate stakeholder issues with the Maine Yankee decommissioning project. The process started within three weeks of the decision to decommission the plant and meant that the CAP were involved in the very early planning and decision making process. The benefits of this approach were seen to;

Build trust: By informing and engaging citizens, opinion leaders and critics, the project was gradually gaining trust with all our constituencies, from the private citizen to the regulators

Foster understanding, deter delays: The more people knew about what was going on, the less likely they were to put up road blocks, delay decommissioning and increase ratepayer costs

The principles of the CAP engagement are embodied in Tables I.H-4.1 and I.H-4.2.

I.H-5. COWAM 2, EURATOM

COWAM-2 was funded as a shared cost project under the 6th EURATOM Framework Programme. The multi-disciplinary consortium consists of 19 organizations from 9 European countries. The stakeholder participation includes some 40 different institutions [I.H-11].

In 2000-2003 the first COWAM project created a European network on radioactive waste governance. The first interest of the initiative was to establish connections between territories concerned by radioactive waste in Europe. Local actors have long been isolated in these issues. The COWAM seminars were a novel opportunity to exchange views, issues and good practices among local communities, all facing similar concerns. Local communities have a genuine interest in governance because they consider not only the issue of radioactive waste management as a technical problem, but as a key challenge for the development of their territories and the life equilibrium of the population. The network also included experts, implementers and regulators in order to elaborate a common understanding of the issues at stake, and to propose as far as possible a joint analysis by the major stakeholders commonly concerned by the quality of RWM decision-making processes. The practical outcome of this first project was to come up with a research framing of radioactive waste governance.

The plural COWAM network identified four strategic dimensions in the governance of radioactive waste management:

- the implementation of local democracy
- the influence of local actors on the national decision-making process
- the quality of decision making
- long term governance.

TABLE I.H-4.1. PRINCIPLES OF CITIZEN OUTREACH

1. Do it
- More than pays for itself in reducing the scope of judiciary hearings
- Costs mainly staff time
- Engages and informs opinion leaders
- Increases mutual understanding
- Provides a third party conduit to the community

2. Do it early
- Before someone else does it
- Perhaps a year before submitting the plan
- Because if changes are to be made, better to know sooner than later

3. Clarify the role of the Citizen Advisory Board
- Not to over-promise; may not make everyone happy
- Advisory, not decision-making role; company will consider advice carefully
- Concerned about interests of the community and fair process
- In need of clear charter, company agreement

4. Treat board with respect
- Don't try to control the board
- Be absolutely open, with no hidden information and agendas
- Use everyday language in all planning documents including those to the NRC. The board and the community are not technical experts, but they can understand plain English.

5. Include credible, influential people on the board
- Power centres of community/area such as town and county political leaders; Chamber of Commerce, Rotary Club or other business-focused members; financiers (e.g. bankers); school personnel (e.g. physics teacher); clergy; news media members (e.g. publisher)
- Opposition leadership
- University professors, available as consultants to the board

6. Use plant facility for meetings
- Familiarity leads to better understanding and demystifies its activities
- If the board wants meetings somewhere else, at least arrange a visit

7. Help the board plan meaningful meetings
- It is their agenda, but facility professionals can help
- If meetings are not worthwhile, no one will come
- Perhaps hold them quarterly
- Explain decommissioning requirements, process, agencies, roles

8. Keep board ahead of the news
- Have process to reach them fast
- Inform them of any developments

9. Be a good neighbour now

TABLE I.H-4.2 REASONS TO ENCOURAGE CITIZEN INVOLVEMENT:

- People are entitled to be involved in issues that directly affect them.
- Involvement in the process leads to greater understanding of, and more appropriate reactions to, the particular risk.
- The input of those who live with the risk every day and are familiar with their own needs can lead to better policy decisions and solutions.
- Co-operation between agency and citizens can increase agency credibility.
- Citizen outrage is reduced.

The second COWAM project (2004-2006) built a research partnership between stakeholders and research contractors on each of these four key issues, and supported continued networking efforts. With this partnership, stakeholders have had the opportunity to frame and feed the production of knowledge so that it better addresses the questions they identified as the most relevant to improve the robustness of decision-making processes in radioactive waste management.

- The "local democracy" group shared knowledge about local committee building, as a best practice to structure local democracy on nuclear related issues in Europe.
- The group on "influence of local actors on the national decision-making process" clarified effective mechanisms for local players to influence national decision-making processes
- The group on "quality of the decision-making process" worked out recommendations for designing and implementing a robust decision-making process or judging an existing decision-making process.
- The purpose of the "long term governance" group was to identify, discuss and analyse the institutional, ethical, economic and legal considerations raised by the existence of a site for long term waste storage or deep geological disposal.

Alongside these transversal products, country-bound National Insight papers agreed by the range of participating stakeholders were published by COWAM 2.

The essential question raised by institutional decision-makers as well as by local communities concerns the implementation of these good practices and principles of decision-making. Significant steps were already taken in some countries during the COWAM 2 project. There is a need for a continuous and enlarged support for these efforts in Europe. The question is all the more relevant and pressing that having reviewed their past difficulties, many countries are now entering a new phase in RWM and attempting to implement innovative and inclusive governance approaches.

In this respect, the objectives of COWAM IN PRACTICE (CIP – 2007/2009) are to:

- Contribute to make actual progress in the governance of radioactive waste management (RWM)
- Follow up and analyse 5 national processes of RWM governance : Spain, United Kingdom, Romania, Slovenia and France
- Support stakeholders, particularly local communities, directly in their engagement
- Capture the learning from that experience for the EU 27

The originality of this project lies in a cooperative research approach, successfully experimented in the COWAM 2 project: with a direct participation of stakeholders in the research groups and in the Steering Committee, the architecture of the project is purposely designed for the stakeholders to effectively influence and feed the project throughout its progress. [I.H-12, I.H-13].

I.H-6. NASA PLUM BROOK REACTOR FACILITY, USA.

NASA recognized early in the planning stages of decommissioning that residents in the area surrounding the Plum Brook Reactor Facility [I.H-14] might be concerned that decommissioning activities and the transporting of low level radioactive waste through their neighbourhoods could pose a public health and/or environmental risk. In recent years area residents had become less familiar with the NASA activities at Plum Brook and thus there were limited opportunities for residents to view NASA as a "good neighbour". Given these factors, NASA determined that it needed a community relations plan for the decommissioning that went beyond a simple media relations effort. The following mechanisms were employed:

— Plum Brook Station open house
— Community information sessions
— Fact sheets and Power Point presentations
— Community workgroup
— Community information bank and decommissioning website

— Mailing list and mailings
— Decommissioning videos
— Postcard/magnets
— Project update for nearby neighbours and neighbours reception
— Decommissioning telephone information line
— Quarterly newsletter
— Newspaper supplement
— Reactor Facility media tour
— Speakers upon request
— News releases, media advisories/notes to editors, public service announcements
— Advertisements.

This strong community relations and involvement programme has enabled a potentially controversial project to move forward successfully with strong community support [I.H-15].

I.H-7. SUPERFUND COMMUNITY INVOLVEMENT ACTIVITIES, USA.

The Superfund Programme was established by the US Congress in 1980 with the objective to locate, investigate and clean up the most (chemically) polluted sites in the USA, but also includes radioactively contaminated sites. An important element in the Superfund activities is the involvement of the (local) communities in cleanup projects. The Superfund web site gives guidance and ideas to the approach to involving communities [I.H-16].

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[I.H-16] US ENVIRONMENTAL PROTECTION AGENCY website: www.epa.gov/superfund/action/community

Annex II

LESSONS LEARNED

The following examples of the lessons learned from stakeholders' interactions in decommissioning projects include an outline of the problems/requirements encountered, solutions found, and lessons learned. The situations described are typical of the issues that can arise in the planning or implementation of decommissioning activities.

The information can be grouped under general categories of event and issues. Note that some events or issues belong to more than one category.

Environmental concerns	II.1. II.16. II.19. II.21
Contractor issues	II.2, II.6, II.10, II.13
Communications with regulators	II.1, II.3, II.11. II.12, II.13, II.20
Co-operation between many stakeholders	II.4, II.16. II. 17
Project transition	II.5, II.16. II.17, II.22
Identification of stakeholders	II.7, II.8, II. 9. II.14, II.16, II.17
Communications with stakeholders	II.15, II.18, II.22

Although the information presented is not intended to be exhaustive, the reader is encouraged to evaluate the applicability of the lessons learned to a specific decommissioning project.

II.1. CHARACTERIZATION OF ENVIRONMENTAL MEDIA, WHITESHELL LABORATORY, CANADA [II-1]

Problem encountered: As part of a formal environmental assessment for the Whiteshell Laboratory decommissioning project, the proposed end state for contaminated sediments at the process water release point to the Winnipeg River met with public and regulatory resistance. The key issue was the existence of adequate data to justify the proposed end state.

Analysis: A team of divers was contracted to conduct a detailed river bottom survey and sampling programme. The resulting data and subsequent analysis confirmed that the contamination of these sediments was well below any possible impact level for aquatic biota and that no mechanisms existed for an impact on humans. On the basis of the detailed information and results of the analysis, the final end state approach of in situ abandonment was accepted.

Lessons learned: A requirement for detailed environmental analysis raised as a result of public and regulatory concern during the environmental assessment process, added real value to the project. The resulting study confirmed the acceptable end state for a significant project component as in situ abandonment.

II.2. INADEQUATE SUPERVISION OF CONTRACTORS, TOWER SHIELDING FACILITY, USA [II.1]

Problem encountered: During the late fall of 1997 and winter of 1998, a subcontractor was surveying surplus materials at the Tower Shielding Facility at ORNL. Since many of the metal items had been exposed to the neutron flux from the reactor, the predominant radioisotope present was cobalt-60, a beta-gamma emitter. Alpha contamination was much less prevalent. Due to schedule constraints, a shortage of qualified manpower, an insufficient number of alpha monitors, and the scarcity of historic alpha contamination, the subcontractor ceased to consistently conduct alpha surveys on all the items. However, the subcontracted Radiological Controls Technicians (RCTs) continued to fill in "No alpha detected" on the green-tags.

During June 1998, ORNL RCTs discovered Am-241, an alpha emitter, present on part of a box that had been tagged as having beta-gamma contamination only. The whole box was previously partitioned to remove the contaminated portion, and the remaining portion surveyed for beta-gamma contamination only and green-tagged for free release. The green-tagged part of the box had recently been sold as clean scrap metal to a local foundry. Expecting that more undetected alpha contamination could be present on other parts of the box, the High Ranking Facilities Deactivation Project manager dispatched an RCT and the Tower Shielding Facility Manager to the foundry site to resurvey the other section of the box. The RCT's survey results determined that the other section of that box was free of alpha contamination, but found previously undetected alpha contamination on a similar box from the Tower Shielding Facility. This contaminated box was decontaminated at the foundry site and later returned to ORNL.

Because of insufficient oversight of the subcontractor, the prime contractor was not aware of the lax surveying practices of the subcontractor until the contaminated material had been released off-site. Since schedule constraints and other pressures can often tempt subcontractors to cut corners by deviating from established procedures and practices, sufficient oversight must be provided to oversee subcontracted work to verify that radiation protection requirements and other contractual obligations are being met.

Analysis: Subcontract Technical Representatives (STRs) are now in place to oversee all subcontracted work to verify that the subcontractors are meeting their contractual obligations and properly following procedures, standards, and applicable regulatory requirements.

Lessons learned: Oversight of subcontracted work is essential to ensure that all contractual obligations, including radiation protection requirements and proper radiological procedures, are strictly enforced

II.3. REGULATION AND SAFEGUARDS, ANSTO, AUSTRALIA [II-1]

Problem encountered: In Australia, a separate regulatory body is tasked with matters relating to Safeguards and non-proliferation. The scope of this oversight is very broad, and includes administrative controls and monitoring of a variety of associated nuclear material and equipment, in addition to fissile material. Also, while research reactors conduct routine, but infrequent, shutdowns of extended duration every few years, more opportunity could be taken to facilitate future decommissioning planning.

Analysis: To minimize potential Safeguards and non-proliferation problems, it is beneficial to consider the early removal of all such associated material and equipment during the decommissioning project so as to minimize future administrative burden and costs. Also, during the final extended shutdown of the research reactor prior to decommissioning, activities that might improve decommissioning planning, such as inspections, surveys and modifications, demand consideration.

Lessons learned: Undertaking decommissioning activities such as inspections, surveys, modifications and the removal of all redundant nuclear materials very early on in a decommissioning project will help improve decommissioning planning and reduce any Safeguards/non-proliferation issues**.**

II.4. ORGANIZATIONAL DIFFICULTIES IN THE SHIPMENT OF DR-3 FUEL ELEMENTS TO THE USA FROM RISØ, DENMARK [II-1]

Problem encountered: The Risø shipments of Danish research reactor DR 3 fuel (255 DIDO irradiated fuel elements) presented unique difficulties due to short timescales and that this was a first-time application of personnel, equipment, and ships to this issue.

Analysis: The NAC International[1] efforts, technical performance, and precision in project management supported the accomplishment of secure and safe spent fuel transport operations as originally scheduled by Risø. This required the close cooperation between Risø National Laboratory, NAC, the US Department of Energy, Westinghouse Savannah River Company and Competent Authorities of several countries. The NAC

[1] The US transport company.

International personnel worked with the Risø team over a twelve-month period during the project. Successful completion of the work and the delivery of the second shipment ended successfully..

Lessons learned: In complex projects, co-operation of all stakeholders is essential.

II.5. ORGANIZATIONAL TRANSITIONS MAY LEAD TO DEFICIENCIES, HANFORD, USA [II-2]

Problem encountered. The 300 Area Facilities Disposition Project recently received a Radiological Problem Report (RPR) at the 340 Facility because quarterly surveillances of temporary shielding in a valve pit were not documented. The shielding was in an area not routinely accessible. The River Corridor Project temporary shielding procedure requires temporary shielding to be periodically inspected and surveyed to ensure it is fulfilling its intended purpose.

Analysis. Evaluation of the deficiency identified a root cause of inattention to detail during facility transition from the Waste Management Project to the River Corridor Project in 1999. The procedural requirements under Waste Management Project allowed the condition, but the River Corridor procedures contained slightly different surveillance requirements, leading to a deficiency.

Lessons learned. As part of Pre-Existing Condition assessments, differences between requirements in organizations need to be identified and documented. Managers should ensure that their employees focus on requirement continuity during organizational transitions.

Attention to detail is needed during organizational transitions to ensure that conditions existing under one set of procedural requirements do not become deficiencies under a different project's requirements.

II.6. WORK FORCE RESTRUCTURING, OAK RIDGE, USA, [II-3]

Problem encountered: The Powerhouse Demolition Project did not address the larger labor issues due to the decision by the DOE Oak Ridge Operations (ORO) that the Project would be a service contract and not a construction contract. The scope and project specifications were defined and the work was bid to specialist demolition contractors. Olshan Demolishing Company, a non-union demolition contractor, won the bid to perform the demolition work. Olshan officials and the Knoxville Building Trades Council representatives discussed various labour issues in an attempt to work out a project agreement that utilized some union workers, but in the end, Olshan could not reach an agreement with the Knoxville Building Trades Council about the terms and conditions specified in the MK-Ferguson of Oak Ridge (MK-F) Project Agreement. The issues that could not be resolved included determining how many craft workers would be hired, the type of craft labour to be used, the Project duration, and the Project work rules. The local unions responded to the failure to reach agreement by setting up an informal picket at the entry that had been planned for use by Powerhouse Demolition Project personnel. In order to proceed with minimal impact to the Project, an alternative entry was set up. Union representatives did not establish pickets at this second portal, and the work continued to completion. Additional costs were incurred to cover the costs associated with providing another portal entrance.

Analysis: An essential strategic issue faced by DOE is how to ensure the availability of qualified trained staff to successfully carry out Environmental Restoration work while under pressure to downsize its staff and reduce costs. Human resource requirements shift dramatically as sites change in status from operations to shut-down and decommissioning. In many of these transitional facilities, the work force that was responsible for operational activities is still present and concerned about preserving their jobs. However, the workers formerly required to maintain these facilities may not have the appropriate mix of knowledge and skills needed to successfully decommission those same facilities. An argument has been made that specialist contractors may be able to perform decommissioning activities faster and at lower cost, because their work force is trained and experienced in performing the specialty decommissioning work. However, bringing in outside contractors and their workers may upset the economic base of the community, and can have widespread and undesirable consequences.

Lessons learned: Consideration of how workforce distribution strategies may impact stakeholders should be initiated for future project work. The stakeholders who are impacted by work force restructuring issues are numerous and diverse. They include the operator, its prime contractors and their subcontractors, labour union

workers, and the communities in which these stakeholders live. There is no simple solution to this issue. A forum for dialog needs to be initiated by the operator's senior management to discuss fair distribution of future project work and the potential impact to stakeholders.

II.7. LACK OF COORDINATION LEADS TO SCHEDULE DELAYS, NEVADA TEST SITE, USA [II-4]

Problem encountered: Contaminated soil was removed from an area during a soil remediation project at the Nevada Test Site. Based on the lead concentration identified in the soil during the site characterization, the project manager planned on treating the waste prior to disposal. However, recent federal regulations exempted this particular type of waste stream from being treated. A waste profile was written to allow disposal based on the recent change in regulation. The waste profile was reviewed by waste acceptance authorities. During the review process, there were different interpretations of how the waste stream should be best classified based on the process knowledge and available soil data. Delays resulted from the process of evaluating the waste and determining whether or not it should be classified as mixed or low-level radioactive waste. The waste was eventually disposed as mixed waste.

Analysis: Involvement of waste acceptance authorities late in the process led to schedule delays. Involvement of the approval authorities earlier in the process would most likely have prevented the disposal delays encountered. This highlights the need to improve communications throughout the process to ensure cost and schedule are not negatively impacted. Early involvement of all stakeholders would have improved the success of the project.

Lessons learned: Identify stakeholders early in the project and begin project status communications early in the process to address unanticipated controversial issues that can lead to additional costs and schedule delays. Early planning and coordination with approval of the authorities are critical in avoiding delays.

II.8. STAKEHOLDERS NOT INCLUDED IN PLANNING, NEVADA TEST SITE, USA [II-5]

Problem encountered: Schedule estimates and tasks were developed for a site-wide computer database without participation of all the people responsible for performing the tasks. Personnel were not included during the pre-planning phase regarding their responsibilities during the schedule-planning phase to ensure the schedule reflected the tasks and steps to be performed. Task definitions were not provided by, and to all, personnel responsible for completing the work. In addition, the project manager did not determine during estimating if work would be done by existing in-house resources or outside consultants. By not having in-house resources, the work was performed by more expensive consultants. This caused the project to overspend even when the schedule was met.

Analysis: Not all stakeholders were consulted during the planning phase. Task definitions did not contain brief narratives to ensure all parties understood the task and their deliverable. Task definitions also did not identify the source of the resource as in-house or from a consultant. This impacted the budget plan as it no longer mapped to the schedule. Some of the differences were due to the scheduled activities not starting as planned, new technology insertion introduced unknown/unplanned tasks that caused schedule anomalies, and underestimates/overestimates on some tasks. There was a project control method in place to adjust the schedule and budget to reflect the impact to the schedule when business reasons/priorities required diversion of resources allocated to the project. These issues were addressed through "Get Well Plans," but did not adjust the project reporting to account for the schedule impact. In addition, the same project management tool was not used by all parties. The scheduler used one tool for scheduling, but all others used a different software for scheduling. Schedules and due dates were calculated without completion of training or receipt and installation of hardware and software.

Lessons learned: Participation should be required from all levels of the project during schedule creation to ensure that tasks are specified and resources are identified. Schedule information developed in the planning phase and adjusted throughout the project should be used to develop and update cost estimates. Project managers need to include all stakeholders when developing project costs and schedules.

II.9. COST-EFFECTIVE PLANNING FOR FACILITY DISPOSITION, OAK RIDGE, USA, ELABORATION FROM [II-6]

Problem encountered: The DOE Office of Worker Health and Safety (EH-5), DOE Oak Ridge Operations Office (DOE-OR), Lockheed Martin Energy Systems (LMES), and Lockheed Martin Energy Research (LMER) have jointly developed important insights and useful practices for integrating safety and health into planning facility disposition projects at Oak Ridge sites. Several examples of Safety and Health lessons learned and good practices identified and discussed in the referenced report relate to stakeholders' interactions as follows:

- Augmenting facility historical and characterization information by interviewing former employees;
- Soliciting worker input in project planning to gain insights from their experiences with similar projects;
- Including stakeholders and regulators early in project planning to provide an open dialogue and early resolution of potential safety issues;
- Characterizing facility hazards, including inherent hazards caused by ageing and structural degradation, in the early stages of planning;
- Using incentive contracting approaches by pre-qualifying contractors and their ES&H programmes, using experts to support development of procurement performance specifications, and streamlining the procurement process;
- Forming multi disciplinary teams, including subcontractors, that are co-located and work together throughout the project to improve communication and teaming;
- Streamlining and focusing responsibility for ES&H management by using a single project ES&H point of contact.

Lessons learned: Integrating safety and health considerations into facility disposition planning can reduce costs as well as ensure environmental, worker, and public safety. This includes as wide participation of stakeholders as possible.

II.10. DEMOLITION OF BUILDING WITHOUT A REQUIRED PERMIT, ROCKY FLATS, USA [II-7]

Problem encountered: During demolition of Building 886 (B886) and Trailer 886A (T886A) at Rocky Flats, it was realized shortly after demolition started that the contractor had not received the required demolition permit from the Colorado Department of Public Health and Environment (CDPHE). Upon discovery, the contractor directed work stoppage and placed the building in a safe configuration.

Analysis: The root cause for this occurrence can be attributed to the following course of events:

(1) Communication breakdown between the asbestos and construction superintendent when the asbestos superintendent failed to inform management that the required demolition permit was not yet obtained and there would also be a required 10 day waiting period imposed upon the project by the CDPHE.
(2) Implementation of proper work controls to insure checklist type activities were not completed. These activities would have included fee payment, posting requirements and regulatory waiting periods. Fundamentally, fee and waiting can be rolled up to a single issue - posting the appropriate permit/notice. If the permit is not physically in hand, the rest is of no consequence.
(3) This activity was not routine and should have been considered a major work step with proper work controls associated with it.

Lessons learned: When doubt exists about regulatory permitting, posting requirements, and subsequent regulatory waiting periods, then work should not proceed until clarification is obtained from the proper plant support authorities. Future permitting will be coordinated through the Project Environmental Manager who will act as a central point of contact between state agency's and site organizations. Work activities requiring a state permit should not commence until proper receipt of required documentation are in place.

II.11. BETTER COMMUNICATION COULD HAVE PREVENTED NOTICE OF VIOLATION, HANFORD SITE, USA [II-8]

Problem encountered: Summary: Tritium sampling of the 324 Facility exhaust stack was discontinued during plasma arc furnace testing. Washington Department of Health (WDOH) issued a Notice of Violation (NOV) because of less than adequate communications regarding the testing and about discontinuing sampling.

Details: A technology demonstration project involving the treatment and destruction of dismantled weapons' components in the plasma arc furnace was conducted in the 324 Building in April 1998. In preparation for the project, a Notice of Construction (NOC) for the plasma arc furnace operations and an NOC modification addressing the addition of 20 curies of tritium to the stack discharge had been approved by WDOH in August 1997. The NOC is a type of permit issued by the WDOH for activities involving potential radioactive air emissions. The number of curies of tritium identified in the NOC modification was a conservative upper bound. The NOC permit did not require tritium sampling nor did the facility intend to sample for tritium. Due to the low potential to emit identified in the approved NOC modification, there were no regulatory requirements for tritium sampling. The facility attempted to obtain concurrence from WDOH for not sampling on the day of the test but could not reach anyone by telephone. The only communication with WDOH was a brief voice mail message. The facility decided to discontinue tritium sampling during the demonstration run on the basis of being able to comply with the NOC and regulatory requirements and because tritium source term information was available to use in lieu of sampling data. The plasma arc furnace operations were completed and tritium sampling was restored on April 17, 1998. WDOH issued a NOV on May 13, 1998 for lack of sufficient process description in the NOC with respect to the tritium source material and because tritium sampling had been discontinued without WDOH concurrence. The lack of detail in the NOC documentation prevented them from determining if controls and monitoring were adequate, from verifying that the source term was as low as indicated, and from approving alternative monitoring procedures or methods.

Analysis: There was no environmental threat posed at any time during this operation. Several Core Functions of the Integrated Safety Management System could have prevented this NOV had they been more effectively implemented: Identify Hazards and Requirements - The Major Subcontractor ensures hazard and environmental impact identification and analysis are performed and updated when facility life cycle and the associated hazards change. Although the amount of tritium released had been approved in NOC modifications, in this case the facility could have carried the environmental impact identification through confirmation by the regulators as the facility status changed with operation of the furnace. Perform Work Within Controls - Processes and procedures are established and maintained for guiding internal communication between the various levels and functions of the PHMC Team, and for conducting external communication with regulatory agencies, community members, and stakeholders. The process for communicating with regulators broke down.

Lessons learned: Facilities with emission and discharge permits should ensure that they receive confirmation from regulators before changing monitoring or sampling processes regarding those permits. Clear, precise, and complete communication with regulatory agencies is essential when dealing with issues within their purview. A party relaying a potentially controversial position to a regulator should receive confirmation of the regulator agreement before proceeding with actions that may be subject to enforcement or punitive actions.

II.12. WORK EARLY AND OFTEN WITH YOUR REGULATORS, NASA PLUM BROOK REACTOR FACILITY (PBRF), USA [II-9]

Problem encountered. As an example of what has come from good relations with regulators, NASA has been able to work with Ohio Environmental Protection Agency (OEPA) and has received approval for an innovative approach to disposing of the estimated 7500 m^3 of Construction and Demolition Debris (C&DD) that will result from the post-licence demolition of the main buildings. One of the remaining below grade structures will be the lower half of the containment vessel, a 2.54 cm thick steel tank that is 30 m diameter and extends 16 m below grade. OEPA has given NASA permission to place all material that would be classed as C&DD into the containment vessel, which will then be capped (approx. 4 m below grade). This arrangement will act as a disposal cell. Based on this unique physical arrangement and its one time use OEPA will not require

NASA to obtain a C&DD landfill licence. This approach will save NASA the time and cost of separating C&DD material from clean hard fill, and from shipping it for disposal at an offsite C&DD landfill.

Lessons learned: Early and consistent contact with all regulators is instrumental to the success of any decommissioning project, particularly in controversial cases. For the PBRF project, all regulators were invited to a 'partnering session' early on in the decommissioning planning process, and were able to make clear what issues were of concern to them, how they wanted them addressed, and how and how often they wanted to be kept informed on the progress of decommissioning.

II.13. EARLY PLANNING SHOULD FACILITATE EARLY ENGAGEMENT OF CONSTRUCTION STAKEHOLDERS, DECOMMISSIONING OF SALASPILS RESEARCH REACTOR, LATVIA [II-10]

Problem encountered: As an example of what has come from mistakes in planning of decommissioning procedures without involvement of construction stakeholders, Radioactive Waste Management State Agency RAPA has not been able to work with construction projects of decommissioning of Salaspils research reactor. Many projects – reconstruction of research reactor's hall, dismantling of unused objects was significantly hindered due to the limited possibilities for local construction authority to issue the permission for construction activities. To solve the previously undefined problem, the new stakeholder – Radiation Related Construction Commission was created in Latvia according to the Order of the Government of Latvia.

The main areas of interest for these stakeholders were as follows:

- The preparation of the technical requirements for the projects;
- Revision and approval of construction projects;
- Acceptance the permissions for implementation of the projects;
- Control the execution of the construction process.

Involvement of the stakeholder facilitates the decommissioning of Salaspils research reactor.

Lessons learned. Early and consistent definition of all stakeholders plays a significant role in decommissioning of nuclear facilities. For the Salaspils research reactor's decommissioning project, stakeholders were not defined fully at the planning stage, which causes the delays in the implementation of decommissioning measures. It was connected with preparation of corresponding legislation and included a new stakeholder in decommissioning.

II.14. STAKEHOLDER INFLUENCE ON UNRESTRICTED RELEASE CRITERIA, USA [II-11]

Problem encountered: Maine Yankee Atomic Power Plant originally developed decommissioning plans and cost estimates based on the NRC unrestricted release criteria of 0.25 mSv/year to the maximum exposed individual. The intent was to allow rubbelized building concrete meeting acceptable residual radioactive material limits to be reused as subgrade fill. Subsequent interaction with key stakeholders, including the State of Maine, resulted in a revised decommissioning plan and cost estimates in support of unrestricted release criteria of 0.1 mSv/year from all pathways and 0.04 mSv/year from the groundwater pathway with the removal of all rubblized concrete. This change resulted in more than a significant increase in projected radioactive waste volume.

Lessons learned: Early agreement with key stakeholders can assist in reducing risk to project schedule and costs arising from release criteria.

II.15 ENTRANCE INTO THE DECOMMISSIONING PHASE AS A RESULT OF A REFERENDUM [ITALY]

Problem encountered: In Italy, the decision to permanently shutdown nuclear power plants was not the result of a process fully based on technical, economical or safety evaluations. Following the Chernobyl accident,

a national referendum was organised on some relevant matters related to nuclear energy. The interpretation and the implications of the results of such referendum were focused after a long period of discussions, when public opinion played a relevant role. The final decision was to shutdown all the operating plants and to stop the ones under construction. Not all stakeholders were prepared to enter the decommissioning period as is the case of a plant that is approaching its natural end of life.

Analysis: The relevant information to provide during the referendum campaign and the general decision making process, when the results of the referendum were known, were very challenging.

During the period after the referendum and before the final decision (about four years), the discussions on more general topics related to the nuclear energy distracted from the problems faced in view of the approaching decommissioning phase, so their resolution was not planned in a systematic way. Nevertheless, even before the final decision was taken, the following issues were raised:

— The workers wanted to know the implications of the decisions on jobs, including professional growth,
— The workers paid much attention to the changes in the organisation structure for the possible implications on the contractual aspects.
— Local communities and authorities demanded the right to play a role in the decisions related to the destiny of the territory and to the waste management.
— Retirements became more and more frequent, due to lack of motivation, and the real knowledge of the plant and of its history were in danger of being lost.
— The conservation and consult ability of the technical documents was identified as a serious potential concern.

Many stakeholders were involved: all voting citizens, political parties, environmentalist groups, utilities, government, safety authority, trade unions, local authorities and population.

Lessons learned: Situations may arise in which most individuals living in the country are called to directly play the role of stakeholders: they may be called by a referendum to make a choice relevant to the destiny of NPPs. To provide the right information before a general consultation has proved very difficult: too much contradicting information from different perspectives. Proper information of the society in general, during normal periods, has been shown to be relevant in the perspective to involve individuals in some decision making process. Even the debate after a general consultation requires that the stakeholders and decision makers involved have developed an appropriate capability to constructively cooperate for elaborating decisions.

The uncertainties of the destiny of the plants, or the sudden decision to stop operation, makes the typical issues related to the end of plant's life blow up in a virulent way rather then follow a more planned and controlled path.

II.16. LACK OF DECISIONS RELATED TO THE DECOMMISSIONING OF PERMANENTLY SHUTDOWN INSTALLATIONS [ITALY]

Problem encountered: There was a stagnation of decisions related to decommissioning permanently shutdown plants. In the years 1995-2000, the Safety Authority recognised the need to strongly promote initiatives to call the attention of the Government, the Parliament, the media and the general public on the urgency of effectively tackling the problem of the legacy coming from the interrupted domestic nuclear energy production activities. The key points raised were the need of a policy for the management of spent fuel still present in the country at that time, the realisation of a national site for waste disposal, the identification of national operator(s) for performing such task and the allocation of relevant financial resources. Unfortunately, not all the stakeholders realised that the final exit from nuclear activities was far from being achieved and that the simple aversion to nuclear energy related matters did not help in devoting the necessary efforts to resolve the problems.

Analysis: It is necessary to state first that in this instance the issue raised was mostly unique, in particular:

— The public nature of the utilities,
— The lack of a subject to be responsible for domestic waste,

— The absence of a consolidated decommissioning regulation up to the year 1996.

A period has been experienced in which the lack of a clear identification of the authority and the responsibility for the key decisions was experienced; moreover, no stakeholder showed strong interest to proceed toward a well defined target associated to decommissioning and to waste management.

Even when Government policy was finally established, and a new Organisation was set up, some delay in performing the required actions was experienced, either due to difficulties in receiving the needed authorisations from local authorities due to a perceived lack of motivation in respecting the schedules. Difficulties in the interactions between the licensee and the Safety Authority also arose. Delays in the programme were easily attributed to the intervention of the Safety Authority by a licensee not incentivized by any kind of profits. In other words, concrete signs were present of a stagnated system, in which no-one took overall responsibility for the first step.

Local authorities were also reluctant to play their role in providing the required authorisations, because most of them were interested in having a clear picture of the final target and of the completion date. In particular, they always manifested their interest in ascertaining that the final destination of the spent fuel and of the wastes was clearly decided and that the plant site was not designated to become a repository.

Many stakeholders were involved in the resolution of the issue, among them they were: Government and relevant Ministries, Parliament, Civil Protection, Electrical utility, decommissioning/radioactive waste management agency, Safety Authority and Local Communities.

Lessons learned: A general lesson may be derived: when the decision to completely phase out nuclear is taken, the road map to a final, well identified, target has to be chosen as soon as possible on the basis of adequate studies. Among the most important issues to tackle are:

— To find the appropriate incentive to the Organisation responsible for its implementation such that it is motivated to proceed to the target in a timely and strategic way.
— To reassure the local stakeholders that the destiny of the site is clear and that all the provisions to adequately deal with spent fuel and radioactive wastes are already in place.
— The role of each institutional stakeholder should be clearly identified and they should be capable of dialoguing and working together using consistent information.

The number of authorizations that the Law establishes for performing relevant activities provides Local Administrators a “veto power” that sometimes may be used in order to maintain consensus by the voters or may be used as a lever to force the achievement of targets not related to the requested authorization. Sometimes, the perception was achieved, by some commenter, that refusing the issue of authorisations, although this behaviour clearly sharpened safety problems, became a way to stimulate the public opinion on the solution of problems that, from their viewpoint, were judged as more relevant. An example might be the refusal to authorise the construction of temporary storage buildings for radioactive wastes, even when they were demonstrated as needed, in order to exacerbate the issue of a national repository.

A proper balance between the rights from the Local Administrations and the needs coming from general interests is rather difficult to achieve.

It has to be considered that the inability to set up a proper decision making process, and the vetoes coming from any stakeholder make it difficult to delineate a linear path to decommissioning and to choose the most appropriate strategy. The utility no longer feels responsible for decisions in areas where other stakeholders have to provide essential support (permissions, infrastructures). Moreover, this can cause embarrassment in the Safety Authority and may result in potentially unsafe situations, when specific and peremptory interventions are necessary.

Moreover, the complete set of stakeholders involved into decommissioning and the expectations from them were not identified and prompted early after the final shutdown of the plant and this caused large uncertainties in issuing and implementing the plans.

In summary, the aspects that were not adequately considered were:

- the expectations from the utility in terms of maintaining capabilities, fulfilling the plans and reaching the milestones,

- the need to maintain a national network of adequate competences in areas relevant for decommissioning,
- the need to promote a smooth generational change in the relevant organisations (licensee, safety authority etc.)
- the identification of appropriate tools for the Safety Authority to tackle delays and to force the changes needed in a context of elapsing time, structures and organisations ageing and shrinking,
- the early involvement of the local communities to let them feel being part of a decision making process related to items of their own interest.

II.17 THE ROLE OF THE GOVERNMENT IN ISSUING ADEQUATE REGULATIONS FOR DECOMMISSIONING [ITALY]

Problem encountered: Before the issue of the new Nuclear Act that introduced decommissioning license procedure, in 1996, the regulatory regime suffered the lack of specific decommissioning rules. When the decision to shutdown was taken, the existing nuclear energy related Laws did not include specific sections dedicated to decommissioning. For this reason, decommissioning activities were initially authorised in the frame of "operating license" procedures.

Analysis: The first Italian power plant to be shutdown was Garigliano, in the year 1978, with the original intent to perform major modifications, but in 1992 the decision was taken to the plant. In 1986 it was the turn of Latina and then of Caorso and Trino.

Due to the lack of specific regulations related to decommissioning, all the plants but Caorso obtained "operating licenses" to start the decommissioning activities in the frame of a specific plan to be presented to the safety authority.

The importance of having specific decommissioning rules in place has been clearly focused. The role of relevant stakeholders during operation is not at all tailored to the role they will have to play during decommissioning. Most of them have the right to understand the plant modifications that take place, no longer aimed at operation, and to what final goals those activities are intended. An ad hoc authorization procedure gives many public and private stakeholders the opportunity to take part in a process that they are interested to influence in view of the interfaces with their own activities.

Among the interested stakeholders there are: Government and relevant Ministries, Electrical utility, decommissioning/radioactive waste management agency, Safety Authority, Institute for the safety of the labour and Local Communities.

Lesson learned: The experience clearly evidenced the need for a visible discontinuity, in the authorization regime, between operating and decommissioning phases, also to ensure that adequate interfaces are set out with the involved stakeholders. The Law that was newly issued in 1996 introduced a specific decommissioning process that recognized the role of several stakeholders.

II.18. COMMUNICATIONS AT LOCAL LEVEL [ITALY]

Problem encountered: In order to properly manage communication at local level, the experience has shown that continuous adjustments are needed. It resulted to be difficult to find in advance general communication rules that can be implemented, in the same way, in different local contexts.

Analysis: An early Italian experience in the area of communication with the public was the institution, in the 70s, of a consulting commission of experts as a result of a convention between the licensee and the local authorities. At the beginning, the main aspect regulated by the convention was the access to the data from the environmental surveillance taken by the licensee and to all the other information needed to fulfil the existing regulations in the area of environmental protection. The commission was chaired by the Mayor of the town and was constituted also by experts from the safety body. After the first experiences, the issues discussed in the Commission were enlarged, considering also:

— programs for major plant activities,
— operating experience,

— emergency planning,
— overall safety of the plant.

The meetings of the commissions were opened to concerned persons or groups. In 1981, the Ministry of Industry, required the utility to build an information center on the site. The same experience was going to be followed by the other Nuclear Power Plants.

More recently, during decommissioning activities, in order to spread the information and to involve local entities in the decision making processes, the so called transparency boards were instituted, mainly by the initiative of the Regions hosting the plants, sometimes stimulated by the Ministry of Industry. Many meetings were held in these contexts but more frequently when relevant activities were planned. In the frame of such meetings, all the local stakeholders had the opportunity to present their specific issues or recommendations.

Such initiatives were taken at first by Emilia Romagna, then by Piedmont and subsequently by Basilicata and Lazio. The organization of the meetings of Transparency Boards were different according to the specific regional social habits and attitudes.

In Emilia Romagna the meetings were open also to concerned citizens.

In Piedmont, the transparency board was mainly intended as a place for discussions among operators, local authorities, central administrations and the Safety Body.

In the Southern Regions, the environmental groups appeared to be the most active and interested to gather information and to debate the arisen issues.

Lesson learned: Communication with stakeholders in the context of enlarged debates provides many advantages, the most relevant being the capability to:

— focus the existing concerns and their actual origin,
— avoid or overcome misunderstandings.

The optimal way to manage the communication with local stakeholders may vary depending from the social habits and attitudes of the public in the area. A flexible approach, mainly driven by local Region initiative, has revealed to be the most effective.

II.19. THE INFLUENCE OF THE WASTE MANAGEMENT STRATEGY TO THE CHOICE OF THE DECOMMISSIONING STRATEGY [ITALY]

Problem encountered: The difficulties in localising and constructing the national repository heavily influenced the choices of the most appropriate decommissioning strategy and even introduced relevant uncertainties in the programs. The initial decision after having permanently shut down NPPs was to implement a safe storage strategy because the relevant decisions on the national waste repository was postponed. Subsequently, a national policy related to the localisation of the repository was issued and the strategy was turned to immediate dismantling, but still large uncertainties exist on the year when the repository will be available.

Analysis: An initial decision was taken, in the ‘70s and 80s, for implementing a deferred decommissioning strategy; one of the most relevant factors for this choice was the lack of national storage capabilities for the wastes to be produced. Only a few plants planned activities to bring the plant to a safe enclosure state in a determined way. After more than ten years, the Government and the administrations involved in the decommissioning licensing changed the policy, establishing that the most effective strategy was the immediate dismantling, when the elapsed time since shut down is also taken into account. The decision was taken on the basis of the commitment to quickly proceed to the localisation and construction of the national repository. At the moment, plans are in place that envisage dismantling activities to begin soon, but still the repository is far from a realty. In the frame of the decommissioning licensing, possible prolonged temporary storage on site for the waste inventory has been considered as an alternative to the availability of the repository.

The stakeholders that were involved in this issue were: Government and relevant Ministries, Electrical utility, decommissioning/radioactive waste management agency, Safety Authority, relevant scientific governmental agencies and Local Communities.

Lessons learned: A clear commitment is needed by the appropriate offices of the Government to deal with the problem of wastes and spent fuel; timely decision on the subject of implementing a technical solution for wastes and the procedures to localise the national repository are among the most relevant decisions to be taken.

Moreover, the identification of the long-term waste storage should be part of the nuclear energy plans, at least concrete milestones to its realisation should have been planned or, otherwise, concrete alternatives have to be available for wastes when the dismantling phase is approaching.

The role of the Government as a stakeholder has to be clearly recognized. The plant owners, the regulators and the licensees need to be capable of properly dialoguing with the Government and to effectively communicate the need for the Government to play its role in the medium to long term perspective.

II.20. INTERFACES BETWEEN THE GENERAL REGULATIONS AND DECOMMISSIONING [ITALY]

Problem encountered: The issue of new regulations of a general scope in the safe storage state emerged as a possible problem that perturbs such a state, that is expected to be maintained stable. From time to time, after the final plant shutdown, new regulations were issued in the field of conventional safety or workers health protection or civil protection. These new regulations, in most cases are explicitly or indirectly applicable to NPPs.

Analysis: Urgent actions may be required during the long term upholding of the plants in a safe state, due to issues of specific conventional regulations (for instance, on safety or health protection aspects of working environment). In general, new regulations envisage transient rules excluding existing infrastructures from the implementation. But, when the new rules are, for instance, connected to the health protection aspects or to the safety of working conditions, the workers have the right to appeal to the Court or to the Trade Unions in order to obtain the prompt implementation of the required working conditions.

During operation of nuclear installations periodic reviews are required for evaluating possible modifications of the plant hardware and software. When the plant is under permanent shutdown, de-fueled and on the way to be decommissioned, any upgrading is hardly justifiable from the safety point of view and the licensee is reluctant to spend money if there is no strong motivation.

For instance, when the presence of asbestos particles in the atmosphere exceeds general health limits, the performance of the clean up became mandatory according to the most recent rules. Some plant areas, where only infrequent access was foreseen in a safe enclosure perspective, became working areas where the clean up connected activities had to be urgently performed. Major unexpected interventions were then needed in order to reduce both the conventional and radiological risk.

Similar experiences were related to other technical items associated with civil protection ordinances (e.g. seismic protection of relevant infrastructures) or electrical safety regulations.

For this kind of issue, the stakeholders involved were: Government and relevant Ministries, Regions, Electrical utility, decommissioning/radioactive waste management agency, Safety Authority, Institute for the safety of the labour, Local Health Public Services, Local Environmental Protection Agencies and Local Communities.

Lessons learned: One drawback in deferring decommissioning is to tackle with changing general regulations' environment which may have impact on the plant configuration or on the defined programmes. The stakeholders, including the Government and the Parliament, should define the most appropriate way to manage the deferred dismantlement taking a dynamic rulemaking in non nuclear area into account.

II.21. INTERFACES OF SAFELY ENCLOSED STRUCTURES WITH SITE EVENTS [ITALY]

Problem encountered: The interfaces between the rivers and the nuclear sites have demonstrated the need for adequate management under decommissioning, in a local environment that gives this activity low priorities.

Several examples can be quoted:

— heavy public pressure was applied to dismantle a submersed dam, put in place in the Po river during the construction of the Trino plant, in order to ensure the availability of enough cooling water to the plant in case of river flow deficiency. That public pressure succeeded in initiating a major modification to the water intake system of the plant, although the plant was in a decommissioning process and the dam was demonstrated not to be the real cause of the flooding, as maintained by the concerned groups .
— Ordinances related to the local hydrological arrangement were issued in a site of a permanently shutdown installation (Saluggia) requiring the closure of the deep wells that ensured its water intake. Heavy modifications were performed.
— Modification of embankments in the Po river upstream of a permanently shutdown plant (Caorso), required a re evaluation of the hydrological safety of the plant.

The Trino intake works in the Po River [Italy]

In the late 90s, some heavy flooding from the Po river involved the site of Trino NPP and the surrounding area, including the closest town. The consequence experienced by the plant itself created some difficulty for the shift personnel to leave or to arrive at the site.

A submersed dam had been put in place during the construction of the plant, in order to ensure the availability of enough cooling water to the plant in case of river flow deficiency.

Although it was demonstrated that the mentioned structure had no significant role in causing floodings, initially some local environmental associations and subsequently the entire community, insisted that this was the main contributor for the recurring events. In 2000, the Mayor of the town, invoking reasons of public safety, issued an Ordinance to remove the submersed dam.

A few meetings were organised and the Authority for the management of the Po river basin was involved. The limited influence of the dam to the floodings was demonstrated, but it was impossible to completely clear up the doubts of the concerned people.

In those years, the plant was already in permanent shutdown conditions and a few spent fuel assemblies were still present in the plant storage pool; for these reasons the licensee decided to perform a plant modification to make use of a different water source for the plant needs, creating in this way the conditions for the removal of the submersed dam. The modification was submitted to the Safety Body and to the local Fire Brigade Offices, approved and implemented. The water source is now taken from wells and a large water reservoir has been built. Moreover, the fraction of recirculated water has been increased.

Ceremonies were organised in April and June 2005 for the signing of the contract to allow the start of the demolition works. Many local press journalists and the town Mayor were present.

Flooding and deep wells in Saluggia Site

Also in the area of Saluggia, where some nuclear installations are located, during the past years (1993, 1994 and 2000), floodings took place from the close hydraulic net of Dora Baltea, which is a tributary of the Po river.

Also the site of the Eurex, former reprocessing facility, the close site of Avogadro (a spent fuel storage pool away from plants) and of Sorin (where some radioactive wastes were stored) were involved. The consequences, although not expected, were not very serious for the facility itself, but the frequency and the entity of such floodings, beyond the ones considered during the plant siting, required some corrective actions, especially regarding the presence on the site of Eurex aged vessels containing high level liquid wastes. Studies were performed by the licensee.

In 2001, The Ministry of Interior issued an Ordinance assigning the Authority for the management of the Po river Basin the task to coordinate a technical working group charged to study the necessary measures to protect the Eurex facility.

The decision was taken to build a 5 m high wall surrounding the site and the design parameters were clearly identified (either static and due to a dynamic impact of the flooding). Since no relevant interface was identified with nuclear safety features, taking also the advice of APAT into account, the Ordinance stated the departure from the authorisation procedure of the nuclear Act. The construction activities terminated in 2004.

In the frame of subsequent authorisation activities, APAT had the opportunity to completely review the design and the construction features of the wall, and to confirm the absence of interfaces with safety aspects of the installation.

In addition, in 2001, the Authority for the management of the Po river Basin officially deliberated the complete closure of the deep wells in the whole area of the Saluggia site, in order to reduce the risk for possible contamination of water for potable use in case of floodings. As a consequence, wells from shallower layers had to be drilled in order to provide the needed source of water for the nuclear installation, in substitution of the surface wells that were used to refill the water basins. In this case, the authorization procedure that is still underway follows the ordinary procedure of the nuclear law, whereas the approval for excavation of wells in the area had to be given by the Province. Nevertheless, delays were introduced due to the fact that another institutional subject initially opposed the decision: the Po River Turin Park Body. Also, this Institution manifested the need to be adequately informed about all the possible consequences of such a modification in the close proximity of a Nuclear Installation.

Embankment on the Po River impacting Caorso NPP

In the frame of a larger plan of the Po river basin settlement, the Authority for the management of the Po river basin decided to modify the layout and the size of some parts of the embankment. The objectives were also to better protect some towns from floodings.

The activity had several potential impacts on the assumptions in the safety case for siting of Caorso NPP, but no communication was given to the plant and to the safety authority since the design and the start of implementation of the modification.

Analysis: During decommissioning, and in particular when the phases that precede the execution of the bulk activities are prolonged, plant modifications or safety case re-evaluations, induced by emerging site related issues, may be needed. There is a plurality of subjects that, by the Law, have to give advice or authorisations for these types of modifications.

Moreover, when the plants are no longer producing electricity, the continued presence of the infrastructure may be viewed by the public as a burden or trouble to the site.

When technical problems arise, often there are technical, professional people committed to arguing against the technical positions expressed by the licensees; in those cases, it is very difficult to find independent scientific institutions whose credibility is sufficiently consolidated.

Finally, if urgent interventions are needed, the ordinary authorization procedure is seen as a source of delays with respect to performing urgent activities and legal shortcuts sometimes are deemed necessary in order to ensure the completion of the activities in the due time.

The main interfaces encountered in such cases are: Ministry of Interior Affairs, Ministry of Industry, Authority for the management of the Po river basin, Po River Turin Park Body, Electrical utility, decommissioning/radioactive waste management agency, Safety Authority, Local Communities, Province, Region, Aqueduct Management Body, Safety Authority and environmentalist groups.

Lesson learned: A systematic identification of the relevant interfaces with the Organisations involved in the management of the site resources should be performed at the beginning of commissioning and decommissioning and periodically updated during the performance of the activities. If this is not properly done, bureaucratic obstacles by stakeholders may be encountered during the performance of critical activities.

Responsibilities and procedures should be established, even in the decommissioning phase, to ensure that all the territory's modifications which impact on plant safety are properly monitored and analysed. Also, all stakeholders that play roles in deciding and implementing such modifications should be properly identified. In some urgent cases ordinary procedures for obtaining accelerated authorisation should be practicable.

It is important that independent scientific institutions preserve their credibility through a high level qualified activity and that this credibility is recognised by the public.

II.22. THE DECLARATION OF NATIONAL EMERGENCY AS A TOOL FOR DEALING WITH TERRORISM THREAT [ITALY]

Problem encountered: An emergency status was declared by the Government as a reaction to international terrorism and to the stagnation of the decommissioning activities. A prompt response was given to security issues but, on the other side, several disturbances were induced in the interactions with the stakeholders.

Analysis: A National Emergency status was declared by Law for protecting the most vulnerable installations and for improving radioactive waste storage facilities with prompt, homogeneous and economic interventions. Of course, given the main worry that generated the measures, the improvement of the security provisions was the main priority, but the interfaces with safety, waste management and decommissioning became stronger.

The main tools identified to reach those objectives in a timely manner was to simplify the authorization procedures by repealing some parts of the Acts and centralizing the decision making process.

Mainly security measures were promptly implemented, but also included some activities relevant to safety. At the end of 2006 this emergency condition ceased.

Lessons learned: In spite of the targets that have been reached during the Emergency Status, working under "emergency" induced the licensee to assign low priorities to activities not directly related to the quick implementation of selected actions or having a long term perspective. Moreover, the same "emergency" attitude made signs appear that the conditions for competent, well coordinated and procedured actions of the subjects involved, including contractors, were not fully ensured. Interventions by the Safety Authority were deemed necessary. It is, therefore, considered of outmost importance that the focus on the urgency and effectiveness of the activities does not distract from the relevant safety management issues. The performance indicators for the effective advancement should not be limited to the number of projects finalised, but should consider the overall conduct of the activities, including preparatory ones.

Moreover, concerns were expressed repeatedly by public opinion on the financial and organisation management in a context characterised by accelerated and simplified procedures.

Obstacles coming from the interfaces with other national and local Authorities were far to be completely overcome by the acts in the emergency regime; in spite of the large powers available to the delegate commissioner, agreements had to be reached in order to avoid too strong oppositions. The interfaces with the safety authority could not take any advantage from the specific status; on the contrary, sometimes it was difficult to identify the proper way to make the review procedures fit with the new regime.

Changes in the authorization procedures may deeply trouble the interactions between stakeholders and induce severe delays in the programmes.

II.23. THE ATTEMPT TO DEFINE A WASTE MANAGEMENT STRATEGY UNDER THE NATIONAL EMERGENCY STATUS [ITALY]

Problem encountered: In the frame of Emergency status and in order to accelerate decommissioning activities, an attempt was made to quickly select the site for constructing a waste repository, giving rise to severe frictions with local communities of the chosen area.

Analysis: In the frame of the emergency status, the decision to accelerate the process for the construction of a national repository was taken in April 2003. A quick-acting commission was set up, delegated by the Prime Minister to the Commissioner. The task was to explore all possible solutions rather than concentrating on surface or sub surface structures, that was investigated in depth in the near past; in particular:

- Redefine safety criteria for waste disposal,
- Propose a site selection procedure,
- Perform feasibility studies for different concepts (from engineered near surface to mined cavities),
- Preliminarily identify candidate sites.

The work of the Commission was concluded in August of the same year and a decree to be converted into Law was issued by the Government identifying the South part of Italy as the exact site for HLW, LLW and MLW repository. No involvement of the public or local authorities were made in the decision making process.

The local opposition was very strong and had resonance at national and international level.

The stakeholders included; Local Communities, Environmentalist groups, Nature preservation groups, Agricultural associations, Tourism associations, political parties, utility, organizations of designers and constructors, contractors for the performance of panned activities and Trade Unions.

Lessons learned: The initiative taken to speed up the process failed its purpose. A large amount of work undertaken in previous years was lost and the team of experts that was constituted at that time was dissolved. The local population was informed by the media when the decision was already taken to locate the repository in the area of a specific town. Efforts made to provide information to the population, just after the decision was made, were completely ineffective. The capabilities for further dialogue with other local authorities still have to be defined.

There are relationships with some stakeholders which take a very long time to be properly built. Attempts to undertake shortcuts may result in wasting years of efforts spent to establish a climate of co-operation.

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ACRONYMS

ACE	Army Corps of Engineers
AEA	Atomic Energy Agency
AEAT	AEA Technology
AON	UK consultant in risk management, insurance broking, employee benefits and Human Relations consulting services
BIDSF	Bohunice International Decommissioning Support Fund
BNFL	British Nuclear Fuel Limited (UK)
BNG	British Nuclear Group (UK)
BP	British Pounds
BPEO	Best Practicable Environmental Option (UK)
CEA	Commissariat a l'Energie Atomique (in French, French Atomic Energy Commission)
COWAM	COmmunity WAste Management
CRP	Co-ordinated Research Project
D&D	Decontamination and Dismantling (or Decontamination and Decommissioning)
DERC	Decommissioning and Environmental Remediation Centre
DOE	Department of Energy (USA)
DTI	Department of Trade and Industry (UK)
EA	Environment Agency
ECA	Energy Communities Alliance
EDF	Electricité De France
EIA	Environmental Impact Assessment
EM	Environmental Management
EP	English Partnerships (www.englishpartnerships.co.uk)
FP	Framework Programme
GMB	(another Trade Union)
IAEA	International Atomic Energy Agency
IIDSF	Ignalina International Decommissioning Support Fund
ILW	Intermediate Level Waste
INEEL	Idaho National Engineering and Environmental Laboratory (USA)
JAERI	Japan Atomic Energy Research Institute
KIDSF	Kozloduy International Decommissioning Support Fund
KRB-A	Nuclear Power Plant Gundremmingen, Block A (Germany)
KWB	King William Building (UK)
LA	Local Authority
LC	Licence Condition (UK)
LLW	Low Level Waste
LSG	Local Stakeholder Group
LMU	Liabilities Management Unit (UK), the predecessor of NDA
LOFT	Loss Of Fluid Test
MoD	Ministry of Defence (UK)
MWH	Montgomery Watson Harza
NASA	National Aeronautical Space Agency (USA)
NDA	Nuclear Decommissioning Authority (UK)
NDPB	Non Departmental Public Body

NEA	Nuclear Energy Agency of the OECD
NGO	Non Governmental Organization
NI	Nuclear Installation
NII	Nuclear Installation Inspectorate
NIREX	Nuclear Industry Radioactive waste Executive
NNC	National Nuclear Corporation
NRC	Nuclear Regulatory Commission
NRPB	National Radiological Protection Board (UK)
OCNS	Office for Civil Nuclear Security (UK)
OGC	Office of Government Commerce (UK)
ORNL	Oak Ridge National Laboratory
PHARE	Poland and Hungary Assistance for Restructuring their Economies
PR	Public Relations
R&D	Research and Development
RMC	RM Consultant
SAP	Strategic Action Planning
SEPA	Scottish Environment Protection Agency
SGHWR	Steam Generating Heavy Water Reactor
SIRC	Social Issues Research Centre
SNM	Special Nuclear Material
SOGIN	SOcietá Gestione Impianti Nucleari (in Italian: Nuclear Plants Management Company)
SSSI	Site of Special Scientific Interest
SWERA	South West England Rescue Association
TACIS	Technical Assistance to the Commonwealth of Independent States
TECDOC	IAEA Technical Document
TGWU	Transport and General Workers Union
UEX	UKAEA Executive
WAGR	Windscale Advanced Gas Reactor
WSCP	Winfrith Site Closure Plan

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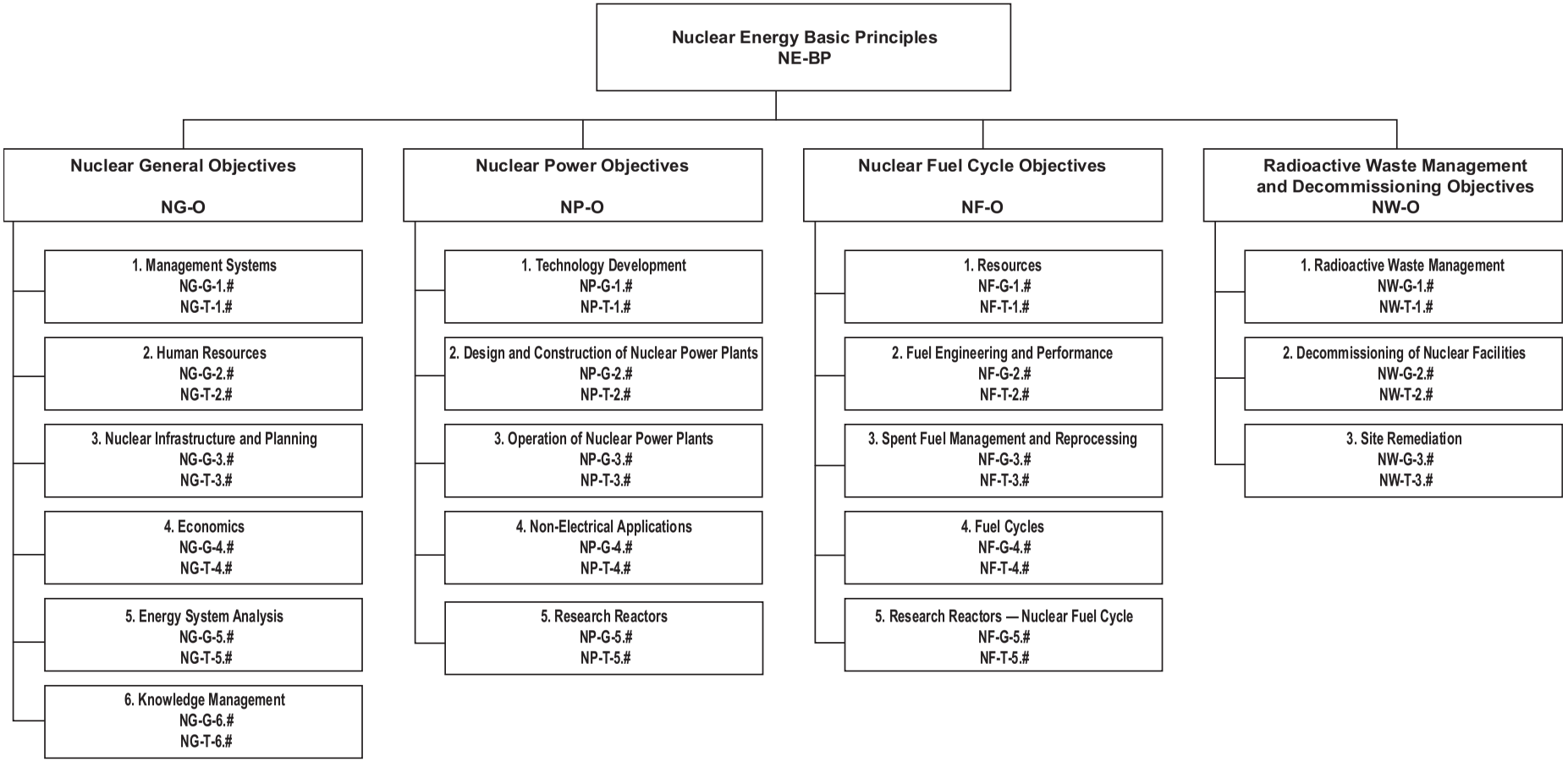

Key

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