Unclassified **NEA/RWM/WPDD(2006)6**

Organisation de Coopération et de Développement Economiques
Organisation for Economic Co-operation and Development **12-Dec-2006**

English - Or. English

NUCLEAR ENERGY AGENCY
RADIOACTIVE WASTE MANAGEMENT COMMITTEE

NEA/RWM/WPDD(2006)6
Unclassified

Working Party on Decommissioning and Dismantling (WPDD)

WHAT WE HEARD WITHIN WPDD ON STAKEHOLDER INVOLVEMENT IN DECOMMISSIONING, 2001-2004

A Compilation of Papers

JT03219599

English - Or. English

FOREWORD

At its sixth meeting, in Paris, 14-16 November 2005, the WPDD held a topical session on Stakeholder Involvement in Decommissioning Projects. The topical session was jointly planned and run with members of the NEA Forum on Stakeholder Confidence (FSC). The Topical Session is documented and publicly available [NEA/RWM/WPDD(2006)5, see also NEA webpage: http://www.nea.fr/html/rwm/docs/2006/rwm-wpdd2006-5.pdf]. The Topical Session provided a stimulus to review the contributions in the area of stakeholder involvement that the WPDD have received since its inception.

This report contains a compilation of all papers regarding stakeholder involvement in decommissioning given at WPDD meetings and workshops between 2001 and the end of 2004.

The compilation, together with other relevant material collected by FSC, will serve as background material for a review, focussing on lessons to be learnt and including examples of key statements by representatives from different NEA member states involved in or affected by decommissioning projects. The review is intended to be published during 2006 in a NEA brochure.

TABLE OF CONTENTS

WPDD-1 Meeting, 2001

Speech by Vila d'Abadal, member of GMF staff

I am the general Secretary of the GMF, a group of European municipalities with nuclear facilities. I would like to speak about nuclear facility decommissioning from the point of view of civil society.

Our vision of these issues is exclusively social. We know what radioactivity, nuclear power plants and radioactive waste are like but at the same time we stay away from debates aiming at finding a technical solution in relation to a specific event. Getting to this point I would like to tell you how people who lives in the surrounding of NPP feel when decommissioning takes place.

NNP's existence can be divided into three periods a bit similar to human life: birth, life and death. In this case, birth is the construction period, life is the working period and death is both the shutting down and the decommissioning.

Each period requires particular policies in order to meet different types of problems and effects dealt with by local authorities' suitable decisions.
The construction period looks like an explosion. Many people get to the site, the population increases as well as the expectations for a better future. Jobs are created on and around the NNP and life standard improves. At the same time, local authorities have to assume two main challenges:

- On one hand the construction of public facilities in order to meet people's needs (infrastructure, health, social services, education, etc.)
- On the other hand ensuring the participation of the citizens in the new situation by implementing the right information policy.

During the working or operation or operation period, once the effects of the construction are over, there are two aspects that worry both citizens and local authorities:

- The first and principal is to follow the operation of the installation mainly as far as security and environment are concerned.
- The second is the increased number of inhabitants on the territory independently of the existence of a nuclear facility

When the nuclear facility shuts down and the decommissioning period starts, the situation is completely different. We can say that, in spite of the differences, it is the same situation as when a big industrial installation closes down and a lot of people are both directly and indirectly affected.

As I said before, the decommissioning is the death period and it is a negative stigma as it means the disappearance of a facility that was the main economic activity in the area. That is the reason why, at this point, people's worries change:

- Before decommissioning concerns were about the operation of the nuclear installation, but after they are about nuclear waste policy.

Before decommissioning concerns were about the increased number of inhabitants but after they are about emphasising the necessity of diversifying economical activities by making them independent of nuclear economy.

- Only the idea of transparency, information and participation remains unchanged. The activity of local authorities or local councils facing decommissioning includes three issues:
  - Control of decommissioning activity as far as general local responsibilities are concerned.
  - Participation in decommissioning process in order to defend local interests.
  - Definition and management of socio-economic plans.

The decommissioning as industrial activity includes a lot of proceedings that affect the territory and its life. As the other industrial activities these have to be subjected to municipal control. Sometimes we observe a tendency in nuclear sector to act without taking into account the competence of the municipalities. It looks as if the nuclear area was a territory out and only the regulatory organism and owners had responsibilities for decision making processes. On the contrary, it is very important to respect the role of local authorities. They have to answer for the legality of all of the proceedings before the citizens. This is very important if they assume the role of spokesman before the media and on account of this before some social sectors who calls for strong control on nuclear facilities. In both cases, media and social calls, local authorities have to demonstrate that their nuclear facilities have either the same amount of control or even more than any other industrial facility existing on the municipality.

Some technical help is needed in order to ensure a real practice of these responsibilities because the contents of the decommissioning projects are very specialised and town halls don't usually have people qualified for these issues. Some countries have accepted to pay for this help when municipalities have to face the following of nuclear projects with estate interest.

Local authorities have other responsibilities which are not included in their general competence but which are actually the most important when we talk about nuclear facility decommissioning.

The first is the environmental protection.
If during the operation period local authorities are watchful in relation to security and emergency planning, they also have to take care of radioactive waste management, and estate waste policy. All of decommissioning proceeding including both treatment and storage of radioactive waste are the main subjects of the debate in relation to the future of nuclear energy. So, decommissioning is fully involved in the general debate about a solution to radioactive waste.

As I pointed out, when a large industrial facility, as a NNP, shuts down a kind of depressing feeling spreads around the territory. This gives way to rumours and information manipulations and then points at radioactive waste management as unsafe for the future of the territory

In order to fight this we have to demonstrate that new developments are possible when decommissioning is over. Currently the debate about the future of nuclear energy is strong because the debate about energy supply is also a conflictive issue. Nuclear territories are open to accept other kinds of power plants. They are willing to defend their condition of power production site. This goal makes necessary some proceedings which ensure that the land will be suitable for production when decommissioning is over. As a definitive solution for high level radioactive

waste has not been set yet, the local populations are afraid of the possibility to transform the site into a radioactive waste storage. This could prevent the site from being used for other industrial activities.

The third activity of municipal councils is the economic development. Most western countries have assumed that nuclear facilities need some special policies in order to find a site and convince local population. Then some sort of economic level should be maintained so that a good level of services would be ensured in the surroundings.

When a site is defined for a nuclear facility its social and economic effects must be foreseen within the local reality and investments must be planned. This includes what is necessary, how to pay for it and what kind of help is needed by the municipalities. Then some measures must be defined in order to get some advantages for the citizens living in the area, mainly dealing with jobs available for local people.

Then, when the nuclear facility is working, the legislation defines some kind of local tax in order to give the municipalities the opportunity of taking good care of the services and at the same time investing in favour of the people who get little or no benefits at all from the nuclear.

Both before and during operation, local policies are usually efficient. They allow local authorities to face the challenges of a new reality and to manage correctly the local interests spreading the benefits among all the citizens.

But a post nuclear policy has never been carried out anywhere. Nowadays we are concerned about the nuclear debate because while the people who take part in most international forums are talking about the future of the installations which affect our territories, nobody talks about the future of the families who make a living directly or indirectly from the economic activity generated by these facilities. It is sometimes forgotten that behind an industry there are people having full civil rights, including work.

This worry has been a focus of debate in the local world. In the International Conference about Municipalities Hosting Nuclear Installations held in Oskarsham (Sweden) in 1995, local authorities who took part in it approved a declaration which included a point referred to as socio-economic impact of nuclear facilities and asked for "an economic and employment plan to avoid excessive dependence and consequent negative impact at the time when the facility is closed".

Definitively a sort of policy foreseeing the effects of closing is absolutely necessary and more if we want to install some nuclear facility in the future. At the same time this plan should take into account the setting of a decommissioning plan.

All these local responsibilities make necessary a general framework where every organism, institution and company involved have the security that they will be able to defend their interests and take part in the decision forums.

The legislation and the instructions related to local policy on nuclear facility sites should focus on these cores: information-transparency, participation and involvement of all nuclear agents in a sustainable economic future.

However a previous factor, the confidence, affect all the processes and has to be considered before talking about the other factors. The most important challenge is to gain a certain level of

confidence among the different agents taking part in nuclear debates, if success is needed when looking for future nuclear sites, decommissioning activities or any event related.

If we want to obtain people's trust we have to work respecting two principles:

First, in order to work directly on the territory one must be involved in everyday life. The idea is that nuclear issues are very wide, very special and also very technical with a very specific language.

There is a certain kind of anxiety among people when a nuclear facility is built or decommissioned. If people are not well informed, their anxiety may provoke suspicion. Even more, the people responsible for reporting about nuclear aspects among the population must become regular members of the community and get involved in normal events of everyday life. If so, confidence is given a chance to grow.

The second item would be that information should be reported on a regular basis. If we are used to explain what it is going on within the daily nuclear operations, avoiding unnecessary technical terms, should not be a problem to communicate any information concerning nuclear activities and obtain people's trust.
Information and transparency are two aspects which are absolutely linked.

Transparency, the first condition is the opposite to opacity and it is based on mutual confidence. Transparency has to run in two directions. So, whoever gives information has to tell the truth but, at the same time, whoever receives it has to believe what they listen to. Otherwise it would be a nonsense dialog.

Second condition, information has to be available. Everybody should be able to access all the information and use it to defend their legitimate objectives.

And the third condition must be to tell the truth instead of trying to convince either the anti-nuclear or the pro-nuclear part. Citizens like the truth not what is tendentious. Local authorities avoid debates about yes or no to nuclear energy, because while we argue in these sterile debates we forget to talk about what is going on with the future.

The content of the information is very important. Sometimes we would like people to learn what they, however, aren't interested in, specially when we talk about nuclear matters. They want to find somebody to trust but not to understand boring technical aspects.

The participation is the way to put this area into practise and is guaranty so that people from nuclear territories are not against decommissioning activities.

The solutions adopted by some states concerning the public's participation in the successive stages of the decisions - legislative, regulation or administrative - depend directly on their political regime, on their constitution and in particular on the structure and the participation of the local authorities as well as on the social and psychological context.

Today all the countries (even Eastern countries) admit that the public should play a role, direct or indirect, in the nuclear policy elaboration or at least in its settings, although a direct participation still constitutes an exception. There are, of course, notable differences in the setting modalities in relation to this participating principle, clearly due to the constitutional, political or social traditions, sometimes old, and also due to the fact that the public sensitivity to nuclear risk differs from a country to another. These differences may also imply different forms and mechanisms, as well

as various participation degrees in the definitive decision. When we ask for participation we are actually asking for co-operation, because local authorities and the citizens on their territories are directly involved in the future of nuclear facilities.
The first step towards this should be an agreement among members of international organisms in order to ensure the participation in all the countries where nuclear energy exists.

It is very important to introduce the idea of local democracy into the operation of nuclear facilities, because it is the way to involve the inhabitants of these areas in the future of this kind of industry and to spread the feeling of security among people.

At the same time, we have to create concrete participation systems in order to allow municipalities and social representatives to take part in the decision making process and to receive permanent information about their nuclear installation or about the general debates concerning the future of nuclear energy.

Currently, the most successful experience is the "Local Information/ Security Commissions" created at local level in some countries. With this tool, local authorities and other opinion leaders keep in touch with the actual situation as far as security and radioactive control are concerned and, at the same time, citizens receive information from their most direct representatives. It is an example of creating confidence among people who live in the surrounding of nuclear facilities.

The implication of the different agents who are involved in nuclear facility operation, specially when it comes to decommissioning, is essential when we work in order to keep up with the economic level in the surrounding of the decommissioned facility.

Before starting decommissioning tasks a study of the economic effects of the closure should definitely be carried out, taking into account, above all, a sustainable professional development for a better future.

The agents involved in the process have full responsibility for the success of the plan in relation to both the nuclear and social effects of the shut down. So the state and the politics, when deciding decommissioning, must feel 100% involved in the economic future of the area.

The citizens and the social sectors directly responsible in the territory have to take part in the studies and have to find support from the authorities.

We believe that these are some elements in favour of a balance among the different sectors leading to nuclear activity planning, ensuring citizen interest respect as well as avoiding useless debates.

WPDD-3 Meeting, 2002

BARSEBÄCK AFTER BARSEBÄCK -
A CASE STUDY ON THE CONFLICTING ISSUES CONCERNING LAND USE AFTER A TOTAL CLEAN-UP (DECOMMISSIONING) OF A NUCLEAR FACILITY

Philip Moding
Malmö, Sweden

1. Barsebäck in the Scandinavian (Nordic) context, a brief background

With the help of a map of Scandinavia showing the nuclear facilities the differences between Sweden's first attempts to phase out nuclear power and the contrasting situation in Finland (and Russia!) can be observed. The Finnish government and parliament have recently decided to construct a new, larger reactor! Denmark (with its grand Niels Bohr) was, from the outset, positively inclined towards not only the Barsebäck facility but also towards developing its own nuclear power resources. During the 1970s opinion in Denmark swung back and forth eventually developing into today's very negative attitude. The Danish view has strongly contributed to Sweden's decision to begin the process of shutting down the Barsebäck facility, which faces Greater Copenhagen across the narrow stretch of water, the Öresund, that separates the two countries. B1 was closed in 1999 and the Swedish government, with strong support from the Danish government, wishes to close B2 next year, i.e. 2003! This is on the condition that the supply of electricity is guaranteed in Sweden even if Barsebäck is completely closed down. B1 and B2 are thus to be closed down for political reasons after negotiations with the power company's owners concerning financial compensation from the State etc.

2. Barsebäck in the regional context

As seen in the pictures Barsebäck is situated on the coast of the Öresund. The facility's first reactor (B1) began operations in 1977 and was shut down in November 1999. The other reactor (here called B2) began operations in 1977 and is still in operation. The state-owned company, Vattenfall, has according to the agreement between the government and Sydkraft, the owner at the time, taken over the Barsebäck facility. Today, as is well known, Sydkraft is owned by the German company E.ON Energie and the Norwegian company Statkraft.

Barsebäck is located in the municipality of Kävlinge, an important factor when considering the future use of the land. This municipality, along with the neighbouring municipalities, would much prefer a continued, safe operation as the main alternative for the facility. Should the government and the power company decide that, for primarily political reasons, to close even B2, the Kävlinge council requests that the nuclear facility is cleaned up, dismantled and properly decommissioned as soon as possible. The municipality aims to plan for a new housing area along the shoreline where the nuclear facility is presently situated. In western Scania there are many recently built and successful examples of coastal housing areas, for example in Helsingborg, in the neighbouring municipality of Lomma and in Malmö. The remainder of the Kävlinge municipality coastline, as with other unexploited coastal areas along the Öresund, is unsuitable for building purposes as there are strict rules concerning nature conservancy that protect the remaining, unexploited parts of the coast. Out at sea in the Öresund and also on the

land there is much interest in building wind power units with the substantial governmental grants now available. A majority in Kävlinge municipality are against these windmills, both on land and in the adjacent sea. Further, the municipality does not appreciate the views of the governmental authorities, especially Energimyndigheten, to maintain the Barsebäck site as a possible location for alternative energy production (i.e. not nuclear power) in the future. Their argument is that the power lines and infrastructure are already in place. The State's present declaration concerning Barsebäck after Barsebäck thus clashes head on with the municipality's declared intentions as expressed, for example, in its latest Municipal Comprehensive Plan. A Swedish municipality has a very strong position in questions of future land use as it has a so-called municipal planning monopoly. Each municipality, according to Swedish law, has the right, in most cases, to decide over the future use of the land within its own boundaries, even in a case such as this.

3. Barsebäck in the international context

The municipality trusts that a number of critical questions will be answered in international forums (fora) such as this. We can still leave the interesting question of a neighbouring country's right to be able to influence and intervene in cases such as Denmark has done in the Barsebäck case. Similar border conflicts have occurred in various places in Europe such as the border between Germany and Switzerland, Germany and France to say nothing of Austria and the Czech Republic. The technical questions are of particular interest for, in this case, Kävlinge municipality. How quickly can the total clean-up and dismantling process be done? When can the former nuclear facility premises be declared suitable for other uses such as housing, green zones, sport facilities, marinas etc?

Within the EU the question of compulsory environmental sequence analyses is being considered, which will precede the closing down of all nuclear power facilities. Such an environmental study was, nonetheless, never made for Barsebäck 1. The Swedish municipalities hosting nuclear facilities underline the importance of such environmental inquiries. Especially a first, strategical phase is of enormous interest for the affected local population as well as the employees working on site. During this phase the applicant and the responsible energy and environmental authorities must clearly answer the questions:

- What environmental gains and losses will accompany the planned close down?
- How and where will the diminished electricity supply, caused by the close down, be compensated for?

This picture emanates from the publics' assumed diminishing interest for a dialogue concerning the exact technical procedures in the clean-up and dismantling operations as the questions become increasingly more technical and difficult to understand. Nonetheless, in order for the concerned municipalities to continue to participate actively in such a dialogue the applicant, or preferably the State, must grant the municipality financial resources to engage or employ independent expertise and organise the continued education of those affected local politicians and civil servants. This method is currently used with great success in connection with the extensive initial studies in Sweden that concern the location of a final repository. When it comes to the difficult placement of new waste sites the chances are that the main interested party, i.e. the concerned power companies as well as the State, is interested in supporting the municipality. Unfortunately it is not as easy for the affected municipalities to mobilise financial compensation from the State and power companies for decommissioning purposes as it is with new buildings and running costs!

The State and power company should therefore carefully examine the aspect of providing a fair amount of financial compensation to those nuclear facility municipalities which are unable to find a sufficient number of replacement jobs as compensation for the losses of nuclear power employees and

the technical know-how etc, which are lost locally and regionally due to the phasing out of nuclear power. The nuclear power municipalities would like to see that the State and power companies act in a socially responsible manner when preparing for phasing out! In the case of Barsebäck and its shut down the former owner, Sydkraft Co, acted very social and responsible by giving the employees a five year job guarantee after the decision was taken on closing the reactor! May this example serve as a good model in the future!

4. The European network GMF - what are its goals?

The European nuclear power municipalities have been cooperating for some years in a network called GMF (the Group of European Municipalities with nuclear Facilities). The network's core consists mainly of the Spanish municipalities' national network AMAC, which has a Secretariat even for the whole of Europe. The Swedish nuclear power municipalities are included within this inner network through our corresponding KSO and the French municipalities ARCICEN. As a common denominator for our cooperation the following key words are used:

- Nuclear safety (the most important)
- Transparency (the opportunity for municipality insight and in good time)
- Local consequences (the opportunity for municipality influence)

GMF strives to get European organs such as the EU, OECD/NEA, IAEA etc to harmonise the national rules for nuclear power and in so doing increase the respect which should be observed for those parties with specific and major interests, such as the concerned local population, the municipalities and also the regional representatives. GMF has made the responsible EU commissioner and Vice President, Mrs Loyola de Palacio aware of this. In this connection we also reminded her of the unfair capacity tax put on Swedish nuclear power.

GMF tries in many different ways to increase the exchange among the local actors in Europe. As a part of this activity GMF arranges an annual conference (the next event being in Prague on 30-31 October 2002). GMF's main target group is the principal officials of the nuclear power municipalities. These are, after all, the elected representatives for the local, greatly affected population. In such a way GMF follows the European community's main principle concerning SUBSIDIARITY and applies local and regional democracy. Subsidiarity means that decisions should be taken as close to the grassroots level as possible; a principle, which has by no means characterised either nuclear power expansion up to now, or the approaching phasing out. In the Swedish municipalities that have been studied and closely examined in the field as possible location alternatives for a final repository for high level waste, the municipality leaders have initiated and permitted extensive dialogues to take place directly with their local citizens. In particular Östhammar and Oskarshamn and their nearest neighbours have thereby completed extensive attempts to improve the dialogue with their inhabitants. All the citizens in an area which may be considered for the location of a final repository, must have a real opportunity to be both informed in an objective way and be guaranteed that their views and opinions are taken into consideration in the decision making process by the municipality, the applicant and the authorities. Both the remaining principal Swedish candidates for a final repository, Oskarshamn and Östhammar, also actively participate in a special network (the COWAM project) where even a number of other potential European final repository candidates are included. The methods of reaching the grassroots which Oskarshamn, in particular, is well known to be applying, have become the subject of enormous international attention.

The representatives for the European nuclear power municipalities feel that far too many decisions in large scale investments, e.g. within nuclear power, have been taken " from the top and down," often using the method "DAD" (decide, announce and defend). This we wish to change and it is hoped that

GMF will find it appropriate to make a supportive recommendation at this conference. Remember that almost every decision concerning the expansion or phasing out of energy production has its clear, concrete geographical consequences. Many citizens, a site and a municipality will be affected for a long time, often for many generations, by such a decision. Therefore it is reasonable and democratically correct that the affected local people and their elected representatives, the local political leaders, at an early stage are not only prepared for the opportunity to join in a dialogue concerning the expected huge changes and investment decisions that may take place. More that they understand and are fully assured that they will have the opportunity to influence decisions. The EU principle of subsidiarity has to be practically applied and put in the driving seat in connection also with a phasing out of nuclear facilities. It must be developed methodologically and systematically at the local level. The GMF network is not satisfied with this just being well formulated, well-meaning advice from above.

The Tarragona Seminar on:
"Strategy Selection for the Decommissioning of Nuclear Facilities",
September 2003

Session V "Social Aspects" at the Seminar.

Speeches by:

- Paul B Woollam, BNFL Magnox Electric plc, UK
- Josep Castellnou**,** Mayor of L'Hospitalet i Vandellòs, Spain
- Kevin Hayes, Westinghouse Electric Company LLC, UK
- Philip Moding, Secretary of KSO, Sweden
- Larry Kraemer, Mayor of Kincardine, Chair Canadian Association of Nuclear Host Communities

EXPERIENCE FROM THE TRAWSFYNYDD PUBLIC INQUIRY

Paul B Woollam
BNFL Magnox Electric plc

Background

Decommissioning strategy

BNFL Magnox Electric's reactor decommissioning strategy has been described in detail in another paper to this seminar. In outline:

- All buildings on power station sites will be dismantled as soon as practicable after the end of generation
- Dismantling of the reactor buildings will be deferred for around 100 years, with the buildings being suitably treated for this time period to make them weatherproof and to deter intruders
- Operational intermediate level waste (ILW) will be packaged and stored on its site of origin, usually in a new, purpose built facility.

UK land use legislation and Public Inquiries

UK land use legislation (contained in the Town and Country Planning Act 1990) in general terms requires an application to be made to the local planning authority for permission to execute any works that involve construction of new buildings or a change to the appearance of existing buildings. No consent is required for total demolition. This legislation applies to all forms of building, whether for housing, supermarkets, quarries or nuclear decommissioning. Additional legislation applies in specific cases. For example nuclear safety is covered by the Nuclear Installations Act and regulated by the Nuclear Installations Inspectorate. So local authorities are not required to determine the nuclear safety, for example, of a decommissioning proposal. They have only to determine whether the impact on the environment is acceptable.

Locally elected representatives usually determine the outcome of a planning application. However, if the application raises issues of more than local importance the application can be "called in" by the national or regional government. This results in the setting up of a Public Inquiry. A Public Inquiry is also set up if the organisation applying for permission (the applicant) appeals against rejection.

An Inspector is appointed to manage the Inquiry and to produce a report making recommendations to the decision-maker. The Inspector does not make the decision and the decision-maker (usually a Government Minister or, as in this case, a Government Committee) does not have to accept his recommendation. A detailed timetable is laid out in the legislation which allows all parties time to produce evidence. It is normal for all major participants (applicant and local authority) to be represented by lawyers and counsel who are expert in planning matters.

The main aim of an Inquiry is to allow the public to have their views heard and the process is more informal than might be expected in a law court. Inquiries are held local to the application site in whatever accommodation is available. Inspectors will normally allow members of the public to air their views on matters that may be of only limited relevance to the Inquiry or the relevant legislation. The public is free to cross-examine all witnesses and is usually helped by the Inspector without any need for legal representation.

The situation at Trawsfynydd nuclear power station

Trawsfynydd power station in Wales is unique in being sited in a National Park. Magnox Electric plc (the applicant in this case) therefore decided to implement a Safestore design that would minimise the visual impact of the reactor buildings over the envisaged Care and Maintenance period. This involves (for this power station only) reducing the building height by about 20m, down to 35m, with a curved roof designed to blend into the surrounding landscape. The ILW store, which will be 91 metres in length x 34 metres wide x 19 metres high, was also designed to minimise visual intrusion.

A planning application for these works was submitted to the Snowdonia National Park Authority (the local planning authority in this instance), but subsequently called in by the National Assembly for Wales on the grounds that the application raised matters of more than local importance.

The Public Inquiry started some 16 months after the application was made and lasted for three weeks. It is interesting to note that the original Inquiry into construction of the power station lasted just three days. At the time of writing (May 2003), the Inspector has submitted his report, in confidence, to the National Assembly for Wales but they have not yet informed Magnox Electric of their decision. It is hoped that a decision will have been announced before the Vandellos Seminar in September 2003.

Lessons learned from the Inquiry

Land use legislation in the UK derives from a European Directive and is therefore, in principle, similar to that in other European countries. However, mindful that this Seminar on decommissioning strategy selection has an international audience and that the application of land use legislation will be different from country to country, this paper notes some broadly applicable lessons learnt on the social aspects of a Public Inquiry.

Stakeholder relationships

- Understanding the views of the various national regulators is of paramount importance to ensure the Applicant's evidence is in alignment with their requirements. The Inquiry Inspector will seek to assure himself that safety matters are appropriately covered by existing legislation and that the inspection regime is adequate to ensure compliance.
- At a national level it is important to understand the concerns of non-governmental organisations, mainly anti-nuclear groups, who seek to oppose the planning application. Their objections may be based on matters that lie outside the scope of land use legislation or may be purely philosophical.
- At a local level it is essential to build relationships with the planning authority to ensure that the concerns of the elected members representing the local communities, and of the professionals who advise them, are fully taken into account. This is particularly the case for environmental matters such as visual impact and noise.

- Relationships with local residents are in many ways the most important, for it is they who will be most affected by the proposals. Evidence from local residents, whether they support or oppose the proposals, is likely to outweigh evidence from objectors, who may live far from the site, unless they can demonstrate local support.

Media relations

- Many of the applicant's opponents, especially anti-nuclear groups, will try to use the media extensively to promote their case. Often local papers will publish anti-nuclear viewpoints without bothering to check accuracy.
- Finding these articles and seeking to correct the inevitable mistakes and sometimes deliberate distortions can be time consuming. However, applicants should not to become involved in media arguments during the course of the Inquiry and such interventions should only be to correct factual errors. The correct place to argue the case is inside the Inquiry, not on the pages of the local newspaper.
- Access to the site to allow factual media briefing on the proposals contained in the application and, in particular, to allow television crews to film the site is helpful in setting the scene for the public who may never have visited the plant.
- Media interest is high at the start of the Inquiry, but rapidly falls as proceedings become routine.

Public understanding

- Anti-nuclear groups may oppose decommissioning planning applications without understanding the legal basis of the land use legislation. They may seek to broaden the remit of the Inquiry to cover a wide range of matters that are outside its scope. To allow public confidence in the process the Inspector may sometimes allow such matters to be discussed.
- The applicant's case should be prepared from the outset on the assumption that all the information provided will be subject to cross-examination: all documents should be written in a manner which the public can understand and which does not compromise commercial or security sensitivities. They should not contain phrases that could be misleading if taken out of context in a newspaper.
- Nuclear matters are complex and the nuclear community tends to suggest decommissioning is technically straightforward. Hence we may assume others have understood the technical evidence, even if they dispute it. This is often not the case.
- Every strategic decision should have a robust rationale and should have resulted from a detailed options analysis. Anti-nuclear groups want this analysis to be visible and transparent. In some cases commercial considerations make this difficult: public domain reports should be prepared that present as much information as practicable. In some cases this will never satisfy all objectors.
- Every aspect of the detailed design requires a detailed, transparent audit trail, again subject to public scrutiny. For environmental matters like noise and visual impact this should be readily achievable.
- There is a requirement to assess the alternative options in detail to answer questions about what would happen in the event that planning consent was not granted. In the case of, say, a proposal to build a supermarket this is straightforward: if no consent is granted no store is built. But when no disposal route exists for the waste from decommissioning, as in the UK, the options for dismantling a nuclear power station are limited.

Some views expressed at the Trawsfynydd Public Inquiry

By national anti-nuclear groups

Few of the objectors spoke against the proposal to build a large new ILW store in a National Park, even though the Inquiry's purpose was the consider the environmental consequences of land use proposals. The primary concerns expressed at the Inquiry were related to deferral of reactor dismantling for 100 years. Some objectors:

- Did not believe the Company's dose reduction analysis (based on Co-60 decay in a carbon steel system) even after detailed questioning of Company witnesses by the Inspector.
- Appeared not to understand the difference between the radiological implications of total activity (primarily pure β) decay in comparison with γ dose reductions, although the matter was explained several times.
- Questioned why Trawsfynydd dismantling is to be deferred in comparison with plans for early dismantling of Tokai Mura, without accepting the seismic siting requirements in Japan.
- Thought the reactors should be dismantled immediately with the resultant waste placed in a store very much larger than the existing reactor buildings.
- Did not understand or accept the engineering associated with nuclear decommissioning.

There were also concerns that the Company had not made available all of its extensive decision-making documentation for commercial confidentiality reasons.

In short the anti-nuclear groups simply did not trust Magnox Electric and appeared unwilling, almost as a matter of principle to believe what they were told.

By Regulators

- The Nuclear Installations Inspectorate said they were content that the proposals are compatible with their expectations for the safe management of radioactive waste.
- The Environment Agency told the Inquiry that it saw no reason to withhold planning permission for the proposals.

The Regulators accepted that the proposed reduced height reactor buildings and the ILW store would be built and operated safely and, on several occasions, explained that they would not allow work to proceed until they were content with the safety aspects.

By Local Authorities

- The local planning authority (Snowdonia National Park Authority) offered no objection in principle to the proposal, subject (primarily) to a review of the need for the ILW store in around 25 years.
- The local authority with responsibility for enforcing environmental and transport matters (Gwynydd County Council) offered "cautious" support considering that no ultimate radioactive waste disposal site is available in the UK.

The local authorities accepted that there is no real alternative to the proposals but, unlike the anti-nuclear groups, were more concerned about the new ILW store to be built in the National Park than reducing the height of the existing reactor buildings. They sought to retain a measure of control over the new store by asking for a review of its need in the future.

By local people

Some local residents expressed views against the proposals with concerns that:

- Radioactive waste would be imported to Trawsfynydd from other sites.
- Related to a range of matters outside the remit of the Inquiry.

Other residents spoke in favour of the proposals citing:

- Economic benefits that had been derived from the power station.
- Acceptance of the Company's willingness to reduce the height of the reactor buildings to improve visual amenity

Most of the local population, either now or in the past, has worked at the site or enjoyed the secondary benefits brought by the power station to an area with widespread unemployment. They are in general supportive of the Company's efforts to retain employment and reduce the visual impact of the shutdown station.

Conclusions

- Magnox Electric's proposals for decommissioning Trawsfynydd power station were not opposed by either the nuclear Regulators or the elected representatives of the local communities, including the local planning authority, even though the station is situated in a National Park.
- The primary concerns came from national anti-nuclear groups and focussed on matters outside the remit of the relevant land use legislation.
- A number of significant lessons have been learnt from this Inquiry which should assist both the Company and the wider public's understanding in the event of a future Public Inquiry into decommissioning proposals at other UK nuclear power stations.

LOCAL INFORMATION COMMITTEE AND SOCIAL REPERCUSSIONS OF THE CLOSURE AND DISMANTLING OF VANDELLÓS-I

Josep Castellnou
Mayor of L'Hospitalet i Vandellòs, Spain

DESCRIPTION OF THE D&D PROJECT: VANDELLOS I D&D

Vandellos-I is a 497 MW gas graphite type nuclear power plant located in the Province of Tarragona. Its construction began in 1967 and it started operating in 1972. Its design was very similar to the French plant at St. Laurent des Eaux.

In 1989 a fire in the turbine house led to the final shutdown of the reactor in 1990 by Ministerial Order. Responsibility for the site was transferred from the utility to ENRESA in February 1998. Since then, main decommissioning activities of Vandellos-I have been undertaken, following post operational clean out, conditioning of spent fuel and treatment of operational wastes including the graphite components from fuel elements. Stage 2 decommissioning activities have been extended up to 2003.

Socio-economic factors

As it is known, when a new nuclear installation is commissioned, exists a change in the socio-economic activity in the local area. This new activity usually begins with an increase of employment and population until the finalisation of the commissioning contracts when the NPP starts up. At the same time during the operational stage, municipal incomes are increased.

During the decommissioning of a nuclear installation, some socio-economic impacts in the surrounded area are produced, strongly dependent on the activity of the decommissioned facility. For a complete evaluation of the impact of the dismantling phase, the overall process of decommissioning of a nuclear installation should be considered, including the following three phases:

- Permanent shutdown
- Decommissioning period
- Post-closure

Permanent shutdown

Socio-economic impact of decommissioning of an installation is marked by loss of employment (direct and indirect) and therefore loss of income.

Direct loss of employment is generated because the activity ceases at the installation and the activity decays during the decommissioning. The overall effect may be summarised in a demographic slump in the area. The reduction in employment leads to the relocation of people who are no longer going to work at the installation and who have no special ties to the area, this especially affecting the younger

people, better trained generations, which have to look for work in other places. As a result, there is a migratory effect in the opposite direction from that occurring on the implementation of the facility.

Indirect loss of employment is produced both activities directly relating to the installation are reduced (auxiliary companies, refuelling work, etc.) and activities linked to the community (commerce and services) are affected.

This direct/indirect loss of employment causes:

- Reduction in economic activity in the municipal areas affected, caused by the disappearance or decrease of activities formerly carried out during the operation of the facility: services (maintenance, cleaning, subcontracting), refuelling outages and indirect activities (commercial and services).
- Reduction in revenues for the municipal administrations (taxes, rates and economic compensations), causing in turn a reduction in the activity of these administrations: lower investments and reduced activity.
- Blocking of the site for other uses, with the impossibility of promoting alternative activities.
- The negative impact of decommissioning makes it necessary for the time lag between permanent shutdown and decommissioning to be as short as possible, as this is a period of uncertainty and economic slowing down in the area.

In the case of Vandellós I nuclear power plant, where the transition period between the permanent shutdown and the start of decommissioning works has taken ten years, the direct loss of employment has meant the disappearance of almost 300 jobs in a community of some 4 000 inhabitants. Local administrations during this transition period were involved directly in the decommissioning project, satisfying all the information requirements.

Decommissioning period

With the start of the decommissioning works, a new stage begins, meaning new activity for the area of influence of the nuclear installation. This does not have the characteristics of a nuclear power plant construction and operation project (less time and lower costs) but for a number of years (5 years in the case of dismantling of the Vandellós I nuclear power plant) it provides new impulse for the area.

The social impact of the decommissioning period is marked by the desire in society to access information and the need to participate in decision-making process affecting the area of influence. During the licensing process, the decommissioning project is subject to public hearings, negotiation with the local administrations and informative meetings with the media and the population of the area. This promotes participation by society and the local administrations throughout the entire process of project approval.

In Vandellós-I, during the decommissioning period, a Commission was created, made up of representatives of the company in charge of dismantling, the administrations of the area of influence and other representative bodies. The purpose of this Commission was to track the evolution of the dismantling process and receive information on it.

The aspects that were dealt with by the Commission are the following:

- Compliance with the conditions agreed on in the license (permit)
- Work progress, evolution of contracted personnel, etc.
- Waste management, materials accounting.

- Safety (training and accident rates) and environmental surveillance.
- Events.

The Commission has proved to be a valid instrument for participation by the stakeholders in the area of influence in the dismantling project.

Also highly important, in addition to this policy of communication, is the training policy, which serves not only to prepare the workers who are going to participate in dismantling but also helps to improve the knowledge and skills of people who might in the future undertake similar work in the same area.

The economic impact during the dismantling phase is clearly positive. It cannot be compared to the activity that occurs as a result of construction of a nuclear power plant, but it does significantly reactivate the local economy. The most important economic impact is the generation of local employment, both direct and indirect. This generation of employment arises from both the direct contracting of workers and from the contracting of companies in the area.

In the case of Vandellós I decommissioning, a total of 1,800 people were involved during the period 1998-2001, with a peak figure of 400 workers simultaneously on site. The composition of this employment was 65% local and 35% from other areas. The following table shows the latest data on employment and on the companies that have participated in the dismantling process.

	LOCAL	**PROVINCIAL**	**REMAINDER**	**TOTAL**
Employees (current)	194		112	306
Companies (Nov. 1999)	40	48	38	126

Indirect employment, which is more difficult to quantify, arises from increasing activity in the area, especially in the services sector.

The other pillar supporting economic activity is the contribution made by dismantling to the local administrations, through: Revenues from licenses and permits, compensation in the form of a fee for waste storage, and agreements with the administrations of the area to promote economic, cultural and sporting activities and investments in equipment.

Post-closure

The completion of the decommissioning works means the end of the activity. All the incentives arising from having hosted a nuclear installation disappear and new alternatives are needed for the area to survive. Planning for the future must be based on the training of people and on the preparation of the companies and entrepreneurs in the area.

There are three areas of training management:

- The local administrations, through agreements with other administrations (for training fund management) and with the companies responsible for dismantling (for the management of local employment), may generate job profiles that serve not only to provide work during the dismantling phase but also to offer alternatives in other sectors during and subsequent to dismantling: construction and services.
- The University, taking advantage of its collaboration in dismantling, may create a specialisation for both its teachers and students in areas implying a high level of technology and providing

expectations for the future and growth: the management of conventional and non-conventional wastes or environmental aspects.

- Companies, through their own needs for training of the personnel working in dismantling, may promote the creation of groups of experts in a field as innovative as dismantling, thus allowing for the creation of stable jobs. Furthermore, offering internships and scholarships to students allows for the professional orientation of the best-trained people in the area.

As regards the preparation of companies and entrepreneurs in the area, advantage should be taken of the economic resources contributed by dismantling to the Local Administrations in order to promote economic activities, either through the strengthening of existing sectors (services, light industry, tourism, farming, etc.) or the creation of new activities relating to the environment or to dismantling itself.

Finally, the release of the site allows the resulting space to be recovered for new activities. The released site may house a wide variety of companies requiring space and services, since advantage may be taken of all the infrastructures (electricity lines, water supplies, cooling systems, etc.) already existing at the site.

A 25 years latency period is beginning at Vandellós-I, in this sense and besides the developments carried out during the level 2 decommissioning stage by the local administrations in infrastructures, socio-cultural interests and industry, a technological centre is going to be created at the site. The objectives of this centre are to survey the latency period, to serve as a way of public information and training, and to develop research projects related to decommissioning activities.

Consequently, the post-closure phase may be tackled with guarantees as long as the necessary efforts are first made by both those responsible for dismantling and by the Administrations, in order to plan the diversification of activities in the area of influence of the installation.

GROUNDWATER CONTAMINATION AND COMMUNITY RELATIONS

Kevin Hayes, CHMM
Environment, Health and Safety Manager
Westinghouse Electric Company LLC

Overview

Westinghouse Electric Company LLC ("Westinghouse") acquired a nuclear fuel processing plant at Hematite, Missouri ("Hematite," the "Facility," or the "Plant") in April 2000. The plant has subsequently been closed, and its operations have been relocated to a newer, larger facility. Westinghouse has announced plans to complete its clean-up, decommissioning, and License retirement in a safe, socially responsible, and environmentally sound manner as required by internal policies, as well as those of its parent company, British Nuclear Fuels plc. (BNFL). Preliminary investigations have revealed the presence of environmental contamination in various areas of the facility and grounds, including both radioactive contamination and various other substances related to the nuclear fuel processing operations. Most noteworthy among the areas of contamination are seven private drinking water wells up to 3,000 feet to the southeast, and one private drinking water well approximately 1 000 feet to the northeast, that have been found to contain tetrachloroethylene ("PCE"), trichloroethylene ("TCE"), and other contaminants associated with their environmental degradation. Potential sources of this contamination include approximately 40 large unlined on-site burial pits and 2 evaporation ponds in which previous operators of the facility disposed of uranium-contaminated wastes and a variety of other hazardous substances. This paper discusses Westinghouse's response to the discovery of drinking water contamination, and the significance of its community relations program within that response.

Ownership History

The Mallinckrodt Chemical Works ("Mallinckrodt") became the first large-scale producer of uranium oxide for the United States' atomic energy program in 1942. In 1956, Mallinckrodt constructed and began operating a fuel processing facility at Hematite, which is approximately 35 miles south of St. Louis. In April of 1961, Mallinckrodt, Nuclear Development Corporation of America, and Olin Mathieson Chemical Corporation formed a joint venture, United Nuclear Corporation ("UNC"), to become the first integrated nuclear service organization in the country. UNC serviced primarily the federal government's nuclear fuel production needs, and some commercial customers, from the Hematite facility. In 1970, UNC and Gulf Nuclear Corporation entered into a joint venture, Gulf United Nuclear Fuels Corporation ("Gulf"), which owned and operated the Hematite Plant in a similar capacity until the spring of 1974. Late in 1973, Gulf announced that it was discontinuing certain aspects of its nuclear fuel business, and consequently offered Hematite for sale. Combustion Engineering Corp. ("CE") purchased the Hematite Facility in May of 1974, and began operating it as a commercial nuclear fuel cycle facility. Ownership again changed hands in 1989, when Asea Brown Boveri ("ABB") purchased the stock of CE and expanded the facility's commercial operations. Finally,

in April of 2000, Westinghouse Electric Company LLC, purchased the global nuclear operations of ABB, subsequently closing the Hematite facility.

On-Site Disposal

Beginning no later than 1965, and perhaps as early as 1958 or 1959, and continuing at least until November of 1970, on-site burial was used as a means of disposal of contaminated materials and waste at Hematite. From 1965 until 1971, up to 40 large unlined pits were dug east of the Plant buildings. These pits were used to dispose of materials and waste generated by the Plant processes, potentially including tetrachloroethylene ("PCE") and trichloroethylene ("TCE"). This on-site burial was a formally authorized activity, conducted pursuant to a policy and memoranda describing the size and spacing of the pits, the thickness of the cover, and the quantity of radioactive material that could be buried in each pit. On-site burial of radioactive material was terminated in November 1970.

The Hematite Plant has two former filtrate evaporation ponds that were also used for on-site disposal of low-level contaminants, potentially including PCE and TCE, and both high enrichment and low enrichment uranium materials containing insoluble uranium bearing precipitates and other solids. The precipitates and solids were allowed to settle and the water evaporated naturally. As additional liquids were added to the primary pond, the overflow flowed through a pipe into the secondary pond. Immediately after CE purchased the Plant in 1974, use of the Ponds was curtailed so as to allow only disposal of spent potassium hydroxide scrubber solution from the uranium dry recycle process and liquids from start-up testing of the wet recovery process. Use of the ponds was discontinued altogether in September 1978.

Although use of the burial pits and evaporation ponds has been terminated, and the ponds have been subject to several remedial efforts, both remain as areas of concern requiring investigation and final remediation.

Environmental Monitoring And Investigations

The Hematite facility initially operated under the authority of the AEC, then under a License from the AEC's successor, the U.S. Nuclear Regulatory Commission ("NRC"). Those authorizations and the License required a variety of environmental monitoring related to radiological safety. Monitoring included process and ventilation stack emissions, downwind air samplers, soils, vegetation, surface water, and groundwater. The introduction of environmental regulations in the 1970s resulted in a state-issued permit for wastewater discharges and associated monitoring requirements.

The owners and regulatory agencies also conducted a number of investigative actions at the Hematite facility over the past twenty years, with increasing emphasis on non-radiological environmental aspects and impacts. An NRC contractor conducted a radiological evaluation of the burial pits in the spring and summer of 1982 that was subsequently published as NUREG/CR-3387. A private contractor for ABB Combustion Engineering completed an investigation to determine the source of Technetium-99 detected in on-site monitoring wells in September 1996. Missouri's Department of Natural Resources ("DNR") and Department of Health and Senior Services ("DHSS") completed an investigation to determine groundwater conditions at and around the facility, including radiological and volatile organic contaminants in November 1996. ABB Combustion Engineering's contractor completed in April 1997 an exploratory probe-hole investigation to evaluate the stratigraphy of the on-site evaporation ponds. Finally, another ABB Combustion Engineering contractor conducted a hydrogeologic investigation from April 1998 to March 1999 to determine whether past operations and waste management practices at the site had impacted groundwater and surface water quality around the burial pit area.

The prevailing conclusion from ongoing monitoring and the various investigations was that the site itself had contaminated soils and groundwater, but that there was no indication of off-site contaminant migration.

Response to Drinking Water Contamination

DHSS conducted annual radiological monitoring (gross alpha and gross beta) of four private wells near the Hematite facility during December 2001. Samples were also collected for VOCs at the request of the DNR. Results of that sampling revealed that one of the private drinking water wells sampled by DHSS exhibited VOC concentrations, including PCE and TCE, above drinking water standards. This well is located northeast of the facility, at a leased residence situated on Westinghouse property. It had last been sampled for VOCs by DHSS in 1996, at which time none were detected. Westinghouse and the DNR conducted follow-up testing upon being informed of the VOC finding in early-January 2003. With the objective of being socially responsible and proactive in providing public protection, Westinghouse also ensured that the resident had bottled water for consumptive purposes while the situation was being evaluated. Follow-up testing then confirmed the presence of VOCs. Again in a proactive manner, Westinghouse installed an activated carbon filtration system in the residence after gaining the DNR's concurrence for such action.

In March 2002, Westinghouse and DNR tested 20 additional wells located southeast of the Hematite facility. Five of those wells were found to contain VOCs, bringing the total number of affected wells to six. Westinghouse again took the immediate action of providing bottled water and installing carbon filtration systems in each of the affected residences. Bottled water was also provided to 17 additional residences located within the potentially affected area, which was defined as the planned groundwater investigation area of the draft RI/FS work plan.

In April 2002, DNR, DHSS, and Westinghouse sampled additional private wells located within a 1-mile radius of the facility, and within a wedge up to 2 miles to the northeast/southeast. Westinghouse also conducted repeat sampling of previously sampled residences. Analytical results from that sampling event showed that no additional private wells were affected. Nevertheless, it was apparent that additional investigation was warranted. Westinghouse, again with the DNR's concurrence, initiated an interim hydrogeologic investigation of groundwater conditions, thereby accelerating that component of the RI/FS work plan, to quickly determine appropriate final corrective action(s) regarding residential drinking water.

Westinghouse proactively signed a Time Critical Removal Action Memorandum with the DNR during June 2002. That document formalized the actions already taken regarding the provision of bottled water, installation of filtration systems, and the interim hydrogeologic investigation. It also established a quarterly monitoring program for residential wells and those being installed through the interim investigation.

The first round of quarterly sampling was conducted in July 2002, and detectable levels of VOCs were found in two more private wells, bringing the total number of affected wells to eight. Except for the well to the northeast, all of the affected wells are at residences located southeast of the Site.

Westinghouse completed its interim hydrogeologic investigation and used it to develop an Engineering Evaluation and Cost Analysis (EE/CA) of alternatives for final corrective action regarding residential drinking water well contamination. The alternatives it considered were taking no action; continued provision of bottled water, filtration, and periodic monitoring; installation of deeper private drinking water wells, and; extension of public water to 24 currently and potentially affected residences. Of the four, Westinghouse recommended the provision of public water as the most effective, implementable, and cost-effective alternative. The EE/CA was presented for public comment in January 2003. Following evaluation of and response to the comments received, Westinghouse and the DNR signed in

May 2003 a Non-Time Critical Removal Action Memorandum that authorized implementation of the public water alternative. Construction began that same month, and will to be completed in October 2003

Community Relations

The need to proactively communicate and work with the community and regulators was easily and quickly identified when considering the potential scope of concerns that could be encountered while the Hematite site was safely decontaminated, decommissioned, and returned to future use. Based on its corporate philosophy of being socially responsible and proactive in community outreach, Westinghouse developed a community relations plan using CERCLA guidance and model documents provided by the DNR. Community interviews were conducted during November 2001 to ensure the plan recognized and addressed local concerns. Such an ability was thought to be an essential first step in building an effective mechanism for providing timely project updates to the community, and being able to receive and understand community feedback. There was also a strong desire to contain the "rumor mill." Both the local community and the news media will inevitably hear and pass a story along. The success of the community relations plan can be gauged if such exchanges, and the resulting perspectives, are made from an informed position instead of one of ignorance and suspicion.

Key features in the resulting draft plan included a prime public contact, planned public meetings and smaller workshops with the local community, regular communication with local elected officials and regulatory agencies, and news media releases regarding significant events and public meetings. It also featured the generation of fact sheets regarding subjects or developments of particular interest, periodic newsletters to the community, development of a mailing list that is shared with regulators, establishment of a local repository to ensure access to official documents, and the opportunity for site tours.

Discovery of drinking water contamination in December 2001 provided an immediate test of the plan, and invaluable opportunities to refine it. Dialogue with the first affected resident revealed something that had been underestimated – provisions for a resident's privacy, particularly for those who refrain from being in the public spotlight. Implementation of the plan also had to ensure that information was disseminated so that an affected resident was the first person to be informed, followed by elected official and regulatory agencies, and then the public and news media if appropriate.

Experience with public meetings provided more opportunities for plan refinement. The public, especially intervenors and concerned citizens, is quickly able to recognize and pursue any lack of common understanding between meeting presenters. That is particularly true when such misunderstanding is between a Licensee or permittee and its regulators. It can have embarrassing consequences, and may undermine public confidence in either party's ability to achieve appropriate results. They must be able to project an informed, understanding, and appropriately responsive demeanor. Tremendous value was therefore found in pre-meeting conferences to better ensure common understanding, albeit without collaboration. It is equally important to quickly, within 24-hours, hold a post-meeting debrief to share lessons learned and ensure that any outstanding public questions are addressed in a timely manner. That is also the ideal time to plan the timing of the next public meeting and the topics it should address.

Conclusion

A variety of lessons can be learned through the Westinghouse experience at Hematite. First and foremost is the need for proactive planning, particularly the development of a community relations plan. Nearly as important is the need for community involvement and stewardship before starting

potentially high-profile operations, or the development of a potentially serious problem. Even the most carefully developed plan will be undermined if it's brought by a messenger that is unknown to the community, and is therefore received with suspicion.

The ability to take prompt actions and meet commitments can not be underestimated as a mechanism for overcoming public suspicion and building trust under adverse conditions. It is important to be aware that direct cost is not the only cost when determining a course of action. Safety, environmental impact, and social responsibility must be considered in order to make appropriate decisions. Information gained in the course of developing a community relations plan will help frame the relative significance of those considerations.

While it is probable that someone will be unhappy or disagree with some decision or outcome while dealing with a situation such as the groundwater contamination encountered at Hematite, they are most likely to accept it if there is a candid and rational explanation. Public concern is typically amplified as the complexity of the problem increases and their understanding of it decreases. A public information and education process that is coordinated with elected officials and regulatory agencies is therefore a vital function of community relations.

The court of public opinion is always in session. Its trust must be earned through appropriate and proactive planning supported by effective and ongoing communication.

SUMMARY OF A PAPER GIVEN AT THE NEA SEMINAR IN TARRAGONA, SPAIN SEPT 4

Philip Moding,
Secretary of the municipalities of Sweden hosting NPPs (KSO)

Session V, Social aspects

Some expectations from European municipalities hosting nuclear facilities

Firstly I want to repeat what I said at the NEA WPDD meeting at Karlsruhe June 2002. Even if the NEA papers so far have focused on the strategies and especially on the important more technical aspects GMF and us from KSO Sweden are eager to underline the social aspects of closing, dismantling and decommissioning. The decisions either to shut down a NPP or to site a new nuclear installation are of highest interest to the affected local democracy, i.e. the municipality. Together with the self evident nuclear safety matter nothing else is as important as the social consequences of any large-scale investment to us as local stakeholders. Too many large scale investments in the nuclear sector have been taken from the top and down, often using the well-known method of "father knows best" or the DAD principle (decide, announce, defend). Therefore GMF and the European municipalities welcome the NEA initiative and efforts to at least listen to what will be said from us as representatives nearest to the affected citizens. You must excuse us as laymen not being able to melt all your expert dominated strategies. I think that most citizens and affected municipalities just thrust our very competent national and international regulators. We expect a high competence from them and you including an independent to different lobby groups and interests.

But do remember that any decision concerning the expansion or phasing out of energy production has its clear, concrete social effects at defined geographic place or places. This must be explained and understood long before a decommissioning procedure can take place. This very first face must be much better developed methodologically and systematically at the local level. There is a long way to go still. From a local point of view we are happy to see some initiatives or better new directives from EU as given June 2001on the environmental impacts of some plans (EU Directive 2001/42/EG). Unfortunately the term Strategic Environmental Assessment, SEA, seems to be replaced by a weaker definition. How these new directives will be applied the best are now discussed in the member countries. Also by us in Sweden, where there is still a lack of communication between our central government, including it's different central agencies, and our affected municipalities. Some sort of DAD procedure is maybe taking place. As far as I know the affected municipalities haven't been heard so far at all.

As investors and regulators you have a need for cooperate much better with us as local stakeholders. With other words the network of GMF is needed as you have heard earlier from its Secretary, to day chairing this part of the Seminar.

A problem to those wanting a more developed and democratic dialogue between national government and the local municipalities, the grassroots, is that it is inconvenient and uncomfortable to a national government for instance our Swedish or the German one to develop a dialogue on the phasing out of nuclear also with the affected communes. But on the siting of new waste repositories our governments have learnt it is a must to come on speaking terms with the affected citizens and their local politicians. It is easier for the Government or the investor to send a letter to the local addressee than to mail a letter about a planned (!) funeral! This is a dilemma to any national government dealing with the phasing out of a nuclear concept. Our Swedish National Council for radioactive waste, "KASAM", has in its report to the government (SOU 2002:63) asked for a research programme focusing on societal humanistic aspects of these issues. A very important prerequisite is of course that such a research must be completely independent of the main stakeholders, read the industry and its organisations. An interesting seminar on this theme for those understanding Swedish will take place in Stockholm October 22, 2003. Ask KASAM, Ministry of Environment, Stockholm (mats.lindman@environment.ministry.se) about this seminar on "the role of social sciences in the decision making on large scale investments and democracy."

As local stakeholders we know probably better than the rest of the nation which benefits the establishments of nuclear power has brought to the sites and their surroundings. As seen from a broad and general point of view: Most NPPs in Europe are sited at "minus regions" i.e. at places losing people and employment. In most cases a phasing out of nuclear should not only be measured in the number of jobs lost on the national level - a rather uninteresting consequence compared with the grave, local affects on each affected place. Geography counts... with other words! The phasing out impacts must also be regarded qualitatively as a significant loss of many qualified jobs. The heavy investments in the nuclear energy have brought advanced technological activities as well as many "normal" jobs to areas needing it. A clear social indication of phasing out is that it will affect most of all elderly people and those with the least education. These groups will have a great difficulty in finding other jobs. Houses, certain shops, schools, nurseries, local service firms will lose their base. Worst of all could be that the inhabitants cease to believe in the future. Any strategy for decommissioning must start from the background of a total approach of the decision making on why shut down? As I said in Karlsruhe from the municipal and grassroot level there is a lower interest to participate in the decommissioning phase if there is a lack of answer to the following primary questions:

1. What environmental gains and losses will accompany the planned shut down?
2. How and where will the diminished electrical supply be compensated for?
3. How and when will the affected local districts be compensated and by who?

As an example of the decided shut down of the nuclear production in Sweden we know from our KSO investigations (KSO Report given May 1999 that around 8000 jobs will disappear, most of them not being replaced in the existing NPP areas. Our affected municipalities have therefore created list of concrete investments as compensations for the closing down of NPPs. The majority concern infrastructure in roads, railways, higher education etc. Currently it is still unlikely that a power company would invest in new large fossil fuel power plants in Sweden. Also new windmills are discussed more and more from an environmental and economic point of view by us. In stead our Swedish Vattenfall, owned by us as citizens of Sweden, is allowed to buy and invest in coal fired plants in Germany and in Poland. Many mean that it is a typical example of double moral. Isn't it or is it just allowed business thinking in the EU? The issue was also discussed in the Swedish Parliament! Back to the aims of this Seminar. You want us as local stakeholders to comment your hard, technical strategies for the decommissioning of nuclear facilities and I am answering the same way as in Karlsruhe. You may think that I am playing offside again but... My advice to you to day: Listen also to us as stakeholders of the social and geographic aspects just at the affected areas. The national level for this is not enough as you could see from my Swedish examples. No decommissioning or no phasing

out is taking place without mostly enormous effects on the local level. Develop better dialogues with us on just this more grassroot level. And don't forget to develop your best talents as fair and unbiased teachers and stakeholders. Try to understand us who demand intelligibility. Local democracies must also be offered a fair possibility to change plans not wanted by them. This is also included in the Maastricht agreement and in the principle of Subsidiary! community expectations

COMMUNITY EXPECTATIONS

Larry Kraemer
Chairperson of the Canadian Association of Nuclear Host Communities
Mayor of the Municipality of Kincardine

Canadian Association of Nuclear Host Communities

Presentation

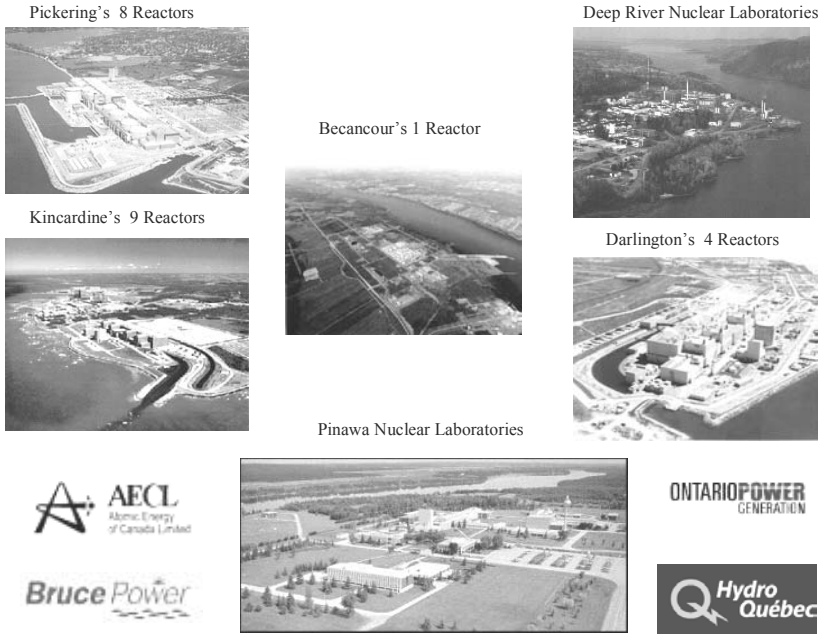
Community Expectations

CANHC

Introduction

Good afternoon, ladies and gentlemen, my name is Larry Kraemer and I wish to speak to you to-day in the capacity of the Chairperson of the Canadian Association of Nuclear Host Communities and also as the Mayor of the Municipality of Kincardine, which is the home to North America's largest Nuclear Generating Station the Bruce Nuclear Power Development.

Historically, the relationship between the nuclear generator and the local community has been one of stability and co-operation. However in more recent times (2000-2003) the nuclear landscape has had several major issues that directly effect the local nuclear host communities.



CANHC Canadian Association of Nuclear Host Communities

Goals

- The associations mandate is to be supportive of the nuclear industry through ongoing dialogue, mutual cooperation and education.
- To strengthen community representation with the nuclear industry and politically through networking with other nuclear host communities.

As a result of these issues, the Mayors of a number of communities started having informal meetings to discuss the issues at hand and how they effect their constituents. These meetings led to the official formation of the CANHC with representation from:

- Pickering, Ontario;
- Clarington, Ontario;
- Kincardine, Ontario;
- Deep River, Ontario;
- Becancour, Quebec;
- Pinawa, Manitoba.

In Canada it is almost impossible to discuss decommissioning and dismantling of Nuclear Facilities without also discussing Nuclear Waste disposal for reasons that I will soon make clear.

Also I would like to briefly touch on how and why expectation of communities may differ by geography and circumstance.

Pickering

A disposal solution for either calandria, decommissioning wastes or used fuel local to the Pickering site would seem to be unlikely given the density of urban population, the low percentage of workers employed in the nuclear industry compared to the rest of the population and Pickering's close proximity to Toronto and its suburbs.

- Pickering Nuclear Generating Station;
- 8 550 mw reactors at end of life;
- 8 calandria + LLW and ILW from decommissioning;
- at end of life site will house approximately 1 200 cylinders of used fuel;
- site is not large acreage;
- urban boundary has pretty much surrounded plant;
- close proximity to Toronto.

Clarington

By end of life it is likely that the urban boundary will have reached this site as well making a local solution unlikely there as well.

- Darlington Nuclear Generating Station;
- 4 950 mw reactors;
- 4 calandria + all LLW and ILW from decommissioning;
- smaller site in terms of acreage;
- approximately 1 000 cylinders of used fuel at end of life;
- next most densely populated;
- approximately 30 mile east of Pickering.

Kincardine

Looking at the size and the volumes of the various substances at the Bruce site it does not take long to figure out why we insisted that Ontario Power Generation enter into a memorandum of understanding to decide the future directions of the waste operations and how decommissioning wastes will be fit into that agreement.

- Bruce Nuclear Generating Station;
- 9 reactors (4 x 750 mw, 4 x 850 mw, 1 x 200 mw in safe storage);
- 9 calandria + LLW and ILW from decommissioning;
- all Ontario's LLW and ILW from operations in interim storage;
- approximately 2 000 cylinders of used fuel at end of life;
- large site approximately 2 400 acres;
- lowest population density of major Canadian generating sites.

Deep River

Majority of population employed in Nuclear Industry very knowledgeable of issues as it stands today. Have shown willingness to look at local solutions to waste and decommissioning issues in the past this trend will probably continue.

- Chalk River Laboratories;
- several research reactors;
- hot cells;
- Maple 1 and Maple 2 reactors for medical isotopes;
- site well removed from major urban centres.

Becancour

Gentilly 2 is Quebec's only Nuclear Generating Station therefore unless Quebec enters into an agreement with some other facility it does not at present look probable for disposal of decommissioning wastes offsite.

- Gentilly 2 Nuclear Generating Station;
- 1 625 mw reactor;
- all wastes ever generated remain on site;
- 150-200 used fuel cylinders at end of life;
- 1 hour from Montreal lightly populated agricultural area.

Pinawa, Manitoba case study

Our association has a diverse geographic base with many unique nuclear experiences. One of these experiences that I would like to share with you is the Pinawa, Manitoba case study.

In 1995 a decision was made to close the more modern facilities in Pinawa and upgrade those in Chalk River as a cost cutting measure. Atomic Energy of Canada has recently received approval to proceed with Phase 1 of their plan for decommissioning of the Pinawa facilities. These include several contaminated buildings, hot cells, an experimental reactor in a safe shutdown state and waste management. Real decommissioning, that is the demolition of buildings and the placement of all waste in permanent disposal facilities, is to be deferred indefinitely because of the lack of disposal facilities in Canada.

It is the will of Pinawa and its surrounding community that decommissioning proceed in a continuous manner until the site can be delicensed, with a permanent decommissioning staff in place until the job is complete. This would prevent severe economic disruption to the communities from the loss of 150 – 200 jobs associated with decommissioning at the completion of Phase 1. This would also ensure that Phase 2 and 3 would be carried out by staff knowledgeable of the site and its hazards. It is the fear of the communities that once the nuclear expertise has been removed 1 500 km away, that the completion of decommissioning will be continuously deferred for centuries.

Long-term management of nuclear fuel waste (Bill C-27)

Concurrent with the formation of the CANHC, the Federal Government of Canada introduced Bill C-27, an Act respecting the long-term management of nuclear fuel waste. Bill C-27 was tasked with the formidable job of creating recommendations for the long-term management of spent nuclear fuel in Canada. The relevant context of this process, was that it was the first time that Canadian Mayors of Nuclear Host Communities have taken collective action in order to further the responsible discussions surrounding nuclear waste management. Also relevant to today's discussion is that this bill did not address the management of LLW of ILW either from operations or decommissioning or dismantling of existing Nuclear Stations or Research Facilities. Serious dismantling efforts in Canada are unlikely to begin until a site has been identified for used fuel wastes. Some of you may be surprised at the expected volumes of HLW by end of life for Canadian plants however our canister size roughly half that of the European canister. And because the Candu system uses natural uranium, fuel life is shorter resulting in a larger volume of a much safer waste. However in much of the publics mind it is still nuclear waste.

Kincardine/OPG Memorandum of Understanding Work Plan (15 April 2002)

At this point I wish to remove myself from the CANHC Chairperson's role and put on my hat as the Mayor of the Municipality of Kincardine.

In early 2002, the Municipality of Kincardine entered into a "Memorandum of Understanding" with Ontario Power Generation to formalize the long-term management of low and intermediate level nuclear waste generated in the Province of Ontario, Canada. The Work Plan included the following tasks:

- initiate independent assessment study;
- conduct geotechnical feasibility study;
- conduct preliminary safety assessment;
- conduct social assessment;

- conduct economic analysis;
- conduct environmental protection feasibility;
- carry out consultation in communities;
- review European and American model for long term management of LLW and ILW.

Project visits goals

- To review best practices in low and intermediate waste management practices;
- to discuss governmental approval processes and talk with local officials;
- to ascertain public consultation methodologies.

LLW facilities visited by Kincardine delegation

- Zwilag, Switzerland;
- NAGRA Project, Wellenberg;
- Centre de l'Aube, France;
- SKB Facility, Sweden;
- Barnwell, South Carolina, USA;
- Carlsbad, New Mexico, USA.

General trends discovered

- Siting some with referendum some not;
- technology generally includes incineration, compaction, concrete liners & water collection systems;
- some facilities built to accept decommissioning wastes some not;
- LLW and ILW can be contained in the same facility;
- in all areas safety was paramount resulting in excellent safety records in all facilities;
- all facilities are good examples for their respective circumstances, however the proposed Bruce facility may have different combinations of all sites visited;
- in general the European facilities are preferred over American facilities;
- sites generate enhanced taxation, real property taxes and business license taxes,

- overall the economic and social well being of the host municipalities is supported by the presence of the LLW waste management facilities;
- increase in visitor traffic (Surprise);
- once sited, community support was evident everywhere;
- farther away you go, more opposition you will experience.

Feasible options identified

1) Deep geological;
2) above ground concrete vault;
3) enhanced processing.

Communities path forward (LLW discussions)

The following is the Communities path forward:

- begin fall 2003 if results of studies positive;
- develop community offsets and benefits plan;
- community discussions and decision;
- must benefit municipality and region;
- must benefit nuclear industry.

Ivey Business School

Independent study for the Municipality of Kincardine.

In order to show the public that the Municipality of Kincardine took an independent view of the MOU process, the municipality has undertaken a partnership with the Ivey School of Business. This evaluation is structured to utilize the experience of Ivey field project (under the guidance of the programs professors) to analyze the long term financial impact of the proposed LLW facility in Kincardine, with respect to both the community & industry.

The results of this study will enable the municipality to enter discussions with financial information and knowledge equivalent to that of industries.

Kincardine's community vision

Our process has yielded a large amount of information. However one of the challenges we face as a council in bringing this to a successful conclusion is negotiating a deal. And to that end much to our councils credit we have realized that greater time and expertise was needed to identify, One, what is the value of what we were offering to our society both in regard to operational and decommissioning responsibilities? Secondly what it was that would benefit our community over the long haul and ensure that our residents needs and concerns were addressed in that time frame? To that end Council has teamed up with Ivy Business School one of the worlds top 20 Business schools to study these issues in depth and help us design a deal that will fulfill the parameters we have set for success:

- economic diversity;
- secure advanced Healthcare;
- direct financial advantage for community and region;
- support for the nuclear industry centre for energy excellence;
- post-secondary education opportunities for our youth.

Upcoming issues

Even though we are spending the pre-requisite time talking with industry and the public, I feel that we are at a stage where we have defined some of the questions; however, I feel that both time and future issues will lead us to the proper solutions for nuclear waste management. Please note that I wish to leave you with some of the upcoming issues that will define the Canadian nuclear waste and decommissioning issues in the future:

- referendum.
- Canada's nuclear fleet will be reaching its life cycle and serious thought must be given to either refurbishment or long-term decommissioning of the facilities.
- these pending waste volumes be dealt with by long-term waste management facilities.
- ongoing education of the public with respect to our responsibilities in nuclear waste management and the education of industry with respect to the public's views of industry at the local community level must continue.

Decommissioning and dismantling

In a general sense the community is becoming aware of the requirement to deal with the large volumes of LLW that will be generated upon the final decommissioning/dismantling of the generation plants. It is estimated that the existing Ontario Nuclear facilities will contribute 100 000 m^3 of LLW material to an unknown waste repository. These specific facts lead credence to the views of my municipal colleagues, that we must now seriously work with industry to strike firm plans to accommodate these significant environmental responsibilities. We feel strongly that our M.O.U. with Ontario Power Generation is a step in the right direction and that when time does pass and we do indeed reach full term on our facilities life span, that the long term management facilities are in place and ready to accommodate the LLW material. The nuclear generation sites in Canada have different social & geographic realities, some being in the centre of large economic hubs, while others being situated in more rural settings. These differences will play a role in both the Canadian determination of the final facilities that will manage both the LLW, ILW and HLW.

Expectations

- We expect that decommissioning and dismantling can not take place in Canada until facilities are in place to accept the wastes.
- Nuclear Host Communities away from the urban boundary seem to be seen as the best hope for sitting such a facility.
- Present policies have the funds for decommissioning and dismantling invested elsewhere we expect to see some significant amount of these invested where the waste a located.
- Prompt or continuous decommissioning starting with the easiest system first and moving to the more difficult is much preferable to continuously delayed decommissioning.
- Legacy management is very necessary meaning, the lowest negative impact possible on future generations should be sought in making decommissioning decisions.
- We expect that nuclear decommissioning and dismantling expertise will continue to be invested in, so that the completion of decommissioning will not be continuously deferred for centuries.

Relevant parts from:

"International Seminar on Strategy Selection for the Decommissioning of Nuclear Facilities Summary and overview of lessons learnt", Tarragona, Spain, 2 - 4, September 2003,

NEA/RWM/WPDD(2003)6, Available at the NEA website:
http://www.nea.fr/html/rwm/docs/2003/rwm-wpdd2003-6.pdf

Overview OF LESSONS LEARNT

A. Duncan, Rapporteur
C. Pescatore, NEA Secretariat

OECD/NEA Member countries include those involved in the earliest developments of nuclear technology in the 1940s and 1950s. These countries have a wide range of plant and equipment that has now served its purpose and needs to be decommissioned and dismantled. A new range of challenges opens up as the more modern nuclear power programmes mature and large commercial nuclear power plants approach the end of their useful life by reason of age, economics or change of policy on the use of nuclear power. The current situation is that much has already been done to deal with the decommissioning and dismantling (D&D) but much remains to be done. The work on earlier facilities has provided a substantial body of knowledge and experience over a wide range of complex technical issues but the requirement now is to apply the available techniques to D&D of the larger commercial facilities. In addition to technical issues, plans and procedures will need to address other major issues associated with impacts on society and the environment, regulatory arrangements and with long-term funding.

This international seminar was held in connection with the entering of the Vandellòs-I nuclear power plant into the safestore period. The seminar focused on strategy selection for the decommissioning of nuclear facilities. All the major types of facilities encountered in the nuclear fuel cycle were represented. Over 100 high-level specialists from all over the world attended, including representatives of the Regulatory Commission of Spain and decommissioning projects managers from Spain, UK, USA, Japan, Italy, Slovak Republic, France, etc. Several mayors from both Europe and North America also attended. The seminar encouraged open discussions to share lessons learnt and identify possible solutions.

The following points provide an insight into these discussions.

Although there appears to be a trend towards early dismantling, there seemed to be general agreement that technical solutions support a wide variety of safe decommissioning approaches. Thus, in terms of decommissioning strategy, it appears that no one size fits all.

A flexible regulatory approach is needed in order to recognize the changing operational risks and physical conditions of facilities with time, and to optimise their dismantling.

The NEA has been released a comprehensive study on decommissioning strategies and costs that indicates worldwide progress[1]. According to this report, over 50% of countries with nuclear facilities have a framework of decommissioning requirements and 60% have defined radioactive waste

1 . See: Decommissioning Nuclear Power Plants - Policies, Startegies, and Costs, OECD\NEA, Paris (2003).

clearance levels. Up to about 70% of the costs of D&D are attributable to dismantling and waste management.

The provisions for safety of the D&D process are closely linked to the availability of the necessary funds as and when required.

A number of common factors were defined for successful implementation of decommissioning strategies: i.e. safety, technical feasibility of decommissioning options, risk-informed progression of D&D activities as project proceeds, maintenance of competency and corporate memory throughout project, waste management and disposal capability, financing that suits the scope of the project, a well-defined risk-informed and performance-based regulatory process, and establishment of effective communication with local and regional governments and key stakeholders, particularly personnel, at the earliest opportunity before decommissioning.

LWRs are relatively easier to dismantle than GCRs, because of the large amounts of contaminated materials, such as graphite, associated with the latter.

The techniques for dismantling fuel cycle facilities are essentially similar to those for dismantling nuclear power plants except that a safestore period would not be helpful in reducing the radioactivity of those facilities contaminated with long-lived radionuclides.

It is important that stakeholders feel that their considerations and concerns are addressed throughout the project.

Several programmatic and policy issues were raised including:

- Should the costs/ benefits of adopting internationally consistent radioactive waste clearance levels, for use in decommissioning projects, be more heavily emphasized in the context of international business and competition?
- To what degree should institutional controls be relied on in safety cases for decommissioning options involving an element of long-term stewardship?
- Does the international trend toward independent national organizations having responsibility for waste management and disposal set a useful precedent?
- Is early dismantling and successful demonstration of technology a significant factor in establishing public confidence for building new plants? (This is key in the French and Japanese strategy.)

Regarding views on where bilateral and multilateral cooperation might enhance progress in defining and implementing decommissioning strategies, the following points were agreed.

- On the issue of radioactive waste clearance, an adequate scientific basis is available for defining clearance levels, but a high level discussion of is needed to look for solutions that can satisfy both international and national interests.
- There was general agreement, supported by the regulators present, that a simpler decommissioning regulatory framework would be beneficial.
- Although it was agreed that exchange of information on funding requirements and systems might be useful, differences in decommissioning work breakdown structures make it difficult to get good cost data.

- An international database on decommissioning experience would be useful. Several databases now exist and it may be useful to look at combining them.
- Societal factors are keys to successful decommissioning projects and establishing pillars of trust is important at the earliest opportunity before decommissioning.

In addition to the above points, the seminar attendees were asked to identify the issues that were of significance to them and where they believed advice and further work by the international community might enable progress. They identified the issues of:

Stakeholder involvement

Early discussion of plans with stakeholders.

Continued dialogue with local communities.

Strategy selection

Waste management provisions.

Costs and funding arrangements.

Waste Management and clearance

Availability of waste disposal routes.

Standards of clearance and effects of differences on decommissioning costs and international business.

Funding and costs

Relationship between funding and safety.

Hazards to the long-term security of funds.

Social demands

Implementing 'Pillars of Trust'. (Safety, participation and economic development.)

Concluding remarks

There may be an expectation amongst politicians and the public that there is a "right answer" to the choice of strategy selection for a particular type of facility, or even all facilities. This seminar and, indeed, wider experience shows that this is not the case.

- Local factors and national political positions have a significant input and often result in widely differing strategy approaches to broadly similar decommissioning projects. All facility owners represented could demonstrate a rational process for strategy selection and compelling arguments for the choices made.

The NEA, and in particular its Working Party on Decommissioning and Dismantling, which was one of the joint organisers of this event, will use these outcomes to inform its future work programme.

SUMMARY OF INDIVIDUAL SESSIONS

SESSION V: SOCIAL ASPECTS

Moderator: **Mariano Vila d'Abadal**,
AMAC, Spain.

Paul Woollam outlined the Town and Country Planning Act of 1990, which addresses land use planning in the UK and provides for involvement of the public. He described experience of its application by way of a Public Inquiry into the BNFL Magnox Electric proposal for decommissioning of its Trawsfynydd nuclear power plant. He stressed, particularly, that documentary evidence for such an Inquiry needs to be written in a way that the public can understand, whilst not compromising commercial or security aspects or containing material that could be misleading if taken out of context. He also noted the legal requirement to assess alternative options but observed that, without a waste disposal route, the options for dismantling a nuclear power station and dealing with the waste are limited.

Lessons were learnt during the Trawsfynydd Public Inquiry about relationships with stakeholders, including members of the local community, NGOs and the media. One significant factor was the location of the nuclear facility in a National Park, and another was the concern of some groups that the Company had not made available all of its extensive decision-making documentation, which was because of the prospect of commercial exploitation of the decision-making methodology. The main conclusion, however, was that D&D proposals were not opposed by the regulatory bodies or the elected representatives of the local communities, including the local Planning Authority, in spite of the sensitive location of the plant. The basic concerns came from national anti-nuclear groups and focussed on matters outside the remit of land use planning law.

Mayor Josep Castellnou gave a chronological review of the life of the Vandellós-I NPP, from plant construction to the transfer of ownership to ENRESA. He also described the duties and membership of the Commission of Municipal Monitoring, which was created to follow up and control the work done at the plant, and he explained how public relations arrangements were made to provide information to people, magazines, radio, TV, and to meetings with press.

The subsequent discussion addressed social and economic impacts in the local area, and focused on the social projects and activities that were carried out, including the construction of an industrial park to promote local economic development.

Kevin Hayes reviewed the history of the Westinghouse uranium processing plant at Hematite, Missouri, (described in Session IV), as an example of how to deal with the social impact of a plant whose operation had resulted in contamination of soil and groundwater. The main requirement as regards social aspects was to communicate proactively and work with the local community and regulators. For this purpose, a community relations plan was developed using guidance from the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and model documents provided by the Missouri Department of Natural Resources (DNR), with Community

interviews to ensure the plan recognised and addressed local concerns. Efforts to contain rumours involved building an effective mechanism for providing timely project updates to the community and being able to receive and understand community feedback

Key features of the resulting draft plan included nomination of a prime public contact, planned public meetings and community workshops, regular communication with local officials and regulatory agencies, and press releases about significant events. It also featured publication of fact sheets about matters of particular interest, periodic newsletters to the community, development of a mailing list shared with regulators, establishment of a local repository for providing access to official documents, and the opportunity for site tours. The lessons learnt from the experience at Hematite confirm the need for proactive planning, particularly the development of a community relations plan, and the ability to take prompt actions and meet commitments in order to overcome public suspicion. They also confirm the need for awareness that direct financial cost is not the only cost when determining a course of action in this type of situation. The overall conclusion was that safety, environmental impact, and social responsibility must all be considered in order to make appropriate decisions.

Philip Moding emphasised that the affected local municipality and stakeholders have a major interest in participating in the decisions to shut down a nuclear installation, and in the social consequences of any large-scale investment. He said that too many decisions about large-scale investments in the nuclear sector have been taken from the top down, on the basis of "father knows best" or the DAD (decide, announce, defend) principle. Any decision concerning the expansion or phasing out of energy production has real, significant social effects and must be explained to the affected local communities. In regard to decommissioning, the implications need to be clearly understood before it takes place, and the process of dialogue must start early enough to give the local community a fair opportunity to influence decisions that affect them.

He also reviewed some recent EU initiatives and Directives designed to develop the dialogue between national government and local municipalities, and analysed the difficulties that still remain with these. He concluded with advice on the need to listen to all stakeholders in the affected areas, to develop early dialogue with the affected communities, and to try and understand local inhabitants who demand intelligibility.

Mayor Larry Kraemer described the role the Canadian Association of Nuclear Host Communities, (CANHC), of which he is Chairperson. He explained its mandate and goals and outlined the political background associated with each of its 6 host community members, together with the features of the nuclear facilities that they host. In the context of new Canadian Federal Government legislation on long-term Management of Nuclear Fuel Waste, he noted that it is impossible to discuss D&D of nuclear facilities without also discussing the options for nuclear waste disposal. This is because at least one of the options has major implications for the timing of D&D and, therefore, for the affected host communities.

He also described the experience of his own rural host community in dealing with the implications of hosting a permanent fuel waste repository as well as those of accepting operational and decommissioning wastes. Visits by community representatives to Europe and the US provided a valuable perspective that has contributed to the view that deep geological disposal appears to display the safety characteristics necessary to gain the support of the local community. In addition, the community has commissioned a study from a Business School in order to develop an effective plan that will address the long-term aspirations of the community as well as being acceptable to the nuclear site operator.

In conclusion, this session served to emphasise once more the importance of early involvement of stakeholders, and the local community in particular, in decommissioning plans and activities that are likely to affect them. The important role of local politicians and community leaders was identified, together with the need to co-operate with any local committees and support them with information in various forms that are readily understood by the public. It also brought attention to the importance of recognising and reconciling the long-term aspirations of the affected community with the operator's plans for the future of the site.

Rome Workshop on: "Safe, Efficient, and Cost Effective Decommissioning", September 2004

Speeches:

Session 2: Italian Decommissioning Scene

- S. Frullani, A. Rogani and E. Tabet, Istituto Superiore di Sanità, Department of Technologies and Health, Rome, Italy

Session 5: Management of Transition and Change throughout Decommissioning

- Pilar Almeida (Jose Cabrera NPP), Benito Gil (CSN) Spain; Anna Lekberg (SKI), Bertil Hansson (BKAB) Sweden; Albert Frischknecht (HSK) (SEGHOF Chairman) Switzerland; Pekka Pyy (NEA Secretariat) France
- Alejandro Rodríguez, Project Manger Vandellos 1 NPP Decommissioning, ENRESA, Spain
- Dale Keyes, U.S. Institute for Environmental Conflict Resolution
- M Laraia, IAEA, Austria, S Gordelier and A Neal, UKAEA, United Kingdom

HEALTH PROTECTION IN THE DECOMMISSIONING PHASE IN ITALY AND ITS ACCEPTABILITY TO THE PUBLIC

S. Frullani, A. Rogani and E. Tabet
Instituto Superiore di Sanità, Department of Technologies and Health, Rome, Italy

1. Introduction: setting the problems

From previous talks [1] you have heard that all the nuclear plants in Italy have ended their commercial activity more than 15 years (Garigliano since 1978) and practically since than, together with other facilities of the nuclear fuel cycle, are in the decommissioning phase. From the radioprotection point of view, the decommissioning phase has a minor impact than the production phase. For the aspects regarding the general public, liquid discharges and gaseous effluents are at lower levels and accident analyses foresee events at lower scale; for what regards workers, operations with high level-wastes are not more demanding in term of radiation doses than several inspection or replacement operations needed in maintenance periods during the commercial life of the nuclear plant. Then, as such, the decommissioning phase does not raise particular radioprotection problems and certainly it is of less radiological risk than the previous phase. There are however other considerations that make this phase of relevant potential risk if actions are not coordinate in a global scheme aiming to solve all the problems that this phase sets.

It has been shown the situation in Italy of temporary depositories of radioactive wastes. On the contrary than in almost all European countries Italy has not a licensed centralized depository for low-medium activity wastes, not to speak of HLW. The localisation on more than 25 places scattered all over the territory of wastes from medical activity and previous nuclear power activity as well as of spent fuel elements is from the radiological protection point of view far from being an optimised solution. Solidified high activity wastes in glass matrix, resulting from the Italian spent fuel elements reprocessed by BNFL that should be returned to our country, make the problem certainly worst.

The necessity of the establishment of a national depository for nuclear wastes, raised by technical-scientific institutions long time ago, has become in Italy a shared objective among all institutional bodies in 1997 when the ENEL (at that time the owner of the four Italian commercial nuclear plants) application for decommissioning license of its plants with a SAFSTOR approach, deferring the dismantle within 50 years, was rejected by the Ministry of Industry, responsible of the authorization procedure, accordingly similar comments and opinions expressed, in the foreseen licensing procedure [2], by Ministry of Health (prepared by its technical body ISS), APAT (at that time ANPA) and other administrations.

Ministry of Industry published at the end of 1999 a document addressing “Strategic Directions for the management of the outcome of the nuclear commercial phase”. Three general objectives with relative time lines were defined. The first two regarded the conditioning of all radioactive wastes present in the national territory and the siting, construction and commissioning of the national depository. These objectives should be reached within 10 years. The third objective concerns the unrestricted release of

the sites where the four nuclear power plants are localized. This last objective should be pursued through an accelerated dismantling (DECON) strategy within 20 years.

In the framework of the agreement Stato-Regioni concerning the definition of some initiatives to promote the safe management of radioactive wastes and to select a site for the national depository, an Expert Group composed by 7 members, designed by the Ministries of Industry, Environment and Health as well as by Piedmont, Venetia, Emily-Romagna and Tuscany Regions, prepared a document on "Conditions for a safe management of radioactive wastes".

In August 2000 the Ministry of Industry issued a decree binding Sogin (who in meantime had replaced ENEL-Nucleare as operator of the four nuclear plants) to present a new application for the decommissioning of the four old electro-nuclear stations adopting the strategy addressed in its "Strategic Directions" document.

9/11 event has brought, among other effects, to the attention of political authorities as well of general public besides the radioprotection problems also the security issues connected with the management of nuclear wastes. This new aspect requires with even more urgency to look for a solution in which all the wastes are collected in a single site.

As result of the gained awareness of the security problems, a Prime Minister Decree has declared, in February 2003, an emergency status for the activities connected with nuclear waste management and in March 2003 a Commissary Responsible for putting in security state all nuclear materials (Commissary in the following) has been nominated, in this respect he has a Regulatory status with intervention power specific to the emergency situation. The emergency status proclaimed in February 2003, bound at beginning to last up to the end of the same year, has been extended till the end of 2004.

From the radioprotection point of view two main points are important to allow the foreseen plans of decommissioning and waste management be effective: the availability of clearance levels that define the unrestricted release of materials from a plant in decommissioning phase (in future also the levels of contamination for restricted and unrestricted release of the site will be needed to be defined) and the availability of a national depository with the required technical and social acceptability characteristics.

2. Clearance levels

Italian legislation does not yet establish in a general way the clearance levels for unrestricted release of material from a nuclear plant (electro- or fuel cycle) but requires that specific prescriptions are set in the authorization of the licence to perform decommissioning activities [3]. The levels however must satisfy the "Below Radiological Concern" criterion [4] in accordance with the basic rules set also by IAEA [5] and U.E. [6] Basic Safety Standard (BSS) for respectively their exemption and clearance levels. These basic rules establish conditions for individual and collective doses, both of which must be met:

- the effective dose expected to be incurred by any member of the public due to the (*exempted*) practice or source is of the order of 10 □Sv or less in a year;
- either the collective effective dose committed by one year of performance of the practice is no more than about 1 man·Sv or an assessment for the optimisation of protection shows that the exemption (*of the unrestricted release at the chosen levels*) is the optimum option.

To have an effective unrestricted release, i.e. the reuse of the material released must not be subject to any radiation protection requirement, the Italian law [7] requires moreover that both two thresholds are not overcome:

- mass activity concentration for each radionuclide < 1 Bq/g;
- activity for each radionuclide as set either from Directive 84/467/Euratom or 96/29/Euratom, whichever the smaller.

In 2003, a Decree of the Commissary has established that the clearance levels set for the Caorso Electro-Nuclear Station were adopted for all nuclear installations.

For Italy, E.U. technical documents, even if not prescriptive as Directive, are an evident reference. Recommendations, established by the EURATOM art. 31 Expert Group, have been published for clearance levels regarding metals, building rubble and other generic materials from the dismantling of nuclear installations [8,9,10].

In table 1 the clearance levels, adopted for the Caorso Plant and extended to all other nuclear installations, for both concentration and surface contamination are shown for metallic and concrete-like material as well as for only concentration for the general clearance levels. In the table the recommended values (direct reuse) by the EURATOM Expert Group are also shown in parenthesis.

In the presentation and in the final version of the paper for the published Proceedings, other tables will be added comparing present Italian clearance levels with the ones adopted by other European countries in their regulations or legislation.

Table 1. **Clearance levels adopted in Italy (Caorso technical prescriptions-June 2000) and (in parenthesis) E.U. recommended levels by EURATOM art. 31 Expert Group.**

Radio nuclide	Metal Material Mass specific Bq/g		Surface specific Bq/cm^2		Building Reuse Mass specific Bq/g		Surface specific Bq/cm^2		Other Mass specific Bq/g	
H-3	1	(1000)	10000	(10000)	1	(100)	10000	(10000)	0.1	(100)
C-14	1	(100)	1000	(1000)	1	(10)	1000	(1000)	0.1	(10)
Mn-54	1	(1)	10	(10)	0.1	(0.1)	1	(1)	0.1	(0.1)
Fe-55	1	(10000)	1000	(1000)	1	(1000)	10000	(10000)	0.1	(100)
Co-60	1	(1)	1	(1)	0.1	(0.1)	1	(1)	0.1	(0.1)
Ni-59	1	(10000)	1000	(10000)	1	(1000)	10000	(100000)	0.1	(100)
Ni-63	1	(10000)	1000	(1000)	1	(1000)	10000	(10000)	0.1	(100)
Sr-90	1	(10)	1	(10)	1	(1)	100	(100)	0.1	(1)
Sb-125	1	(10)	10	(10)	1	(1)	1	(1)	0.1	(1)
Cs-134	0.1	(1)	1	(1)	0.1	(0.1)	1	(1)	0.1	(0.1)
Cs-137	1	(1)	10	(10)	1	(1)	1	(1)	0.1	(1)
Eu-152	1	(1)	1	(1)	0.1	(0.1)	1	(1)	0.1	(0.1)
Eu-154	1	(1)	1	(1)	0.1	(0.1)	1	(1)	0.1	(0.1)
□-emitters	0.1	(1)	0.1	(0.1)	0.1	(0.1)	0.1	(1)	0.01	(0.1)
Pu-241	1	(10)	1	(10)	1	(1)	10	(10)	0.1	(1)

The comparison between Italian and European clearance levels shows that in the majority of the cases the European levels are higher. The information that must be supplied with this table is the set of

radionuclides that drives the contamination in the specific wastes. For instance, if the driving radionuclide is Co-60, as it seems to be the case, the differences in the table are of relative importance. Certainly technical bodies must be ready to reconsider the problem if a substantial gain in the management of wastes is reached raising some levels without affecting the practical level of radioprotection [11].

3. A national depository for radioactive wastes.

A pivotal point in the "Strategic Directions" document of the Ministry of Industry (now Ministry of Productive Activities) is the availability, by the end of this decade, of a commissioned national depository for all nuclear wastes. The depository should be at the same time an ultimate depository for wastes of categories I and II and a temporary depository for spent fuel elements and wastes of category III [12,13].

In December 2003, a decree has been issued [14] regarding urgent disposition on collecting, clearing and storing radioactive wastes with modalities that ensure safety and security. According to this law, the Commissary must select, within one year, the site for the national depository reserved to spent fuel elements and wastes of III category, having heard a technical-scientific Commission specifically established. The site validation should be carried out within one year from the date of the selection and the commissioning of the depository should be completed within the end of 2008. The same decree foresees an other legislative act for the treatment and storing wastes of I and II categories. Then, it seems now that the strategy is changed and could be that radioactive wastes will be stored in more than one single site. If true, this choice should be demonstrated to be the optimised solution because is certainly not evident.

The decree foresees also a compensation for cities and provinces where nuclear plants are localized, till the commissioning of the national depository. While this is a comprehensible choice to reduce the pressure of local communities to send away nuclear wastes from their territories, it will be a wicked choice if the process of finding a correct solution for the waste problem would be slackened.

4. What Radioprotection experts have learnt

Primary aim of radioprotection is to provide an appropriate standard of protection for man and environment without unduly limiting the beneficial practices giving rise to radiation exposure. One of the main rules followed in radioprotection is that any exposure should be optimised, said often as ALARA principle. Any exposure should be As Low As Reasonably Achievable, economic and social factors being taken into account. This principle was fixed as such in the ICRP Recommendations of 1977 [15], about 30 years ago, and iterated in the present (1990) [16] version that is the base of practically all national legislations in radioprotection. The implementation of the principle was thought to be possible through a semi-quantitative analysis minimizing the function "net benefit" in comparing different possible options [17,18]. The involvement of other parties was considered to be limited to some choice in numerical values of some parameter entering in the equation, giving some monetary value to such a simple question (!) as the cost of a man·sievert, i.e. the risk to have some health effects as a consequence of the exposition, and other parameters like that. This approach could be considered son of the "managerial" model [19] according which a government administrator or expert is entrusted to identify and pursue the common good, specially of people that derive more detriment from a practice. But this model has been challenged in all the world by increasing scepticism that managers could adequately identify a public interest in an ever-more-complicated administrative systems. The quantitative optimisation has never worked in complex situations as the siting of an hazardous plant, decisions on levels of releases or contamination levels for unrestricted release of a site where previously an hazardous plant was sited.

The bottom end of the evolution of the approach in the public participation in environmental and health related decision-making can be fully appreciated in the draft of the new ICRP Recommendations that are foreseen to be approved, after 5 years of debates – also this is a sign of times – in their final form during next year [20]. In the executive summary of the three paragraphs dedicated to the optimisation of protection one is devoted to the problem of participation of stakeholders.

"(S11) The involvement of *stakeholders,* a term which has been used by the Commission in *Publication 82 [21*] to mean those parties who have interests in and concern about a situation, is an important input to optimisation. While the extent of the stakeholder involvement will vary from one situation to another in the decision-making process, it is a proven means to achieve the incorporation of values into decisions, the improvement of the substantive quality of decisions, the resolution of conflicts among competing interests, the building of trust in institutions as well as the education and information the workers and the public. Furthermore, involving all parties affects by the decision reinforces the safety culture and introduces the necessary flexibility in the management of the radiological risk that is needed to achieve more effective and sustainable decisions."

It is a really change of paradigm, in Thomas Kuhn's meaning [22], in radioprotection as well, it is hoped, in the attitude of governmental bodies, regulators, operators, technical-scientific institutions. It is dictated by practical experience of about 30 years gained in finding solutions to many problems in many countries in radioprotection and non-radioprotection issues [23].

It is worthwhile to mention in this NEA Workshop the role played by NEA Committees CRPPH and RWM in the 10 years long-standing reflections on stakeholder participation finalised through the three Villigen Workshops [24] and the Forum in Stakeholder Confidence [25], respectively.

5. Building consensus in Italy for siting the national depository

The approach that replaced the "managerial" era was based on a pluralist model [26]. Public, having for several reasons lost the hope to find in technical institutions at the same time expertise and accountability, began to ask to government technical bodies to be arbiters among different possible interests, for instance operators and public or workers.

As a reflection of this attitude in '70 and '80 in many countries the structure of Nuclear Agencies was revisited with a clear separation of the agency having regulatory responsibilities with agencies aiming at the development of nuclear industry and nuclear applications. The separation of Regulator and Operator functions has been since that time a necessary element, even if not sufficient, to increase trust in institutions in the decision-making process.

The involvement of stakeholders in the decision-framing process can be seen as a tentative of institutions to overcome their role of arbiters, to stress the importance of the act of participation not only in influencing decisions but showing that interaction among often contrasting interests can lead to identify the common good and act on shared common goals [27]. The aim is to have mutually acceptable outcomes rather than unsatisfying compromises with "winners" and "losers" and long term stable decisions rather than short-term fixes.

In a country like Italy in which general legislation seeking public participation and access to government information and decision-making is lacking, an administrative way must be found to promote and institutionalise the participation of stakeholders. In other countries, many models have been used and tested with different success. In U.S.A., apart the public comments introduced with the Administrative Procedure Act (APA) in 1946 (!), they can be classified in: a) public meetings and

hearings; b) advisory committees not seeking consensus; c) advisory committees seeking consensus; d) negotiations and mediations [23].

In Italy a model has been proposed by the Expert Group mentioned in the introduction [28]. *In the presentation and in the final version of this paper for the publication in the printed Proceedings a brief summary of the methodology proposed by the Expert Group will be inserted.*

One argument often used against stakeholder involvement is the supposed time consuming of the procedure. Generally everybody agrees on a careful technical analysis in the process of acceptability of a site for a depository for nuclear waste. Experts agree in considering social acceptability as important and problematic, if not more, than technical aspects, but hardly social aspect was considered till recent years an issue to invest manpower and time. In Italy, while it is known the effort spent by many groups since ’70 in the technical characterization of the sites little it is known about the effort spent in analysing and approaching a solution for the social aspect of the problem.

The list of benefits gained from the involvement of stakeholders, derived from the work done inside CRPPH [29], can be used also in the case of the Italian nuclear waste depository:

- Responds to shifts in societal attitudes to science, industry and government.
- Offers possibility of resolving tensions between economic and social concerns.
- Helps to prevent disputes and conflicts where it is deployed ex-ante.
- Helps to resolve disputes and conflicts where it is deployed ex-post.
- Increase the substantive quality and sustainability of decisions.
- Builds trust in institutions.
- Educates and informs the public.

6. Conclusions

Technical problems connected with the setting of clearance levels for all radionuclides of interest must be solved through a specific legislative document taking into account the debate that is developing at European Community and other International institutions and regulatory bodies.

The major point to be solved for the decommissioning activities in which Italy is deeply committed is the siting of a national repository for radioactive wastes that should be at the same time an ultimate repository for wastes of categories I and II and a temporary repository for spent fuel elements and wastes of category III. Having solved this problem, the repository must be built and commissioned approximately by 2010, to maintain the objective sets in the “Strategic Directions” document of the Ministry of Productive Activities (formerly Ministry of Industry) to have the unrestricted release of the sites where the four Italian nuclear power plants are located approximately by 2020. Also in Italy one main issue in all these problems is how to build a public consensus. As it is now done in all countries with democratic representative systems, such decision processes cannot be done without an involvement of stakeholders, starting from local communities. There are not realistic and rational shortcuts to this procedure as already been seen in many countries and also in our own country. Italy has not yet a general legislation seeking stakeholders and more specifically public participation in the decision aiding process, then an administrative solution must be found. One possibility is to try to follow the recommendations of the Expert Group set up by the Conferenza Stato-Regioni [30]. Probably this means that the time scale foreseen in the Decree of last December is unrealistic but not any more time must be wasted. In the meantime all the activities concerning the treatment and conditioning of radioactive wastes and dry storage of spent fuel must be considered as primary activities and carried out in a time as short as possible.

It is a privilege and worthwhile here in Rome, at the end, to report the old logo of our Institute (Istituto Superiore di Sanità) that is also well adapted to the discussion: Rerum Cognoscere Causas. It derives from Publius Vergilius Maro [32]: Felix qui potuit rerum cognoscere causas. Wise is the man who understood the reasons why things (facts) happen.

References

[1] See Ivo Tripputi talk, these Proceedings.

[2] See Massimo Goti talk, these Proceedings.

[3] Legislative Decree no. 241 of 26th May 2000.

[4] Annex I of ref [3].

[5] International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources. (Schedule I). IAEA Safety Series no. 115. IAEA. Vienna 1996.

[6] Concil Directive 96/29/EURATOM of 13th May 1996. Title III and Annex I.

[7] Legislative Decree no. 230 of 17th March 1995 Annex I, par 1-5, and ref [3] art. 36.

[8] EUROPEAN COMMISSION (1998). Recommended radiological protection criteria for the recycling of metals from the dismantling of nuclear installations. Radiation Protection n.89.

[9] EUROPEAN COMMISSION (2000). Recommended radiological protection criteria for the clearance of buildings and building rubble from the dismantling of nuclear installations. Radiation Protection n.113.

[10] EUROPEAN COMMISSION (2000). Practical Use of the Concepts of Clearance and Exemption- Part 1. Guidance on General Clearance Levels for Practices. Radiation Protection n.122.

[11] Interesting talks on this subject are foreseen in Section 3 of this Workshop.

[12] For the classification of wastes used in Italy see ref [1] and ref [13].

[13] ANPA Technical Guide 26

[14] Legislative Decree no. 368 of 24th December 2003.

[15] International Commission on Radiological Protection. Recommendations of the International Commission on Radiological Protection, Publication. 26. Ann. ICRP 1 (3) (1977).

[16] International Commission on Radiological Protection. 1990 Recommendations of the International Commission on Radiological Protection, Publication. 60. Ann. ICRP 21 (1-3) (1991).

[17] International Commission on Radiological Protection. Cost-Benefit Analysis in the Optimization of the Radiation Protection. Publication. 37. Ann. ICRP 10 (2-3) (1983).

[18] International Commission on Radiological Protection. Optimization and Decision-Making in Radiological Protection. Publication. 55. Ann. ICRP 20 (1) (1989).

[19] S. Breyer. Breaking the Vicious Circle: Toward Effective Risk Regulation. Cambridge, MA. Harvard University Press (1995)

[20] International Commission on Radiological Protection. Draft for consultation of the 2005 Recommendations of the International Commission on Radiological Protection. http://icrp.org

[21] International Commission on Radiological Protection. Protection of the Public in Situations of Prolonged Radiation Exposure. Publication 82. Ann ICRP 29 (1-2) (1999)

[22] T. S. Kuhn. The Structure of Scientific Revolutions. The University of Chicago Press, Chicago. IL. (1962)

[23] T.C. Beierle and J. Cayford. Democracy in practice. Public Participation in Environmental Decisions. Resources for the Future, Washington, DC. (2002).

[24] References for Villigen Workshops

[25] References for FSC Workshops.

[26] R.B. Reich. Public Administration and Public Deliberation: an Interpretative Essay. Yale Law Journal 94 (7) 1617

[27] J.S. Dryzek. The Politics of the Earth: Environmental Discourses. Oxford University Press. Oxford. U.K. (1997)

[28] Conferenza Stato-Regioni. Rapporto del Gruppo di lavoro sulle condizioni per la gestione in sicurezza dei rifiuti radioattivi. 25 maggio 2001. www.minindustria.it/rifrad

[29] J. Lochard. The Stakeholder Involvement Process: Lessons Learned from CRPPH Activities. Talk presented at "The 2nd Asian Regional Conference on the Evolution of the System of Radiological Protection". Tokyo, 28-29 July, 2004.

EARLY PLANNING AND TRANSITION MANAGEMENT FROM OPERATION INTO DECOMMISSIONING-VISION OF FUTURE WORK IN THE AREA OF HUMAN AND ORGANISATIONAL FACTORS BASED ON EXPERIENCE

Pilar Almeida (Jose Cabrera NPP), **Benito Gil** (CSN); Spain
Anna Lekberg (SKI), **Bertil Hansson** (BKAB); Sweden
Albert Frischknecht (HSK) (SEGHOF Chairman); Switzerland
Pekka Pyy (NEA Secretariat)

Abstract

Decommissioning commercial nuclear power plants with their employees and stakeholders leads to a range of safety management, socio-technical and societal challenges. These aspects need to be taken into account in order to assure smooth end-of –operation and decommissioning. The focus of this paper is especially in the planning and transition period into decommissioning. The areas found as critical as a conclusion of the workshop organised by Committee on Safety of Nuclear Installations (CSNI) in 1999 are used as the starting point of the evaluation. The topic is discussed based on experiences from mainly two countries with different cultural and regulatory frameworks: Spain and Sweden. The discussion is completed by information about the accomplishments of Special Expert Group on Human and Organisational Factors (SEGHOF) in the area. The area of treating human and organisational factors in planning and transition is broken down into five sub-areas. Each topic ends up with a view of the situation and visions for future, of which the most important are elaborated more in the concluding remarks.

Introduction

The NEA Committee on the Safety of Nuclear Installations (CSNI) has long recognised the importance of Human and Organisational Factors in decommissioning of nuclear facilities. As a demonstration of that, the Extended Task Force (ETF) on Human Factors of CSNI Principal Working Group 1 (PWG1) held a workshop on *"Nuclear Power Plant Transition from Operation into Decommissioning: Human Factors and Organisation Considerations"* in 1999 in Rome. Professionals from regulatory agencies, utilities, and research organisations from 11 countries participated. The meeting was held in conjunction with the Joint NEA/IAEA/EU workshop on *"The Regulatory Aspects of Decommissioning"*.

The work of the ETF has been continued by SEGHOF – Special Expert Group on Human and Organisational Factors. The main missions of this expert group are to improve the current understanding, to advance the utilisation of methodologies for human and organisational factor assessment and to address emerging safety issues in order to maintain and improve the safety of nuclear installations in member countries. In order to advance these aims, the group: meets to exchange information and experience about safety relevant human and organisational issues; discusses in detail, compare and benchmark when appropriate programs in Member countries; indicates where further research is needed and collaborates with other groups. Decommissioning has been one of the

working areas of the group with other topics like simulator training, modifications, maintenance, analysis of operating events and safety management. The 1999 workshop in Rome gave rise to an activity and a separate workshop, which in turn led to a publication of a Technical Opinion Paper about Management of Change [1].

The hypothesis behind the ETF decommissioning workshop in Rome 1999 [2] was that organisational aspects are fundamental to any successful decommissioning process. The workshop identified eight key issues and their subtopics related to human and organisational factors that would contribute significantly to the success of the transition to decommissioning and, consequently, need careful attention in planning. This paper concentrates upon the following of them:

1) Capabilities and experiences on Human and Organisational Factors /MTO (generic issue)
2) Experience feedback system on organisational and human factors aspects of decommissioning.
3) Sustaining safety culture and morale during the transition from operation into decommissioning;
4) Identifying key organisational functions and management skills that are critical during the transition;
5) Sustaining organisational memory and obtaining and retaining staff competence during decommissioning;

In the following text, these five key areas are discussed in the light of experience from Sweden and Spain. Also SEGHOF activities are referred where applicable in order to come up with messages for future decommissioning projects. The paper ends up with concluding remarks with regard to the situation with inclusion of human and organisational factors into transition planning and avenues for future.

Decommissioning Scenes and General Aspects of related HOF activities in Sweden and in Spain

Barsebäck NPP, Sweden

In February 1997 the three political parties with a majority in the Swedish Parliament reached an agreement to close down Barsebäck 1 in July 1998 and Barsebäck 2 two years later. Both units are ABB type BWRs with external main circulation pumps. The Barsebäck site is located in the very south of Sweden on the west coast close to Copenhagen and Malmö.

There were some obstacles. The parties needed to pass a new law through the Parliament and the owner, Sydkraft, claimed that to close the plant down was against the basic Swedish laws, the European laws and also against human rights. A complicated legal process started and in parallel, Sydkraft and the government started negotiations s around an economical agreement for closing the Unit 1 plant. Both these processes continued until October 1999. Consequently, the time frame between the political agreement and the actual closing down of Unit 1 was 34 months.

After the closure of Barsebäck 1, the Swedish government has started an investigation on how to solve the future energy demands and included negotiations with the utilities that own nuclear power plants to find a solution on how to phase out the nuclear energy. These negotiations are ongoing and still no agreement has been reached. Several activities at the plant have been performed to prepare the closure of the second unit if such decision will come. However, the main focus for unit 2 is on continues operation and business as usual.

José Cabrera NPP, Spain

Jose Cabrera NPP is a one-loop PWR Westinghouse nuclear power plant in operation since 1968. In October 2002 the Government, following the CSN proposal, decided to renew the license of José

Cabrera NPP until April 2006, instead of giving six additional years (October 2008) according with the licensee application. In those dates there were considerable public concern, press coverage and some politic opposition to the renewal of the license. In order to oversee José Cabrera NPP safety along the period 2002-2006, the CSN issued, among others, two new license conditions. They required the implementation of a formal Safety Management System and a formal Safety Investments Decision Process at the plant.

For its part, the CSN developed a specific Action Plan with the aim of reviewing all licensee processes to reinforce those affected by challenges and also review the inspection and evaluation process of the very CSN to reinforce them mainly in human and organisational factors. Some points included in this Plan are: to reinforce the annual inspection plan; to give priority within CSN to José Cabrera issues; to improve the communication with the licensee, Parliament, media, etc. and to establish contact with other regulators for exchanging information.

The closure of this plant will be the first planned decommissioning of a nuclear power plant in Spain, which means that this is the first time Spanish nuclear industry has to face safety culture and organisational issues, waste management issues or technical issues related to this change. The complexity of decommissioning activities envisages that different human factor aspects have to be taken into account: change management, uncertainty effects on people, transference of knowledge, among others. To achieve a successful change, Jose Cabrera NPP has prepared some strategies: Professional Future Plan, Communications Plan, and the Organisational and Human Factors Program.

In the following sections, the five items mentioned in the introduction will be discussed from the point of view of Barsebäck, Jose Cabrera and SEGHOF activities.

1. Capabilities and experiences on Human and Organisational Factors /MTO

The importance of having a well defined Organisational and Human Factors Program as a part of safety management is nowadays well recognised in the nuclear industry. This is particularly important during the transition from normal operation into decommissioning, where human factors issues have been identified.

1.1 Barsebäck NPP, Sweden

In Barseback the human factor activities are addressed in the organisation during operation of the plant through the MTO program. During the transition period this program was adapted to the consistently changing environment that characterises this time period. Some examples of human related messages are shown here below.

Some key elements for the management of the transition period are:

- Communication/Information, even if you don't have any news
- Involvement of plant staff
- Sensitivity to rumours
- Observation of staff discussions and their behaviour
- Management fast reaction
- Support to managers, training, time for individual talks, mentorship etc
- Creating networks between managers-
- Openness and honest in discussions, information

These elements have to be imbedded and strengthening in managing the transition period, as it is a time of continues change. It makes it difficult for the managers and they have to communicate with

their staff and also be sensitive for rumours, concerns of staff and what is up on the agenda when the personnel has their discussions at the lunch or coffee break.

Human factors / MTO experts have been heavily involved in a supportive way. MTO experts were invited to give presentations and support in the evaluation of regular staff surveys that were done to measure the staffs satisfaction and feelings about the situation. To keep safety on the top, there is a need to inform staff on always be critical and apply a questioning attitude, the STARC-concept (stop-think-act-review-communicate) was strongly promoted as a way to do self-checking.

Another important activity was to strengthening the managers' possibilities and capabilities to observe their staff and to find out what concerns were coming up. More time was also devoted to discussions with the staff. A lot of management meetings were devoted to discuss the situation and to find out possible human factor related concerns and how to keep the motivation on top. SKI made regular inspections and asked for a monthly report were the plant analysed the situation, and monthly meetings were held to discuss the result of the analyses.

1.2 José Cabrera NPP, Spain

To consider, in an integrated manner, all the aspects related to organisational an human factors in the projects and activities of the Plant, Management decided to create an Organisational and Human Factors (HOF) Area, operative since 2000. One of the first activities of the Area was to issue a document, called "Organisational and Human Factors Programme", which main objective was to implement, systematic, procedural and integrally all the organisational and human factors engineering related aspects in the different activities and processes of the Plant.

Later on, the Program was adapted to incorporate new considerations related to transition period into decommissioning. These changes required deep involvement of HOF experts. Several processes like communications (internal and external), organisational assessments, staff participation, management supervision and coordination with the regulatory body were reinforced.

1.3 Summary and visions

One of the key points in the successful transition from operation into decommissioning, when such a process is anticipated by the organisation, is to take into account human and organisational considerations. The message is that there needs to be a programme including future plans, motivation, as well as effective and open communications, to avoid that people's attention focus on topics different from plant safety. Furthermore, the plant management have to realize that this is a time of continues change, which needs to be manage with flexibility and that it is not always so easy that you can follow a programme strictly. Then, managers' non-technical competences are specially relevant for this period.

2. Creating a system to share international experience about HOFs in decommissioning planning and transition

In 1999 Rome Workshop [2], it was seen important to establish improved methods for obtaining and sharing information and experience on a regular basis in order to identify organisational and human factors issues, good practices and lessons learned as regulators and utilities deal with decommissioning. CSNI SEGHOF is holding its meetings based on a flexible 6-9 month interval and decommissioning is one of those items and it has been discussed in three consecutive SEGHOF meetings. No concrete needs to create a system to share specific knowledge about HOF problems and solutions with regard to

transition into decommissioning have risen due to sparse knowledge. Consequently, SEGHOF follows-up the situation.

2.1 Barsebäck NPP, Sweden

At the time when the closure of Barseback NPP started to be on the agenda, there was no international organized exchange of experience about HOF in transition to decommissioning, but a lot of documents existed and meeting where held about the technical issues. Therefore, both the SKI and Barsebäck NPP have searched for international and also national experience. The regulator has organized studies of the decommissioning experience in USA and Europe. National experience from closure of industries has also been studied to see what experience could be relevant for inspections for the closure of nuclear power plants.

Personnel from Barsebäck NPP has visit plants in Germany, Italy , UK and US to study experience from decommissioning programs and has also participated in development of some IAEA guidance documents. During the last two years has a more formalised exchange of information and methods for decommissioning been established with the German utility E.ON.

Barseback has also participated in some well focused meetings on management and organisational issues, which has been very valuable and also opened up some new contacts in our network. WANO will arrange a workshop in Barseback in January 2005 on the subject: "What are today's best strategies and methods for waste management during decommissioning".

2.2 José Cabrera NPP, Spain

Jose Cabrera NPP Top Management has searched national and international experience visiting several plants in the same situation (Germany, UK), although there is not a formal system to share information. Also we have organised meetings with experts on decommissioning from USA. The CSN has been actively involved in international experts groups dealing with these issues (IAEA, NEA…) and has shared information with other regulatory bodies (NRC, SKI, …)

2.3 Summary and visions

Organized experience exchange in decommissioning is still comparatively sparse in HOF related issues. Whilst systems for experience feedback exist for power reactors, research reactors and fuel cycle facilities, this is not the case for decommissioning. Till now, it appears that the interest to develop improved means of sharing experience internationally has been low. There are potential benefits in a formal exchange but the objectives of such work would need to be defined well. Continuously used database type of a system may not be the right tool for this. Anyway, the message is that well focused workshops or *foras* should be organised between specialists in human and organisational factors, stakeholders and decommissioning executives in order to exchange good practices.

3. Maintaining adequate safety culture and morale during the transition

In 1999 WS, ideas were expressed about a need to study measures that have been used by plants to sustain safety culture to identify both effective and ineffective approaches. Other needs were expressed about to compare measures that plants use to sustain safety culture across transition periods during decommissioning and to identify periods of greater vulnerability to lowered safety culture and morale. SEGHOF is working in co-operation with the IAEA in the field of safety culture and is not directly carrying its own activities is the field in order to avoid duplication. Safety management,

human factor and organisational issues are covered in the IAEA Safety Reports series No. 31 "Managing the early Termination of Operation of Nuclear Power Plants" [3], No. 36: "Safety considerations in the Transition from Operation to Decommissioning of Nuclear Facilities" [4] and an IAEA draft document on Safety Culture in Maintenance.

3.1 Barsebäck NPP, Sweden

Important elements in the Barseback strategy to manage the early termination of operation were: well informed staff; continuous communication with staff; give the staff social security, involvement of staff in developing strategies as well as their new future and strong promotion of self checking

Several activities have been introduced at Barsebäck NPP to sustain motivation and trust in management. At an early stage a five years guaranteed employment was introduced to assure that all employees had time enough to plan and prepare for their future and to avoid that the staff was forced to search for new jobs unforeseen. During the period from the final decision to the actual closure the staff were involved in several activities to further strengthening the safety of the plant as for an example how to assure operators activities as a result several forms of shadow checking of work was introduced. Other examples are the involvement of the majority of the staff in projects like the "New Factory" with the aim to find ideas for new businesses and in those ways ideas for possible new employment.

One example of implemented activities after the "New Factory" is the development of operation and maintenance staff to be designers in the "Design Academy". About 10 staff members have passed the training and have now moved into new positions.

Before, during and after the transition period, management introduced extensive communication programmes, and as examples here strait forward oral information was given when ever the situation changed to all staff in the big conference room. Normally the president of the plant gave the information and at some occasions the president of the utility gave the information. The information was given in an open way and the staff raised several questions. Managers held frequently meetings with staff to discuss the actual situation and the workers had possibilities to discuss with colleagues their thoughts and get their opinion.

Barsebäck introduced an approach of monitoring the "feelings of workers" by managers in order to be aware of a possible impact on safety. All managers formed a network to observe staff when something happened and reported up to next level of management. Immediate reactions from upper management is important to nurture the confidence of the staff and the regulatory body in the manner which they handle the situation. In order to track any changes in safety culture and worker motivation at the decommissioning unit, Barsebäck are conducting climate surveys. The result from these measurements was compared with innovated companies and the results were in the same level as this category of companies. SKI reviews the monthly reports regarding these efforts and discusses the issues that have at monthly meetings as well as covering this area as part of its regular inspections.

Barseback has also improved their safety culture program, inspired by IAEA guidance, and formed cross functional groups for discussion on safety culture related issues. The result of these discussions has then been discuss and commented by management and then again discussed in existing organisational groups where also these group have reported back what activities they are implementing to improve the safety culture.

3.2 José Cabrera NPP, Spain

To maintain acceptable levels of safety performance and to avoid that day to day decommissioning activities lead to a lack or relaxation of these levels, Jose Cabrera NPP has developed a Safety Culture Program. The general principles of a safety conscious work environment, objective of Jose Cabrera NPP are the following: 1) The safe and reliable operation of the Plant has the overriding priority, over any other consideration; 2) Plant Top Management assumes the aforementioned commitment, and spreads this principle through the organisation, which adopts this as a safety goal common to all the individuals 3) All the persons that composes the Organisation acquire a questioning attitude, and are concerned about the achievement of their assigned tasks in a efficient manner, respectfully towards the environment 4) External and self-assessment as well as ongoing improvement are basic tools to accomplish these principles. Structured interviews are periodically developed, taking a cross representative sample of plant personnel. There is a set of questions, aimed to determine the status of the attributes, in a colour-coding basis. Depending on this status, enhancement actions are defined.

The main attributes to reinforce safety attitudes and behaviours are: there is visible leadership and commitment by the management of the Company to developing and maintaining safety culture; line management demonstrates an active and positive role when safety issues arise; there is commitment to the importance of a safety culture in business strategy and planning; there is a culture of support and concern about each other throughout the organisation; all employees demonstrate a commitment to safety; training and learning opportunities are provided that enhances the safety of Jose Cabrera NPP; there are clearly identified measurements and performance indicators with respect to the safety culture of the organisation; there is mutual trust and confidence between the management and the workforce; there is open communications between management and the workforce on issues that impact safety and doing work; management places safety of the facility and the employees over production; there is management concern and commitment towards all events or issues that might impact business activities.

Jose Cabrera NPP has developed an Internal Communications Plan, which main objective is to establish criteria and instructions to implement a method for internal communications, which consolidates the culture, arranges in an effective and open manner communications channels and structures the information precisely, generating confidence. There is a Communications Committee, chaired by Nuclear Generation Manager. All line managers have the responsibility to spread to the people depending on them key information, and to permit the adequate information flow, in a double way basis (up–down, as well as down-up). This Plan contemplates the information flow, as well as which information has to be communicated and the channels to do so: web page, Internal Bulletin, e-mails, press communicates, etc. There are also periodical meetings, where Top Management informs the entire workforce about relevant topics, such as evolution of Professional Career Plan, safety status, etc.

3.3 Summary and visions

To maintain adequate levels of safety performance, there needs to be a structured and well-defined safety culture and communication program. An open dialogue is very important during the transition period that also all employees go through in this continuously changing environment. Open communication is a key issue in the successful transition into decommissioning. The lack of open and sincere communications between Management and work force could lead to loose motivation and create uncertainties in people, who could put the attention in other aspects different than plant safety and safety culture attributes in general.

4. Organisational functions and management skills during transition from operations to decommissioning

SEGHOF has observed that it would be important to identify what organisational processes used at operating plants can transfer successfully to decommissioning plants and what processes do not transfer successfully or are not appropriate under decommissioning.

4.1 Barsebäck NPP, Sweden

Several of the processes used during decommissioning are based on processes used during operation. Safety requirement will be lower when all fuel has been transported away from the site. Safety requirement in the phase were buildings are demolished are focused more on containing radioactivity. During the decommissioning there is a need for have processes for work preparation, work permit, radiological permit, fire permit etc. Processes for periodical testing, ISI has to be adapted to the situation a less used. Processes for design modifications will rarely be used for new modifications, however you can see the use of a similar process to do the preparation of the work packages and there could also be a need for a modification to move some parts that there is still requirements on.

The transition from operation to decommissioning is a period during which very high demands are set on managers to fulfil several different roles in a continuously changing environment at the plant and at the same time handle his/her own future. The managers have to be good listeners, analysists, advisors and not afraid to make decisions. There is also a continuous need to be updated on the actual situation and communicate messages to upper management as well as to their staff.

Public information to neighbours and the community is one area that has to be continued to inform about what is going on at the plant when it is closed. It is important that the neighbours continue to have trust in the plant and how it is handle the new situation. Furthermore, it is important to keep the plant and surrounding areas in so good condition so that the visitors and neighbours see the plant as robust and not a scrap yard.

4.2 José Cabrera NPP, Spain

Jose Cabrera NPP has developed an Integrated Safety Management System (ISMS), in which HOF are specially taken into account, which is being helpful for managers to accomplish their organisational functions in this transition period. It has three main objectives: 1) to maintain and improve safety performance, having always in mind the overriding priority of the plant: its safe and reliable operation, 2) To foster and support a strong safety culture, through the reinforcement of strong safety attitudes and behaviours in individuals and working groups and 3) to provide a means to prioritise globally corrective and enhancement actions, as well as to define a set of safety indicators. The Safety Management System for Jose Cabrera NPP has been developed taking into account all the procedures and programmes of the plant and developing others new, considering the state-of the art in these topics. To complete it, several meetings to collect all the personnel thoughts and suggestions have been held.

The main parts of the ISMS are: 1) Safety Policies, issued in a unique document, in which safety fundamentals, Mission, Vision and Values are listed, as well as the main safety features to establish and maintain a safety conscious work environment; 2) Open and Effective Communications, internal and external, as described in “Jose Cabrera NPP Communications Plan” 3) Professional Future Career Plan for all staff and 4) The Organisational and Human Factors Program, to ensure that all the human and organisational aspects are considered in all the activities and processes of the facility.

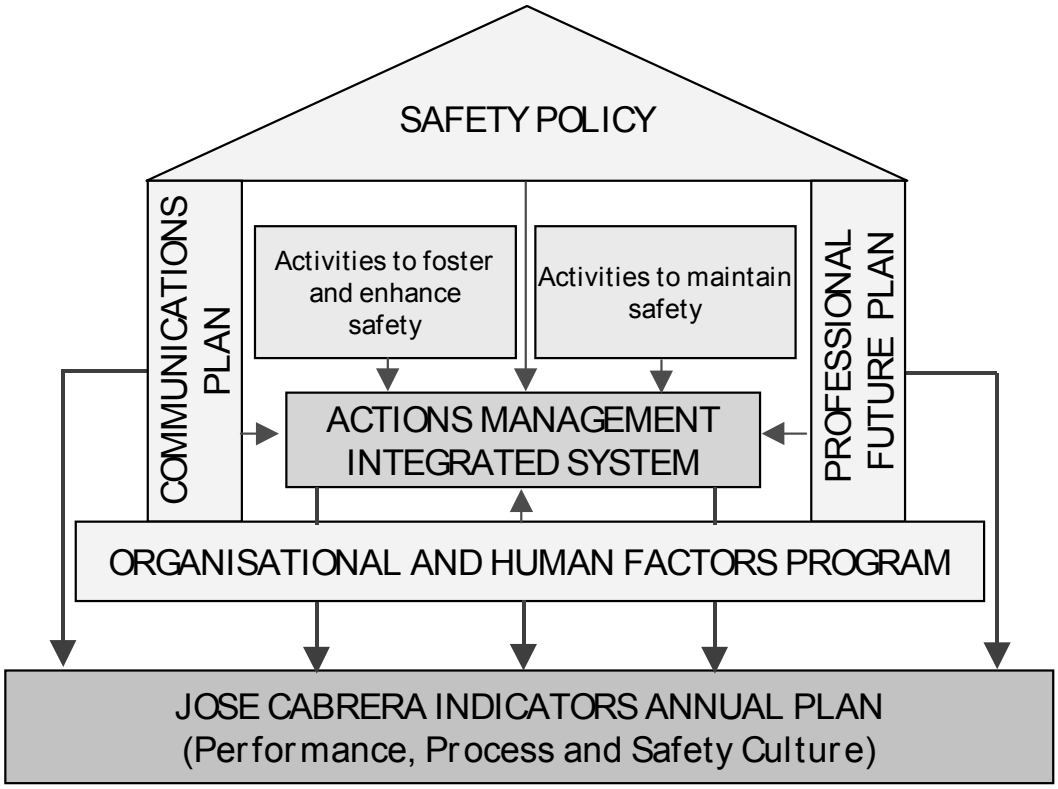
There are two main parts in the system: 1) all the activities, projects and applications that are aimed to maintain safety and 2) the activities focused on safety improvement. All the actions, independently from its origin (self-assessment program, regulatory requirements, root causes analyses…) are managed by the Actions Management Integrated System, which prioritise the actions, manage them and follow up their complete implementation. This system includes an Investment Management System.

As a part of the ISMS, Jose Cabrera managers have received additional training in non-technical skills, and an external evaluation of the organisational strategic apex will be carried out by WANO by mid September, 2004.

4.3 Summary and visions

The key message is to identify what organisational processes used at operating plants can transfer successfully to decommissioning plants and what processes do not transfer successfully or are not appropriate under decommissioning. This is in order to avoid overburden in changing organisational setting. When simplifying the processes to the decommissioning mode, the safety must be given priority even if the safety focus may be changed to be more on radiation safety and industrial safety. It is important, when tailoring the new slimed organisation, not to forget the relative long period of time when the plant still will be there and the need to continue to inform the neighbours on what's going on in order to maintain the good trust in plant management's way to handle the decommissioning.

Management non-technical skills play a very important role during the transition period. The message is that any effort in order to assess and improve them might be worthwhile. Additionally, any formal system that could help managers in their functions (for example, investment prioritisation) would be beneficial to maintain safety on appropriate levels.



5. Organisational memory and competence when moving to decommissioning

In 1999 WS [2], the participants expressed that it would be important to identify effective approaches to retain expertise during the transition from operations to decommissioning. CSNI SEGHOF is following up the high-level CNRA and NDC actions with regard to nuclear competencies. To some extent the topic also has commonalties with the June 2004 NEA CNRA regulatory industry forum theme of weakening nuclear infrastructures and suppliers in many countries. Here, the key questions are: what type of competence needs to be retained e.g. nuclear engineering and safety competence versus decommissioning techniques and radiation protection and what type of processes could be used for that purpose.

5.1 Barsebäck NPP, Sweden

Barsebäck addressed two primary sources of information on organizational memory, documentation and staff knowledge. Barsebäck conducted a quality audit and assessed the status of documentation to assure adequate written organizational memory. Also a program to obtain information from staff leaving the plant was implemented. SKI reviews these assessments and this program.

Barsebäck analyzed alternative ways of organizing the work for decommissioning and produced a plan for a new organization. The transition to the new organizational system was in May of 2000. SKI reviews and provides feedback on all proposed organizational changes that may impact safety. For example, SKI required that Barsebäck develop a procedure for managing organizational change and required an analysis of control room staffing.

Barseback AB is today a subsidiary to 100% owned by the Ringhals AB, Together; they form the Ringhals Company group, which is owned by Vattenfall AB and Sydkraft Kärnkraft AB, the latter a company within the Sydkraft Group. Through this constellation, there are more possibilities to offer staff members continues work and in that way retain staff enough to document the knowledge of today. The actual decommissioning will not start until 2017 and therefore ongoing activities are now to gather information from documentation and knowledge with operators what has happen at the plant (leakages, areas with high contamination etc.). Drawings and other information are transferred to modern database programs and drawings scanned.

5.2 José Cabrera NPP, Spain

In 2002 CSN required that all Spanish NPPs should develop plant procedures to manage organisational changes. The objective is to guarantee that any organisational change does not have any negative impact on safety. Jose Cabrera has issued its procedure, which is being applied for any organisational change. It includes the assessment, review, approval, implementation and follow-up of the changes.

With regard to current transition period, Top Management has publicly declared to the entire workforce that their professional future within the company is guaranteed. Additionally, the Cabrera NPP has developed an Alternative Professional Future Plan for employees. This plan helps to decrease the uncertainties, helps to maintain peoples' attention on safety as an overriding priority, as well as to retain knowledge from experienced people at the plant. In this Plan, it is declared that the safe operation will be attended till the last minute, according to safety policy and principles, counting on the experience and well doing of the present personnel. During the last period of operation of the plan, to define the future of employees the Company's organisational criteria will be applied, offering the best alternative to each worker among all the working centres UNION FENOSA has.

The main milestones of the Plan are: 1) Definition of safety systems needed; 2) Definition of Technical Specifications needed; 3) Definition of new Organisational Structure; 4) Selection criteria and required professional profiles; 5) Surveys to personnel, to define their preferences; 6) Definition of personnel to develop decommissioning activities at the Plant; 7) Identification of vacant posts in UNION FENOSA Group; 8) Appointment people to posts; 9) General Corporate Training and 10) Specific Training.

5.3 Summary and visions

An important message is the need to develop procedures to manage organisational changes in NPP's. Obviously these procedures become even more relevant when changes affect to the whole organisation, as it most obviously is the case during the transition period to decommissioning. Another key message is that during this period staff loss of motivation and uncertainty about the future could arise, both could negatively affect safety. Well developed personnel plans could help in mitigating those effects. Open and fluent communications between plant managers and staff, as well as with regulatory body are of paramount importance in this particular topic.

Concluding remarks

Decommissioning commercial nuclear power plants leads to a broad range of safety management, socio-technical and societal challenges. Organisational aspects are fundamental to any successful decommissioning process. Organisations must provide support for the management of change and must assure that resource and competence needs are appropriately specified, that uncertainty of personnel is minimised and staff morale is maintained. Furthermore, many new technical challenges must be met. The organisations too often have to address all these challenges with little guidance or experience, with reduced resources and surrounded by societal pressures.

During the planning and transition into decommissioning, an organisation needs to determine and implement a range of organisational processes: management of change, work planning & management, safety management, and allocation of the resources and staff to carry out the technical work. This all is necessary in order to identify key organisational functions and management skills that are critical during the transition and to sustaining organisational memory and obtaining and retaining staff competence during decommissioning.

Decommissioning is never purely technical project but it has to be planned and implement by staff with also human and organisational factors competence. Experience in decommissioning is still comparatively sparse, it is important to develop improved and well-defined means of sharing experience internationally. It is suggested that well focused workshops or technical meetings should be organised periodically between specialists of HOF, stakeholders and decommissioning executives in order to exchange good practices.

Sustaining safety culture and morale during the transition from operation into decommissioning is crucial in order to maintain adequate levels of safety performance. For that purpose, utilities need to have a structured and well-defined safety management & culture program. Any such program needs to include at least the following aspects: future plans, maintaining motivation and communication strategy. Maintaining and improving non-technical competencies at the top management level is very relevant when new organisational issues arise during this period.

Finally, due to the still limited experiences and the novelty and nature of human and organisational issues, it is strongly recommended a close cooperation between the utility and the regulatory body from the very beginning of the transition period. Open and frequent communication is needed.

References

1. NEA 2004, CSNI Technical Opinion Papers - No. 5 *Managing and Regulating Organisational Change in Nuclear Installations* (2004). Published: 09-JUN-04, 20 pages. NEA#05348, ISBN: 92-64-02069-1 Publicly downloadable from: http://www.nea.fr/html/pub/ret.cgi?div=NSD
2. NEA 2002, *CSNI Workshop on Nuclear Power Plant Transition from Operation into Decommissioning:Human Factors and Organisation Considerations*, May 17-18 1999, Rome, Italy. NEA/CSNI/R(1999)17. Publicly downloadable from: http://home.nea.fr/html/nsd/docs/indexcsni.html
3. IAEA Safety Reports series No. 31 "*Managing the Early Termination of Operation of Nuclear Power Plants*". ISBN 92-010-8603-2 IAEA, Vienna, 2003 English. 48 p.
4. IAEA Safety Reports series No. 36: "*Safety Considerations in the Transition from Operation to Decommissioning of Nuclear Facilities*". ISBN: 9201151039, Vienna 2004. 38p.

Other related readings

NEA/CNRA/R(1998)1 Comparison of the Inspection Practices in Relation to Control Room Operator and Shift Supervisor Licenses, 1998.

NEA/CNRA/R(1998)3 Performance Indicators and Combining Assessments to Evaluate the Safety Performance of Licensees, 1998.

NEA/CNRA/R(2001)9 The Effectiveness of Licensees in Inspecting the Management of Safety

NEA/CNRA/R(2003)4 CNRA - Nuclear Regulatory Inspection of Contracted Work Survey Results - Working Group on Inspection Practices

CNRA reports are downloadable from: http://home.nea.fr/html/nsd/docs/indexcnra.html

NEA/CSNI/R(1994)17 Management of maintenance outages and shutdowns: summary of reports, 1994.

NEA/CSNI/R (1997)13 The Role of Simulators in Operator Training

NEA/CSNI/R(99)21 Identification and Assessment of Organisational Factors Related to the Safety of NPPs

NEA/CSNI/R(2002)20 Workshop on the Regulatory Aspects of the Management of Change, Chester, UK, 10-12 September 2001: Summary and Conclusions

NEA/CSNI-89 Identifying significant human actions in reactor accidents, 1984

NEA/CSNI-137 Analysis of incidents involving human factors, 1987

NEA/CSNI-180 Analysis of incidents involving cognitive error and erroneous human actions, 1990.

NEA/CSNI/R(1995)10 Human factor related common cause failure, 1996.

NEA/CSNI/R(1997)15 Improving reporting and coding of human and organisational factors in event reports, 1998NEA/CSNI/R(1993)18 New man-machine interfaces in nuclear power plants

NEA/CSNI/R(2002)9 Approaches for the integration of Human factors into the Upgrading and Refurbishment of Control Rooms

NEA/CSNI/R(2003)14. Proceedings of the Workshop on Scientific Approaches to Safety Management, 8-10 April 2003

CSNI reports are downloadable from: http://home.nea.fr/html/nsd/docs/indexcsni.html Safe, Efficient, and Cost effective Decommissioning, Rome, September 6 -10, 2004

PROVEN APPROACHES TO ORGANISE A LARGE DECOMMISSIONING PROJECT, INCLUDING THE MANAGEMENT OF LOCAL STAKEHOLDER INTERESTS

Alejandro Rodríguez
Vandellos 1 NPP Decommissioning
ENRESA, Spain

Introduction

Spanish experience holds a relatively important position in the field of the decommissioning of nuclear and radioactive facilities. Decommissioning projects of uranium concentrate mill facilities are near completion; some old uranium mine sites have already been restored; several projects for the dismantling of various small research nuclear reactors and a few pilot plants are at various phases of the dismantling process, with some already completed. The most notable Spanish project in this field is undoubtedly the decommissioning of the Vandellós 1 nuclear power plant that is currently ready to enter a safe enclosure, or dormancy, period.

The management of radioactive wastes in Spain is undertaken by "Empresa Nacional de Residuos Radioactivos, S.A." (ENRESA), the Spanish national radioactive waste company, constituted in 1984. ENRESA operates as a management company, whose role is to develop radioactive waste management programmes in accordance with the policy and strategy approved by the Spanish Government. Its responsibilities include the decommissioning and dismantling of nuclear installations. Decommissioning and dismantling nuclear installations is an increasingly important topic for governments, regulators, industries and civil society. There are many aspects that have to be carefully considered, planned and organised in many cases well in advance of when they really need to be implemented.

The goal of this paper is describe proven approaches relevant to organizing and managing large decommissioning projects, in particular in the case of Vandellós-1 NPP decommissioning.

Approaches to organise and manage the large decommissioning projects

So far, Vandellós 1 is the only nuclear power plant that is in an advanced stage of dismantling. Nevertheless, the definitive shutdown of José Cabrera nuclear power plant is planned for mid 2006, and preparatory work for dismantling activities have started over this past year. No further decommissioning of nuclear power plants is foreseen in the medium term.

Vandellós-I was a 500 MWe gas graphite type nuclear power plant located in the Province of Tarragona. Its construction began in 1967 and it started operating in 1972. Its design was very similar to the French plant at St. Laurent des Eaux. In 1989 a fire in the turbine house led to the final shutdown of the reactor. Before responsibility for the site was transferred to ENRESA in February 1998, some post operational activities were undertaken by the utility that operated the Plant: post

operational clean out, conditioning of spent fuel and treatment of operational wastes, including the graphite components from fuel elements.

Decontamination and dismantling activities have been extended to the conclusion of Stage 2 of Decommissioning, in June 2003. This stage includes confinement of the reactor shroud, the performance of demolition and backfilling operations and release of a large part of the site. The facility is currently being prepared for the dormancy period, which will be followed by total dismantling of the remaining parts of the plant (Stage 3). On completion of the dormancy period, around the year 2027, the last level of dismantling will begin. This will imply the release to green field of the site and its return to the owner.

The main approaches to manage and organize the project have been the following:

Spanish framework, Transfer of responsibility

The company responsible for dismantling, ENRESA is required to draw up a Dismantling Plan, along with the rest of the mandatory documentation required by the standards in force, and to submit this Plan to the nuclear authorities.

When the decommissioning Plan is approved, the responsibility of the site is temporarily transferred from the owner company to ENRESA, as the organisation responsible for performance of the decommissioning work, such transfer lasting until the decommissioning operations are completed and the site is returned to green field.

In accordance with the Law, the costs of radioactive waste management and of the decommissioning of nuclear installations are financed by the producers of such wastes. The financing of these responsibilities is by way of a fund set up for this purpose.

The integration of the personnel from the former operator

Provision for preserving design information and records of the as-built plant lay-out must also be taken into consideration, especially when the chosen strategy is deferred dismantling. In this sense, it is a key element to ensure a good balance between maintaining experienced staff, with knowledge of the plant and able to keep “the memory of the installation”, and recruiting new staff with specific experience in dismantling.

In the case of Vandellós-1, one hundred people coming from the former operator were integrated into the ENRESA organization as contractors, in the fields of operation, maintenance and health physics.

The industrial conception of the processes

As in the case of the construction of nuclear power plants, dismantling is an industrial activity. The performance requires a series of organisational, technological, human and economic and financial capacities, within a specific legislative framework and under rigorous control.

Within ENRESA’s internal organisational structure dismantling projects depend functionally on the Operations Division, and receive the necessary internal logistical support from the Divisions of Strategy, Finances, Administration and R&D.

As a management company, ENRESA operates within a framework of optimal use of resources, with minimal in-house human resources at the Vandellós site. ENRESA's personnel are placed in key

positions and maximum support is provided from head office (Madrid). The organisational structure adopted by ENRESA at the Vandellós-I site includes a Site Manager and a Technical Manager supported by specialists in different areas. The Project team is completed with subcontracted engineering companies, which provide engineers and experts for the different activities.

This organisation receives support from the ENRESA head office for project activities such as planning, costs, delivery dates, R&D, waste management, engineering, radiological protection, licensing, etc.

At this point it would be appropriate to reflect on the organisational model used for the works. When the different packages were prepared for the contracting of services, consideration was given to the possibility of selecting a major contractor (architect-engineer) to undertake responsibility for the project, or alternatively, to break down the activities in order to involve a larger number of companies, particularly local firms. Although the first of these options had the advantage of several previous references in dismantling projects (Fort Saint Vrain and Connecticut Yankee, among others), the option selected was the second one, involving all types of companies. This approach has required major co-ordination efforts by ENRESA, but has two advantages. Firstly, there are a larger number of companies with the necessary know-how, which in subsequent projects will mean a greater possibility of competition and will also increase the possibility of Spanish companies participating in international projects

Secondly, and even more important, the participation of local companies allows the reduction in activity in the area due to closure of the plant to be palliated, and also serves as a vehicle for implementation and communication with the local society.

The organization chart, Team management

The internal organization during decommissioning wasn't identically to the one during operation. Important changes were implemented in the organisational structure and new services were created. Other services were enlarged or reduced.

One of the most important approaches in the internal organization was the formation of a new department called "material management service" dedicated to all tasks related to decontamination, release, and radioactive and conventional waste management.

Multidisciplinary groups were created for controlling and supervising the various tasks, including inside the teams specialist in disassembly, labour risks, quality assurance, health physics, and other disciplines as needed.

On-going training was one of the most efficient ways for reorganizing the former departments to face the new activities. It was also the most efficient tool to reduce the risk of accidents.

The management of the local stakeholder interests

When a new nuclear installation is commissioned a change takes place in the socio-economic activity in the local area. The new activity usually begins with an increase of employment and population until the finalisation of the commissioning contracts when the NPP starts up. At the same time and during the operational stage, municipal income increases.

During the shut down previous to decommissioning of a nuclear installation, some socio-economic impacts in the surrounded area are produced; this is marked by loss of employment (direct and indirect) and therefore loss of income.

In the case of Vandellós-I nuclear power plant, where the transition period between the permanent shutdown and the start of decommissioning works has taken nine years, the direct loss of employment has meant the disappearance of almost 300 jobs in a community of some 4,000 inhabitants.

During the decommissioning period a new stage begins, which will include new activities for the affected area of the nuclear installation. This does not have the characteristics of a nuclear power plant construction and operation project (less time and lower costs) but for a number of years (5 years in the case of dismantling of the Vandellós-I nuclear power plant) it provides new impulse for the area.

During the decommissioning phase 1998-2001, a total of 1 800 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 following table shows the latest data on employment and on the companies that have participated in the dismantling process. Indirect employment, which is more difficult to quantify, arises from increasing activity in the area, especially in the services sector.

In Vandellós-I NPP, during the decommissioning period, a Local Committee was created, made up of representatives of the company in charge of dismantling, the administrations of the area of influence and other representative bodies. The purpose of this Committee was to track the evolution of the dismantling process and receive information on it.

The aspects that were dealt with by the Committee are the following:

- Compliance with the conditions agreed on in the license (permit)
- Work progress, evolution of contracted personnel, etc.
- Waste management, materials accounting.
- Safety (training) and environmental surveillance.
- Events.
- Accident rates

The Committee has proven to be a valid instrument for participation by the stakeholders in the area of influence in the dismantling project.

Also highly important, in addition to this policy of communication, is the training policy, which serves not only to prepare the workers who are going to participate in dismantling but also helps to improve the knowledge and skills of people who might in the future undertake similar work in the same area.

The other pillar supporting economic activity is the contribution made by dismantling to the local administrations. This includes revenues from licenses and permits, compensation in the form of a fee for waste storage, and agreements with the administrations of the area to promote economic, cultural and sporting activities and investments in equipment.

Social aspects, communication and public participation

Public participation has proven to be a key element to be taken into consideration. Certainly, the start of dismantling activities may raise much interest and concern among the public, especially of neighbouring towns. From experience, the public is particularly concerned with the safe management of radioactive waste as well as with the residual risks and limitation for reuse of the site. If the site will

be used for interim storage of plant radioactive wastes before being released for unrestricted use, a good public understanding of the safety measures during the decommissioning period is also vital.

The Spanish regulations call for establishing an Information Committee all along the construction, operation and dismantling of nuclear installations. This Committee is made of representatives from the nuclear site, the Nuclear Safety Council, and central and local authorities. The duties of the Committee are to inform about development of plant activities and any other related subjects that are considered of interest.

Complementary to these activities is the communications policy, ENRESA provides support, and covers the need to keep the general public informed. Particularly noteworthy in the case of Vandellós-I are the visits received at the Information Centre, and the permanent contacts with the local media to cover information needs.

For this purpose, the company has developed an active and transparent policy with political groups, the media and the scientific community, based on dialogue and information transfer. The general population living close to the installations at which ENRESA carries out its activities is a preferential target as regards this policy.

Management of the future

Complete dismantling may not be advisable for sites with a territory that is not valuable from an economic or strategic point of view, or for sites where subsequent controlled industrial activities are planned at the time of dismantling. In this latter case, after having secured the area and verified that there is no health risk, these buildings can be used for other non-nuclear industrial uses or can be simply left aside.

A 25 years dormancy period is beginning at Vandellós-I, in this sense and besides the developments carried out during the level 2 decommissioning stage by the local administrations in infrastructures, socio-cultural interests and industry, a technological centre is going to be created at the site. The objectives of this centre are to survey the dormancy period, to serve as a way of public information and training, and to develop research projects related to decommissioning activities.

Consequently, the post-closure phase may be tackled with guarantees as long as the necessary efforts are first made by both those responsible for dismantling and by the Administrations, in order to plan the diversification of activities in the affected area of the nuclear installation.

DECOMMISSIONING: GUIDING PRINCIPLES AND BEST PRACTICES FOR INVOLVING LOCAL STAKEHOLDERS

Dale Keyes
U.S. Institute for Environmental Conflict Resolution

Abstract

A wide range of nuclear facilities covering the entire nuclear fuel cycle have been constructed and operated for many years worldwide. For communities where the facilities are located, concerns about safety and environmental contamination are paramount. Working together with elected officials, local community leaders and the public at large during the earliest planning stages will help alleviate concerns about facility operation and ultimate disposition, and will result in better decisions about facility design, location, construction, operation and, ultimately, decommissioning. Such comprehensive community involvement has been the exception rather than the norm. Now that older facilities are being considered for decommissioning, efforts to involve local stakeholders and alleviate their concerns face major challenges. This is particularly true where some residual radioactive contamination will remain onsite and future use of the site may need to be restricted. Plans for stakeholder involvement at the decommissioning stage should be carefully designed and provide for honest, authentic and meaningful involvement of all stakeholders affected by decommissioning decisions. A set of principles and best practices is proposed to help guide the design and implementation of effective community involvement programs. The principles and best practices are drawn from the experiences of public involvement practitioners in a variety of environmental contamination applications.

Introduction

The U.S. Institute for Environmental Conflict Resolution (U.S. Institute) is an agency of the U.S. Government. Its mission is to assist stakeholders in resolving environmental disputes or working collaboratively to reach agreements, where a federal agency or a federal interest is involved. The Institute also works with other agencies to develop guidance for stakeholder involvement in problem solving and decision making. Working in support of the U.S. Nuclear Regulator Commission (NRC), the U.S. Institute developed a guidance document on stakeholder involvement in facility decommissioning (*Best Practices for Effective Public Involvement in Restricted Use Decommissioning of NRC-Licensed Facilities*). Although the focus is on decommissioning in which future uses of the site are restricted due to residual contamination, the principles espoused in the guidance document are broadly applicable to all types of facility decommissioning and, in fact, to the entire spectrum of activities associated with nuclear facilities.

Perspectives on Community Involvement[2]

One of the first hurdles to clear in developing an effective community involvement program is the divergence in perspectives between community stakeholders and decision-making organizations. To the former, decision makers often appear arrogant and patronizing – their technical experts have all the answers and the decisions have already been made. Attempts to involve the local community often are seen as little more than exercises by the regulatory body and/or licensee in "D-A-D" – decide, announce and defend. Decision makers likewise tend to be suspicious of non-decision makers, especially the public at large, who they see as holding irrational fears and unrealistic expectations for sharing or usurping decision-making authority. Changing the perceptions and behaviors of both sides is central to making community involvement truly effective.

Rationale for Involving Community Stakeholders

A deeply rooted principle of democratically governed societies is the right of the governed to be involved in events and decisions that affect their lives. Moreover, the knowledge of community stakeholders about local social, economic and environmental structures, processes, and conditions will inform decision making; incorporating this knowledge will produce better decisions. Finally, engaging stakeholders in the decision-making process in a meaningful way will help make them "owners" of the decision. This is a particularly important outcome where the cooperation or even active participation of local stakeholders is needed for successful implementation and enforcement of decisions, and is essential for governmental entities with environmental, safety, land use and related authority over the facility site.

Guiding Principles and Best Practices

The field of "public participation/public involvement" has developed in the U.S. and elsewhere into a legitimate discipline overseen by professional practitioners. A set of guiding principles for designing and best practices for implementing community involvement programs has emerged based on substantial field experience, both positive and negative. The principles and practices are:

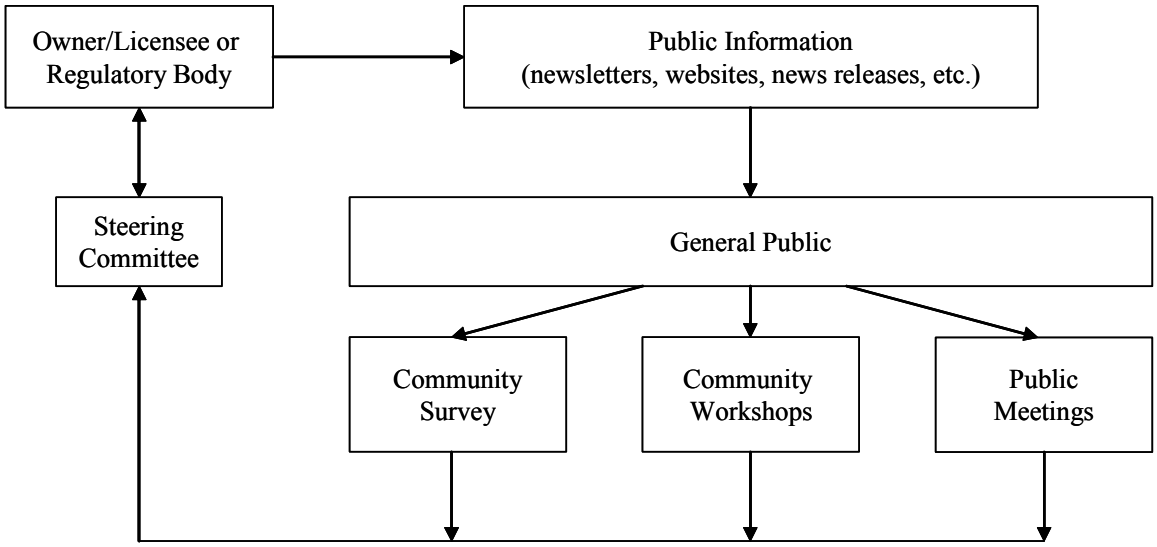
- Identify and understand "the community".
- Characterize stakeholders by interests and how they are affected.
- Actively seek out groups and community leaders.
- Focus on their concerns and effective ways to involve them.
- Be clear about what "is on the table" – what can be influenced by community input and what remains the sole purview of the decision-making authority – and be prepared to explain why.
    - Think broadly about how the local stakeholders can be helpful in shaping decommissioning plans and in implementing and enforcing them.
    - Consider the stakeholders expectations.
    - Decide on how much decision-making authority can be shared.
    - Select the level of stakeholder involvement on the "*inform* to *consult* to *involve* to *collaborate*" continuum.[3]

2. The term "community involvement" will be used rather than the more common terms "public involvement" or "public participation" to denote the involvement of a wide range of organizations and individuals (from the local community in which the nuclear facility is located) who do not have legal authority with respect to making facility-related decisions, but who nevertheless have relevant authorities or vested interests in the decisions – elected officials, government agencies, civic organizations, advocacy organizations, religious institutions, land owners, business owners and employees, and the public at large.

- Develop a written community development plan, and include stakeholders in developing it. It should include:
  - Objectives
  - A Structure
  - A Timeline
  - Provisions for evaluation
- Provide accurate, accessible information.
- Foster genuine dialog.
  - Group discussions are better than large meetings
  - Small groups are better than large ones
  - Listen first, then respond and ask for suggestions
- Provide feedback on how the input and advice was used.

Example Community Involvement Program Structure

An effective community involvement program can take many forms, and program designers should be flexible in meeting the needs of the local community and the decision makers. An example structure is shown below (Figure 1) to illustrate how the guiding principles can help organize the program. Here a Steering Committee, likely would be composed of various representatives of community groups, works to advise rather than share decision making with the decision-making authority (that is, it acts as an advisory rather than a shared decision-making body, that is, participates at the *involved* rather than the *collaborative* level). In the same vein,



.the public outreach campaign is designed to *inform* and *consult* with the public at large. Local government agencies and elected officials could be part of the Steering Committee or could be involved as separate entities.

[3] This continuum is taken from the International Association for Public Participation and describes an increasing level of involvement, from simply providing information to accepting and incorporating advice and sharing decision-making authority.

Challenges in the Decommissioning Context

Decommissioning, being the final set of events in a facility's life cycle, also brings with it the history of community involvement for that facility. Where community stakeholders have been actively involved in the planning, design, siting and possibly operation of the facility, and where they have developed a partnership with the facility owner/operator/licensee while the facility operated, they are likely to embrace active participation in the decommissioning process. Where local stakeholders have not historically been involved effectively or where mutual trust and respect for and by the owner/operator have never been achieved, decommissioning is more likely to be contentious. Under these conditions, community stakeholders will be suspicious and less willing to believe the licensee's and/or regulatory body's assertions and assurances about safety and enforcement of the decommissioning plan. The design of the community involvement program must be flexible, taking into account the existing program, if any, and the history of community involvement at the site. Where no program is in place, one must be designed de novo starting with the assessment task. To overcome mistrust, the decision makers should consider offering the stakeholders a higher level of involvement, perhaps even some degree of shared decision making. Balancing some of these challenges is the prospect of reducing or eliminating risks to the community as the facility ceases operations and moves through the decommissioning process. Of course the removal and transport of radioactive waste will create its own set of risks, and any residual site contamination will have to be addressed into the future.

Training and Professional Assistance

Working effectively with community stakeholders is usually an acquired skill, and all facility owners/operators could benefit from basic awareness training. In addition, designing an effective involvement program may benefit from professional assistance. Using a third party neutral to facilitate meetings and discussions, especially for advisory or joint decision-making bodies, is highly recommended.

Conclusions

Successful community involvement is the result of a carefully crafted set of coordinated activities conducted over the long term. Ideally, facility decommissioning is simply the end stage of the involvement process, or the beginning of a site stewardship process in those cases where decommissioning does not produce an uncontaminated site. In either case, decommissioning will not be a new, unexpected event, and stakeholders could be involved just as they have been over the life of the facility. In many cases, however, decommission will represent a new set of challenges for the community, and a stakeholder involvement program will have to be created from scratch. The guiding principles and best practices are intended to help designers and implementers of community involvement programs achieve effective community involvement regardless of where in the facility life cycle involvement is needed.

References

Douglas Sarno and Dale Keyes, *Best Practices for Effective Public Involvement in Restricted-Use Decommissioning of NRC-Licensed Facilities*, U.S. Institute for Environmental Conflict Resolution, 2002 (http://www.ecr.gov/s_publications.htm).

International Association for Public Participation, *IAP2 Public Participation Spectrum*, 2000 (http://www.iap2.org).

TRANSITION FROM A NUCLEAR TO AN INDUSTRIAL SITE MANAGING CHANGE IN THE RE-USE OF SITES

M Laraia
IAEA, Austria

S **Gordelier and A. Neal**
UKAEA, United Kingdom

ABSTRACT

Examination of the role of nuclear decommissioning in the move towards sustainable development suggests that this potential for redevelopment should not be ignored. Sustainable development implies the need to combine economic development with conservation of natural resources such as land. Sustainable development also implies economic development with maintenance of social and community integrity. Both of these can be served by the sensitive redevelopment of sites to provide continuity of employment and new productive activity. Finally, experience to date with redevelopment both inside and outside the nuclear field suggests that successful engagement can be a key success factor in promoting outcomes which are both profitable for the operator and recognised as responsible and worthwhile by the wider community. Following a generic discussion on factors and issues inherent to the re-development of decommissioned sites, this paper expands on a significant UK example.

PART 1 – GENERIC ISSUES

1. Introduction

Various objectives for decommissioning work can be envisaged in terms of both the planning and scheduling of activities and the motivational and morale aspects as they affect the efficient progress of the work. The conventional approach, whilst useful in shaping the planning of work to decommission many facilities tends to favour decommissioning programmes that are more extended (e.g. unrestricted release or greenfield options) than some sections of society would prefer. It also does not recognise the important role that re-use of the facility or its constituent parts might play in contributing to a positive outlook for the decommissioning project and its stakeholders.

It is perhaps to be expected as a consequence of the value of the land released by decommissioning, that clearance of one nuclear activity from the site will lead to its re-use in a new activity. Most nuclear installations benefit from a level site, good access to utilities, transport and other communication links and a skilled local workforce, all of which are conducive to rapid redevelopment. In some cases non-nuclear spin-off activities are already established on the site before the end of nuclear operations and provide the basis for regeneration of the site in a new role.

Given that this is the case and that decommissioning of nuclear installations will usually be followed by site redevelopment is it reasonable to consider the implications of deliberately planning for decommissioning as redevelopment. This is considered in Table I.

Experience from early nuclear site redevelopment has identified many issues which can have an important bearing on the redevelopment potential of sites and the work to be done. These issues are explored below under the headings of Policy, Management and Technical.

2. Policy Issues in Planning for Redevelopment

Long Term Site Use/Mission

Recognition that the long term mission of a site has changed or been completed may come suddenly with a decision to close a major facility or may only be recognized reluctantly after a period of years of progressive reduction in demands for the site's services. The future for such sites can take many different forms. Some may be cleared and cleaned completely for unrestricted use by others. A specific reuse may be planned for the long term or perhaps only for the short term, possibly for equipment storage, temporary offices, waste storage etc. Some sites have found beneficial re-uses for parts of sites and decommissioned facilities in their continuing R&D missions. Certain commercial nuclear power plant operators have elected to replace the nuclear heat source with a conventional fossil-fueled heat source and reuse the site for continued electrical generation. Two such cases were Pathfinder and Fort St Vrain (FSV) in the USA [1, 2].

Where the reuse is to be under a new owner the original owner may transfer the responsibility for post-closure management of any remaining parts of the site and residual risks arising from previous operations to the new owner. In some regulatory regimes this is the only way of freeing the owner from a potentially indefinite responsibility or at least providing indemnity against those risks.

Relationships with outside stakeholders

Any nuclear operation normally involves a large number of external agencies and organisations in its running, including suppliers, customers, regulators and local officials. In the case of site redevelopment new parties will take an interest in the project and the range of outside stakeholders will increase. New stakeholders will include the potential new owners or tenants of the site as a minimum, but good practice from other industries and the limited experience of redevelopment in the nuclear industry suggests that involvement of a wider range of stakeholders from the local and regional community is both to be expected and beneficial.

The dynamic evolution of new relationships has the potential both to help and hinder the redevelopment process and all parties should seek to develop mutual understanding and trust. By setting out to encourage productive re-use of the site the operator is contributing to the economic and social development prospects of the local and regional communities. This can be a positive factor in relationships with local stakeholders and may engage their support in matters such as planning consents and co-operation in the adjustments needed to local infrastructure to enhance the value and potential of the site.

As a longer term issue affecting the future of nuclear power development more generally, by maximizing the economic value of a spent nuclear site the operator has the opportunity to demonstrate that nuclear decommissioning can be accomplished economically, and sensitively. This will increase public confidence in the operator and the industry more widely and may improve the operator's

prospects for being allowed to undertake future developments and reduce the pressure for stricter regulation.

Evaluating Sites for Redevelopment

The location of a site and the quality of communication links, especially road, rail and sea links have an important bearing on the redevelopment potential and re-sale value of sites. Many nuclear sites benefit from good communication links needed for the construction of the installation and for the movement of fuel and waste containers. However many are also located far from centres of population which can be a disadvantage. The remoteness of some sites and their situation in undeveloped areas can make tourism-related development relevant.

When considering the potential redevelopment value of assets on the site it is important to distinguish between the different valuations that may have been placed on assets. The accounting or 'book' values of the assets is often determined from an initial purchase price and an allowed annual depreciation sometimes determined by tax laws. This accounting depreciation does not take account of factors which affect the market value of assets such as physical degradation or wear, availability of spare parts and the availability of alternative assets with lower operating costs. Often a group of assets with low individual values can be configured into a system with a much higher value. For example a turbine and generator set worth only scrap value might provide the basis for local power generation if configured with an appropriate boiler.

Companies or organizations evaluating the feasibility of reusing a decommissioned nuclear site will run a cost-benefit analysis. From a strictly internal perspective, this may prove that sale or redevelopment of the site will not provide sufficient return on the investment necessary to make it attractive to a new owner or tenants. From a broader perspective, the benefits of reuse may be very large but accrue instead to the community, which would profit from retention of jobs and stable or increased tax revenues. In these circumstances, facility owners may be able to negotiate grants, payments or "in kind" assistance from local governments in exchange for a commitment to prepare a decommissioned site for reuse.

3. Management Issues

Staff morale

In any decommissioning activity the selection and retention of the appropriate staff and the maintenance of good levels of morale is an important challenge to be addressed by management. The positive outlook encouraged by a decision to redevelop rather than close a site can make an important contribution to maintaining the morale and commitment of the workforce. When combined with good community relations, it also puts staff in the position of working for the benefit of the local community and with their support. Uncertain redevelopment prospects or a failure to convince the workforce and the community of the sincerity of management commitment to successful redevelopment can lead to feelings of insecurity, undermining staff morale and co-operation. This is especially relevant in the case of remote sites where alternative employment is not available locally and the site is responsible through payroll payments, tax contributions and supply contracts for an important part of the whole economic activity of the area. There are several examples of decommissioning projects where re-employment concerns were the driving force toward site re-development (Oak Ridge, USA; Greifswald, Germany).

A common problem faced in site closure is the loss of the best and most able staff to other employers or projects with a more secure future outlook. Loss of these key staff can seriously undermine the

effectiveness of the closure work and redevelopment programme leading to rising closure costs, extended closure programmes, and in the worst cases, failures in management and safety standards. By providing new employment opportunities associated with the site redevelopment activity the tendency for good staff to leave can be moderated.

Reducing Management Complexity

In adopting a redevelopment strategy the operator of a site takes on new responsibilities for preparing and marketing the site and integrating the new users needs into the work to decommission the site. This adds to the scope and complexity of the work and the variety of expertise needed. Strategies for reducing the overall complexity of the management problem can play an important part of maintaining management control. These can include among others:

- Reducing the size of the site to reduce the volume of work related to site area or perimeter. In this way the scale of activities such as monitoring and maintenance of security surveying can be reduced.
- In the case of redevelopment, it may be possible to hand over to the developer responsibility for some of the assets on the site with the associated responsibility for managing the associated hazards. An example would be the turbines and the high voltage systems connecting to the electricity distribution grid in the case of a redevelopment involving re-powering of a former nuclear generating plant.

4. Technical Issues

The redevelopment potential of any site will depend heavily on the nature of the particular site and the local circumstances. Often it is a combination of factors which conspire to create the most valuable redevelopment prospect for any particular site. This means that there are no general rules that can be applied widely across sites to direct the investigation of redevelopment opportunities. However there are important aspects which apply to many sites and which can be drawn to the attention of site operators to consider in their own planning. Some factors that are often found to have an important impact on the redevelopment value of sites are considered below, with suggested actions that operators might take to enhance their site's potential value, under the headings of:

- Scope of work;
- The feasibility of meeting radiological release criteria for site de-licensing;
- Minimisation of radioactive wastes;
- Value of site characterisation;
- Key development assets;
- Age and condition of structures;
- Sub-surface features; and
- Social factors

Scope of work

If the work required to return a nuclear site to its natural or baseline state is compared with that likely to be required in preparation for redevelopment it is likely that in many cases the redevelopment option would require less work. For example, it would not be necessary to demolish any structures that were to be retained for re-use and it would not be necessary to restore any ground that was to be covered by new development.

The feasibility of meeting radiological release criteria for site delicensing

For some nuclear sites and in some regulatory regimes it is economically impossible in the short term to meet the radiological criteria for de-licensing. This arises where the conditions for de-licensing are based on a 'close-to-zero' contamination or 'close-to-zero' hazard criterion and a residual hazard, such as arises with low levels of ground contamination is sufficiently dispersed that remediation techniques are unable to restore it economically. In parallel, technological and statistical approaches to satisfactorily prove the achievement of extremely low residual levels have been progressively refined, although complying with regulatory requirements is often difficult. This evolution has resulted in cases where an already de-licensed site has been reconsidered for further cleanup work [3] or release criteria have been lowered in the course of decommissioning [4] causing significant extra costs and delays.

Safety and health is considered in the reuse, but a radiological reuse compared to say a child care centre and the allowable criteria for residual or even perception of residual radioactivity has a very strong bearing on re-use in the planning process for D&D and to what levels clean-up must occur to. In the USEPA Superfund site programme there has been a big push to relieve the site owners of these properties of liabilities if people will just reuse the sites and be relieved of liabilities or accept the sites in less than pristine conditions - or so called brownfields where a site is to be reused for industrial operations anyway. Another example - Rocky Flats will be used as a wildlife refuge [5].

Stewardship

Stewardship is defined as the "acceptance of the responsibility and the implementation of activities necessary to maintain long-term protection of human health and of the environment from hazards posed by residual radioactive and chemically hazardous materials" [6]. Planning for stewardship should be part of the decommission planning process, as the costs and liabilities associated with stewardship may influence the final decision on decommissioning approach, degree of remediation, and reuse of a site.
If reuse is to occur, then the degree of contamination remaining must be compatible with the chosen new use, and the new user will become responsible for most, if not all, of the stewardship activities and costs. A key action prior to transferring the site for reuse is the establishment of an information system that will preserve the data on location of remnant contamination and the reasons for any associated institutional or physical controls.

Minimisation of radioactive wastes

Many operators have a regulatory duty, or at least a financial interest, in minimising the amounts of radioactive waste arising from decommissioning. By leaving in place and handing over to the developer structures on the site that are useful to the future site activities the work to demolish them and process and sentence the resulting demolition waste is avoided. In practice much material is sentenced as radioactive waste even though it is not because of the cost and difficulty of demonstrating that it is below the clearance criteria in contamination. This kind of radioactive waste is avoided in respect of any structures which are left in place.

Value of site characterisation

Reusing a site is often a convenient strategy in terms of information and legal authorizations already available. For example, information on demography, geology, hydrogeology, seismology, floods etc. is usually available as part of the licensing process for a nuclear site. This information should not be produced from scratch as in the case of a new industrial site. Associated to this, site permits (e.g.

electrical lines, non-radioactive and radioactive discharge limits etc.) that are based on the above-mentioned site characteristics would be already in place for a new plant and should not be requested from the authorities. This is particularly relevant where new nuclear uses are being considered and licenses for nuclear operations are already in place.

The level and reliability of site characterisation work at nuclear sites is therefore of potential value to future developers. The work done to characterise a nuclear site in terms of foundation conditions, groundwater monitoring, quantification of seismic hazard and the condition of installed plant and services can be attractive in reducing the initial level of investment of any developer considering the site and of reducing the risk associated with new industrial uses. Details of site surveys, analyses and assessments should be retained. Conversely uncertainty about contamination levels on the site would be an important disincentive for investment and so evidence to support claims that contamination of the site is minor and well understood should also be retained.

Key development assets

Experience suggests that the development potential of a redundant site is often dependent on one or two key assets left over from the site's operating life. These assets can provide an important catalyst to a particular kind of development or serve to improve the attractiveness of the site as an investment proposition for developers. An important step in exploring the redevelopment potential of a site is to identify these potential key assets and assess their relevance to future development scenarios. Once identified these assets should be protected from deterioration during the remaining life of the site. In the case of nuclear facilities the key assets might be represented by:

- High quality electricity grid supply connections;
- Airstrips, road, rail or sea access with offloading facilities;
- Office space;
- Support services (e.g. catering, public transport);
- A partly 'captive' local workforce with a high level of technical skill;
- Prestigious old/historic buildings (e.g. the Jason case, UK [7])
- Non-radioactive machine shops, workshops and general production facilities, especially with large machinery, consumables stocks; or
- A large flat site suitable for a substantial manufacturing investment or for a smaller investment whilst still retaining the future potential for contiguous expansion.

Age and Condition of Structures

It is typically easier to find a beneficial re-use for a newer structure than for an older one. Although short-term use may be possible, longer-term use of such a structure may not be cost effective or even possible due to structural degradation. In addition, decontamination and dismantling can weaken the structural integrity of buildings, especially (a) if removing large concrete areas, or (b) "chasing leaks" of radioactivity into underlying foundations. An assessment will need to be performed of the financial resources needed in order to beneficially reuse those areas that have structural degradation from the decommissioning. Older facilities may need to be evaluated to determine whether they can be modified in a cost effective manner to comply with any current structural building codes.

Sub-surface features

The presence of or a lack of any of a number of various subsurface/underground features may impact the ability to redevelop a site after completion of the decommissioning process. Underground features

considered here might include: vaults, tanks, pits, water supply systems, fire protection systems, sewerage systems, and other waste retention systems. Often as a part of the decommissioning, some of these types of items or systems may require removal or remediation. Depending on the future planned use or redevelopment plans for the site such systems may or may not be beneficial. Some other radiological systems may be left in place if another follow-on application as a nuclear facility is envisaged.

Social Factors

Any of a variety of different social factors or combinations of these factors can be concerns of the local citizens and regional residents during decommissioning and site remediation projects. Examples of social factors includes: public desires for space/real estate re-use options, property values, employment issues, perceptions of radioactive waste management, loss of educational opportunities, loss of tax revenues (perhaps). All of the above are examples of these different social factors.

Public concern over certain social issues can eliminate certain redevelopment options. This was true of the planning for the reuse of the Barseback in Sweden where the local community preferred to use the space where the yet to be decommissioned plant is situated for re-development and use as a housing development while local governmental authorities planned to reuse it to take advantage of the available infra-structure and to use it for electricity production using a different heat source [8].

PART 2 – A PRACTICAL EXAMPLE: FROM NUCLEAR R&D SITE TO SCIENCE & TECHNOLOGY PARK – WINFRITH, UK

5. Overview

It is important that any site-decommissioning programme should have a clear end-point vision. At Winfrith that vision is to create a pre-eminent science and technology centre. There are three main precursors to achieving this: decommission the facilities; delicense the land; and attract tenants. At Winfrith these three processes are being conducted in parallel.

UKAEA's Winfrith site was built in the late 1950's to undertake research and development into electricity generation from nuclear power. Pioneering scientific and technical work was carried out which resulted in a better understanding of nuclear issues, particularly nuclear safety. At its peak, Winfrith employed 2000 staff and at one time had nine operational nuclear reactors. The most noticeable landmark was the Steam Generating Heavy Water Reactor (SGHWR) which, when in operation, provided the National Grid with enough electricity for a small town. In the early 1990's the UK Government wound down its programme of nuclear R&D, and work started on restoring the environment of the Winfrith site by the progressive removal of the nuclear facilities.

Winfrith has always been considered to be one of three key sites in Dorset (the county in which it is situated) for development of quality employment, and the site management, with the support of the UK Government's Department of Trade and Industry, decided to undertake a programme of environmental restoration that retained appropriate buildings and infrastructure systems that could be put to alternative long term use.

To date, successes have been achieved in both the decommissioning work and also the establishment of tenants. The progressive decommissioning work continues and as UKAEA retreats across the site, from east to west, the non-nuclear research and development businesses move in.

The tenant base is growing and by the end of 2002 there were 40 different companies resident on site with employee numbers ranging from 1 to several hundreds with a total of ~1000 staff. The larger tenants include QinetiQ and DSTL (both from the former Defence Evaluation and Research Agency), the Natural Environment Research Council's Centre for Ecology and Hydrology, and RWE Nukem. In addition, the UKAEA programme employs ~500 as staff and contractors.

The range of work established at Winfrith provides a focus for its further development as a scientific and technical centre of excellence. Facilities have been created in partnership with the local council for small and start-up businesses, while strong links are being encouraged with universities that have an interest in areas such as environmental research. Together they will form a vital part of the commercial community, stimulating growth through technical interaction and innovation. Very recently a major part of the site has been sold as a thriving technology park.

6. A Little History of the Winfrith Site

In the 1950s the United Kingdom Atomic Energy Authority (UKAEA) was developing a number of designs for civil nuclear power plants. These designs were mainly being developed at UKAEA's Harwell site near Oxford. Although the designs were being developed at Harwell, it was not possible to build the prototypes at that site. This was due to a number of reasons including limited water supplies, and no access to the sea for a sea discharge pipeline. A committee was established to identify a location of a new UKAEA site for the construction of prototype reactors. The committee had a number of both technical and social criteria against which to judge candidate sites. An example of one of the social criteria was a requirement for staff to disperse into the local community and hence avoid forming a 'company town'.

Winfrith in south Dorset was identified as the preferred site. Approximately 1200 acres of heathland were purchased. In January 1957, a public inquiry was held in the nearby county town of Dorchester prior to planning permission being approved. This inquiry lasted just 2 days and was mainly concerned with the effects of water extraction.

Work on the site began in 1958. Approximately 350 of the 1200 acres purchased were enclosed within the perimeter fence. The remaining land was used as a *cordon sanitaire* around the site. The basic layout of the site was to have a central administration facility with the individual reactors located around this facility. Over the years a number of prototype reactors were constructed on the Winfrith site. Six zero energy and low power reactors were built in due course, together with the larger Dragon and Steam Generating Heavy Water (SGHWR) reactors see Table II.

Supporting these prototype reactors was a number of facilities. These included a post irradiation examination facility, a fuel fabrication facility, a fissile material store, radiochemical laboratories, workshop facilities, etc.

During the 1960s and 70s a vast amount of excellent scientific and engineering work was carried out at Winfrith. At its height the site employed about 2000 staff, with a high percentage of graduates.

During the 1980s reactor safety research was also carried out on the site and work on the site also diversified to include some non-nuclear work. For example work was carried out for the oil industry both on the mathematical modelling of oil wells and also on chemical techniques to enhance oil recovery.

From about 1990 work on the development of nuclear power and of reactor safety systems was beginning to come to an end. The last reactor operated by UKAEA, the NESTOR Reactor, was closed down in 1995. UKAEA's rôle then changed to one of environmental restoration of its sites.

The Winfrith site includes areas of heathland that are the habitat for some protected species of flora and fauna. As such, part of the site has been designated as a Site of Special Scientific Interest, and has to be managed accordingly.

7. Decommissioning Progress

During the 1990s decommissioning work was carried out on a number of facilities across the Winfrith site. In particular the following successes are worthy of note.

SGHWR Ponds Decommissioning

The Steam Generating Heavy Water Reactor operated until 1990. The reactor was then defuelled over the next three years. One of the major tasks that was undertaken during the first stage of decommissioning was the preparation of the ponds for long term care and maintenance. The task of decommissioning the ponds was split into two separate activities: 1) removal and decontamination of the pond furniture; and 2) the removal of the water, residual sludges and decontamination of the pond surfaces.

The furniture removal and decontamination activity required the contractor to remove 22 storage racks, 6 burst can thimbles, 1 uncoupling station, 1 size reduced rack and 1 flask support platform from the pond and to decontaminate the material with a target of 80% free release waste. The pond draining and surface decontamination activity required the contractor to progressively lower the pond levels and to decontaminate and seal all the concrete surfaces

The overall objective of the pond project was to leave the pond surfaces clean and/or sealed and to provide access to the bottom of the ponds. The walls were successfully cleaned using water jetting and were sealed with water based paints. The decommissioning of the ponds was completed by 1996.

NESTOR Reactor Decommissioning

Decommissioning of the Nestor Reactor commenced in November 1998 and was completed in January 2000. Included with the Nestor decommissioning operations was the post operational clean out of the six reactor support laboratories and the store of 200 tonnes of experimental shielding plates.

DIMPLE Reactor Decommissioning

Decommissioning of the Dimple Reactor commenced in August 1999 and was completed, with the exception of the external, underground dump tank facility, in April 2000. The Reactor Vessel, an aluminium tank some 2 metres in diameter by 4 metres high, was lifted out in one piece and size reduced by cold cutting techniques for disposal as LLW.

Waste processed included:

- 131 tonnes of packaged LLW in ISO containers
- 5 tonnes of LLW packaged into 40 220lt drums sent for supercompaction
- 580 tonnes monitored and cleared for free release

Alpha Materials Laboratory (A52)

The Alpha Materials Laboratory (AML) was a two-story building, built in 1961/62 and commissioned in 1963, was used for the manufacture of mixed oxide fuel for use in reactor physics experiments. In this rôle the facility handled kilogram quantities of plutonium, usually in oxide form, and throughout its operational life many tonnes of plutonium passed through the building. The AML ceased commercial operations in the early 1990s.

The decommissioning project involved the removal of all internal and external systems, facilities and services including the demolition of buildings and leaving behind a green field site. The work involved the decontamination of suites of gloveboxes and ventilation plant in a manner that minimised the waste arisings.

The contract delivered a green field site with no significant safety or environmental incidents. The waste arisings were optimised. The contractor began work in 1996 and 'green field' status achieved in spring 1999.

Active Handling and Decontamination Building (A59)

The Active Handling and Decontamination Building was constructed between 1962 and 1964 and was designed and built for the post-irradiation examination (PIE) of a wide range of reactor fuel assemblies and structural components. The main components within the operational area were two 'Hot Cell' or cave line suites together with their associated operational areas.

The Winfrith site strategy and plan did not identify any future operations that would require the services of the Active Handling and Decontamination Building and, following a comprehensive competitive tendering exercise, the Winfrith Operations, Maintenance and Decommissioning (WOMAD) contract was awarded to RWE Nukem in mid 2000. A major component of this contract is the complete decommissioning to a 'brown field' of the A59 facility. This decommissioning is well underway and is currently running to time and cost.

8. Development of the Winfrith Technology Centre

As the decommissioning work progressed, buildings and facilities which were no longer required for UKAEA's activities became available. A key part of the strategy for the site was to attract new businesses onto the site to use these facilities. The Winfrith site is located in a fairly rural area of Dorset and had become a major centre for employment. As such Winfrith was seen as a major contributor to the local economy. The policy of reusing buildings for new businesses both ensured that the level of employment across the site remained high and also brought some income to the site to offset the decommissioning costs.

The earliest tenants on the Winfrith site were ex-UKAEA employees whose rôles had changed. Staff working for AEA Technology, who had previously been the commercial part of UKAEA, changed from being part of our own organisation to tenants and in some instances contractors providing services to UKAEA. Other tenants were UKAEA staff who had been divested to new organisations. For example the Facilities Management part of UKAEA were divested to a company called Procord who later became Johnson Controls Ltd. New companies who relocated to the Winfrith site soon joined these early, ex-UKAEA, tenants.

The site was marketed to potential new tenants as the 'Winfrith Technology Centre'. An early major success for the Technology Centre was when the Government Defence Evaluation and Research

Agency (DERA) moved from its home in nearby Portland to the Winfrith site. DERA leased a building which had formerly been the workshops for the site. The building was completely refurbished to provide the new tenant with the office space, laboratories and workshops they required. DERA brought over 500 employees to the site and represented a major step in the development of the Technology Centre. It is interesting to note that the injection of 500 non-UKAEA employees significantly changed the character of the site. New faces were seen around the site which started to develop a more cosmopolitan atmosphere. Later DERA split into the private sector organisation, QinetiQ and the public sector organisation, DSTL.

Another major success for the Winfrith Technology site was the relocation of the Natural Environment Research Council's Centre for Ecology and Hydrology (CEH). CEH was formed by the co-location of two previously separate organisations, namely the Institute of Terrestrial Ecology and the East Stoke River Laboratory. CEH took occupancy of a building that had previously contained offices and laboratories. Some of these laboratories had handled radioactive materials and the building was located on the nuclear licensed site. Prior to CEH occupancy the building was fully decontaminated, subject to extensive radiological surveys, and refurbished. The radiological surveys were extremely thorough and well documented as they were part of the case for delicensing that part of the site. It was very important to UKAEA that the quality and quantity of surveys would be sufficient to demonstrate to the Nuclear Installations Inspectorate that that part of the site may be delicensed. UKAEA was most keen to avoid a situation where, after the tenant had taken occupancy, it would be required to re-survey part of the building that would have resulted in considerable disruption to the tenant.

CEH brought approximately 100 staff to this new facility. The staff were mainly biologists many of whom had a great concern for the environment. Prior to their re-location to the Winfrith site many of the staff had little knowledge or experience of a nuclear site. Many of their employees had very real concerns about working on a nuclear site and particularly in a building that had previously contained radioactive materials. UKAEA and CEH worked together to provide staff with accurate information and reassurance about working on a nuclear site. Information sheets were produced and also the Winfrith Head of Site and the Head of Safety & Environment gave presentations to staff and answered their questions. Although many of the staff were reassured a small number still had concerns about working on a nuclear site. Several months after their occupancy discussions with CEH management tended to indicate that there were few if any remaining concerns.

In the late 1990's discussions were held with the Local Authority about promoting small businesses in this part of Dorset. It was decided to introduce business starter units to the site. The location of these starter units was a collection of single storey wooden buildings. These buildings, known as C51T (the "T" stood for temporary), were the original buildings occupied by the Contractors who first worked on the site in the late 1950's. Since then the buildings had been used for a variety of purposes including the site's training centre. After 40 years the buildings were repainted and new felt placed on their roofs and renamed as C51. This work was financed jointly by UKAEA and the Purbeck District Council. The starter units provided reasonable accommodation with some shared facilities such as a conference room and kitchens. The provision of heating and power was included in the rental price. The rent structure was such that new businesses would pay a low rent for the first year and the rents would increase year on year for up to four years. After four years it was anticipated that the businesses would either have failed or would be successful and would be able to rent accommodation from UKAEA at commercial rates. The business plan for the starter units was that the units would be fully occupied within 2 years. In practice the units were fully occupied within 1 year.

The starter units are now the home to a number of small and very diverse businesses. Examples of the businesses currently on site include:

- A mobile phone fascias design and distribution business
- An environmental business looking at river water quality
- A small electronics business
- A business developing military tank simulators for the MOD
- A number of small consultancies

9. The Nuclear Licensed Site and Delicensing

One significant issue in the development of the Winfrith Technology Centre has been the effect of the Nuclear Licensed Site. Of the 350 acres within the fenced site about two thirds is designated as a Nuclear Licensed Site. The boundary between the nuclear licensed and non-licensed site is clearly marked but there are no restrictions on people and traffic moving from one side to the other. As such control of access to the Nuclear Licensed Site, including security and safety induction training, is applied to all personnel entering the site. This means that all personnel employed on the site must undergo training particularly with regard to actions to be taken in the event of a site emergency or a site emergency exercise. During site emergency exercises all tenants on the site are involved and must, in the event of the site alarms being sounded, take sheltering action, close doors and windows and carry out a role-call. This, together with the security requirements, does place an additional burden on tenants on the site. Generally tenants co-operate very well with these requirements and many appreciate the level of security.

An additional burden of being located on the Nuclear Licensed Site is that Licence Condition 3 requires that UKAEA seeks the Nuclear Installations Inspectorate's (NII) consent before it may issue a lease to a tenant. Before the NII will give this consent we need to demonstrate that UKAEA, as the Licensee, will have an appropriate level of control over the tenant which is normally exercised through the lease. It must also demonstrate that the work of the tenant is such that they will not bring any hazards onto the site that could adversely affect nuclear safety. Although demonstrating compliance with these requirements is generally not difficult, it can introduce a delay and in some cases a significant delay, to the issue of a lease to a tenant. The Site's Nuclear Licence requires that UKAEA supervises the safety of the tenants in some incidences. Three of the tenants carry out work with radioactive materials and UKAEA must ensure that these tenants work to its Safety Management System. To facilitate this UKAEA has developed tenant safety requirements which are based on its own internal safety requirements. The site has also appointed a Tenant Safety & Environment Manager who liaises closely with these three tenants. UKAEA will also, at appropriate intervals, carry out inspections and audits of the tenants' facilities.

To remove any area from the licensed site UKAEA has to demonstrate to the NII that there is "no danger from ionising radiations" on that part of the site. Given the ubiquitous nature of natural background radiation, this requires interpretation. It was agreed that contamination levels below 0.4Bq/g would be regarded as presenting 'no danger'. UKAEA have been successful in delicensing two areas on the Winfrith site (the case for delicensing a third area is currently with the NII). To achieve this a comprehensive series of radiological surveys and sampling were carried out. A case is then prepared for the NII to show that there are no operations on that part of the site that require to be on a licensed site, and to demonstrate that there is no residual man-made radioactivity greater that 0.4Bq/g.

10. Current Status

Over the late 1990's and the early part of this century further tenants were attracted to the Winfrith Technology Centre site. Currently there are over 40 organisations located on the Winfrith site. Of the 1600 people employed permanently on the site about two thirds are tenants. Recently the amount of building space occupied by tenants has overtaken that occupied by UKAEA, which includes all the redundant nuclear facilities as well as office space occupied by UKAEA. As such the balance has changed. No longer is the Winfrith site a nuclear facility with a small number of tenants, it is now a thriving Science & Technology Park with UKAEA still owning and managing a number of redundant nuclear facilities. This status is now nationally recognised by Winfrith's membership of the UK Science Parks Association (UKSPA). The site has also created strong links with local universities.

UKAEA's core business for our sites, other than the Culham Fusion Research Centre, is environmental restoration. Although UKAEA had been successful in developing the Technology Centre this was not part of its core business and this restricted, to some extent, how it could develop the site. The Department of Trade and Industry (DTI) provide funding for both the environmental restoration work and developing the Technology Centre. DTI rules allows UKAEA to spend money to bring a redundant facility up to a standard where it could be marketed, but did not allow it to build speculatively any new office or other facilities.

In 2001 UKAEA began to consider the practicalities of separating the Winfrith Technology Centre, which is predominantly located at the east of the site, from the remaining redundant nuclear facilities at the west of the site. The main drivers for this separation were:

- To allow UKAEA to focus on its core business
- To allow a third party to develop the Technology Centre more rapidly than UKAEA would be able to
- To remove some of the restrictions on the tenants caused by being part of a Nuclear Licensed Site
- To provide an injection of funds to accelerate the decommissioning programme.

In 2002, an opportunity was identified to sell the non-licensed part of the site to a third party. This entailed physically separating the disposal site from the retained site. The separation required infrastructure changes to the site's drains, communications systems, alarms, etc., as well as constructing a new fence between the two sites. In order to facilitate the separation of the two sites, a new project team was established entitled the Winfrith Early Remediation and Disposal (WERD) project. This team had the very challenging task of preparing all the documentation required for the sale of that part of the site and also project managing the infrastructure work required. In April this year the eastern end of the Winfrith site was sold at the commercial market price to English Partnerships as a thriving business park, which they will develop further. UKAEA and English Partnerships continue to work together on the final separation of the two sites – a successful end to the UKAEA's restoration mission for this and for this part of a major nuclear R&D site.

11. Summary of this example

Winfrith has a proud history of scientific and engineering achievements. That mission was completed by the mid 1990's and its new mission became to create a Pre-eminent Science and Technology Park. To date there has been excellent progress in achieving this vision. UKAEA has had some notable successes in its decommissioning work that has been achieved though working constructively with private sector contractors. It has demonstrated that delicensing is achievable notwithstanding the very stringent delicensing criterion of demonstrating that there is 'no danger from ionising radiations'. It has also been very successful in attracting new tenants to the site. Over 40 non-UKAEA organisation

are now located at Winfrith accounting for about 1000 of the jobs on the site. In April 2004 a major part of the site was sold to English Partnerships as a thriving business park, which will continue to be developed and provide quality employment for the local communities.

12. Conclusions

In the coming decades a large number of nuclear installations will reach the end of their useful lives and require decommissioning. Many of these installations will be decommissioned with the aim of replacing them by new installations that may serve the same purpose or another completely different purpose. By recognising and promoting the redevelopment potential of sites early in their 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 and land resources associated with the sites.

13. References

[1] CLOSS, J., Case Study- Pathfinder Decommissioning, presented at the ASME Short Course Program on Environmental Restoration of Nuclear Facilities, St. Louis, Mo., May 1992, ASME 1992

[2] FISHER, M.J., CHESNUTT, S.W., Fort St. Vrain Decommissioning – A Successful Conclusion, presented at the ANS Topical Meeting on Decommissioning, Chicago, Ill., 14-17 April 1996, American Nuclear Society, La Grange Park, IL 60526, USA 1996

[3] US NUCLEAR REGULATORY COMISSION, Site Decommissioning Management Plan, NUREG-1444, Washington D.C. October 1993, Suppl. 1, November 1995

[4] INTERNATIONAL ATOMIC ENERGY AGENCY, Planning, Organisational and Management Aspects of Decommissioning : Lessons Learned (Appendix 1.2, case 2) IAEA-TECDOC-1394, IAEA, Vienna, 2004

[5] FEDERAL LEGISLATION, "Rocky Flats National Wildlife Refugee Act of 2001", S. 1438, 107th Congress of the United States.

[6] US DEPARTMENT OF ENERGY, Stewardship Working Group, December 1999, The Oak Ridge Reservation Stakeholder Report on Stewardship, Volume 2. Oak Ridge Operations, Oak Ridge, Tennessee.

[7] HANSFORD, E.W.W., FRANCIS, R.J., BROADBENT, J.H., JASON Decommissioning Project, NUCLEAR DECOM'98, Proc. of an Int. Conf. on Nuclear Decommissioning '98, London 2-3 December 1998, IMechE Conference Transactions 1998-12, Published by Professional Engineering Publishing Ltd, 1998, pp.157-168

[8] OECD/NUCLEAR ENERY AGENCY, "The Decommissioning and Dismantlement of Nuclear Facilities – Status, Approach, Challenges", Paris, 2003.

Table I **Differences in Approach between Demolition and Redevelopment**

Perspective	Decommissioning and Demolition	Decommissioning and Redevelopment
Functional	Structures and assets with no useful function are removed.	Structures and assets with functional value for the next use of the site are retained and may be re-configured for a new use.
Physical	The site is returned as close to its pre-development state as possible.	The site is transformed into new industrial, commercial, recreational or residential property, possibly with portions of the facility retained.
Nuclear Regulator	The existing operator or owner must remove nuclear hazards as required by law.	Ownership of the site is transferred during or after the elimination of nuclear hazards.
Risk-based cleanup	Most conservative risk assumptions are used to determine remediation goals.	The proposed new site use determines the remediation goals, consistent with protection of human health and the environment.
Community	Economic activity associated with the site is lost.	New economic activity replaces economic activity lost by closure of the nuclear facility.
Decommissioning Planner	The decommissioning end point is defined by what is known about the original state of the site and current legislative requirements.	Identification of the decommissioning end point depends on planned end use and any redevelopment agreement.
Liability Management	The owner remains liable for future harm caused by any failure to completely restore the site.	The owner transfers the site and possibly the residual liabilities to the new owner
Resource Use	The land occupied by the nuclear facility is unavailable for use during decommissioning, demolition, and restoration. The subsequent lead-time needed for any new use will further delays access to the resource.	The land is returned to use earlier, enabling development on a brownfield site rather than on more sensitive or valuable land.
Financial	Cashflows are negative until the completely restored site is leased or sold.	Costs of decommissioning and restoration are reduced, can be offset by the development value of the land, and are recovered more quickly.
Decommissioner	The decommissioner is free to plan and execute the work within financial and regulatory constraints.	Planning and execution of decommissioning must be done in consultation with the developer to maximize the redevelopment value of the site.
Long-term Stewardship	The owner remains responsible for monitoring residual contamination and continues to maintain any institutional controls.	Management of all site activities becomes the responsibility of the new owner.

Table II **Winfrith reactors**

Reactor	Type	Operational Dates
Zenith	A zero energy experimental reactor	1959 - 1972
Nero/Juno	A zero energy experimental reactor, originally Nero then modified to become Juno	1960 – 1963 (Nero) 1964 – 1973 (Juno)
Hector	A zero energy experimental reactor	1963 - 1976
NESTOR	30kW 'Argonaut' type reactor used for reactor physics and shielding experiments	1961 - 1995
DIMPLE	A zero energy water reactor used for reactor physics experiments	1962 - 1995
ZEBRA	A zero energy experimental fast reactor assembly	1962 -1982
DRAGON	A 20 MW (thermal) High temperature gas cooled reactor	1964 - 1976
SGHWR	100 MW (electrical) Steam Generating Heavy Water Reactor	1967 - 1990

Relevant parts from:

WPDD Workshop on: "Safe, Efficient, and Cost-effective Decommissioning, Workshop Conclusions/Final Stocktaking", 6-10 September 2004, Rome, Italy.

a) Overall main messages for the Rome Workshop
b) Outcome – Session on "Management of Transition and Change throughout Decommissioning"

NEA/RWM/WPDD(2005)6, Available at the NEA website:
http://www.nea.fr/html/rwm/docs/2005/rwm-wpdd2005-6.pdf

Main messages:

In summary, the main messages emerging from the Rome September 2004 workshop on "Safe, Efficient, and Cost-effective Decommissioning" are:

- **Decommissioning is a mature industrial process** and many projects have been safely completed with support of local communities. Technical and scientific issues are well-understood and practical experience and associated lessons are being documented to guide future activities. Emphasis is being placed on effective planning with active programmes of community involvement.
- **Individual countries need to further develop integrated decommissioning and waste management strategies** to ensure that long-term solutions will be available for all wastes generated from decommissioning. National systems are evolving to meet national needs, against a framework provided by the international organisations, and these seem increasingly to favour early dismantling regardless of the availability of waste disposal routes.
- **Realistic and streamlined regulatory programmes are being developed** with feed back from industry experience and are placing more responsibility and accountability on licensees.
- **Accurate decommissioning waste cost calculation methods is needed.** Waste volumes may vary from project to project even for similar installations. There though appears to be a strong case for accumulating data and benchmarking costs for similar plants and processes. Further work and experience exchange on cost comparisons between different strategies (for example clearance and recycling/reuse of materials versus direct surface disposal) would be valuable.
- **International clearance criteria have been established**, with individual countries free to adopt them.
- **Financial mechanisms for decommissioning funding are evolving in the NEA member states** to meet regulatory and project needs. Continuing challenges are uncertainties in cost estimates and the implementation of measures to assure that funds will be available when required.
- **Creative research on decommissioning is being carried out.** Human factors and organisational issues are studied. Practical solutions are being implemented such as the use of management transition programmes. Some increased efficiency and effectiveness is needed by way of R&D on improving technology and developing innovative techniques, subject to justification of its cost and value. There is a need to consider how to design commercial contracts so that decommissioning contractors will be willing to test new, relatively unproven techniques.
- **Continuing emphasis on education in critical nuclear skills is needed** to ensure availability of the necessary expertise for both near-term decommissioning needs and long-term energy needs.
- **Public acceptance is still a major challenge**. Without public acceptance, decommissioning may be prolonged and difficult to implement. Hence, all actors and interested parties need to be constructively involved in the dialogue within the local communities to gather and evaluate all relevant concerns and thereby inspire confidence in the safety of decommissioning activities.

5. Outcome – Session on "Management of Transition and Change throughout Decommissioning"

5.1 Target outcomes of the session

Identification of management issues in transition and presentation of solutions that have worked, and future needs regarding,

- Management planning for transition and decommissioning.
- Management of decommissioning.
- Stakeholder engagement.

5.2 Subject areas

This session was chaired by Albert Frischknecht, HSK, Germany. The subjects to discuss in this session were:

- Effective ways to organize & mange a decommissioning project (including knowledge management).
- End of plant operation and transition to decommissioning with emphasis on managing workers and other stakeholders.
- Effective stakeholders interfaces (before and during decommissioning and including community aftercare).
- Transition from a nuclear decommissioned site to an industrial site.

A summary of the papers in the session can be seen in Appendix 2

5.3 Conclusions and results of the session

The need for early planning for decommissioning was re-emphasised and it was noted that this is already built into facility design and licensing arrangements in many countries, so it is clear that this message has been widely accepted. As regards the content of plans, it is also clear that a wide variety of technical and practical issues have to be addressed, and that in addition to the technical issues, stakeholder interests have to be protected. One particularly valuable point that was emphasised was the need to identify and agree on the end-point of the decommissioning process. That is to say, getting a clear understanding of what the site may be used for afterwards. (e.g. Re-use for industrial purposes or for unrestricted use, i.e. 'Greenfield' status.) This may influence the extent of clearance required, the overall costs and, significantly, the eventual impact on the local community. The key point was that the plan should ensure, so far as possible, that there are no surprises during the decommissioning process, and it did not seem that there was much more to be done on this in the international context, except perhaps in regard to consideration of plans for dealing with the possible effects of terrorist activity.

Management of decommissioning was a major issue for further consideration. The first message was that decommissioning needs to be managed as a professional project in its own right. There was also some discussion of the relative merits of having decommissioning done by the existing plant operator or having it taken over by some other organisation set up for the purpose, like ENRESA in Spain or ONDRAF/NIRAS in Belgium. There were different and strongly held views on either side. One suggestion was that, for the purpose of reducing the facility to waste, it needed people different from

those who had built it and cared for it during its operational life. Another was that it needed people who knew and understood the plant and its history.

There was a question of whether contractors used for decommissioning should be major contractors, with a large contract, or a larger number of smaller, local contractors working under local management and employing local people. The Spanish experience at Vandellos seemed to favour the latter option. There was also the question, related to the issue of fixed price contracts mentioned above, about how technology is developed and improved and how it is shared and disseminated if there is no mechanism for getting contractors to feed back information on what worked and what did not. These matters seemed to be of common interest and worth further study in the international context.

It was also suggested that, in parallel with such developments in the management of decommissioning, there might be scope also for developments in the management of its regulation. The regulation of decommissioning activities is not a simple extension of the regulatory regime that was in place during plant operation. New issues requiring regulatory review and consideration arise that were not present during plant operation. Also, it was agreed that regulatory burden should decrease as the risks associated with the facility decrease.

Stakeholder engagement emerged again as a major issue. It is now seen clearly as the key to progress on many issues of nuclear power, and not least on the matter of dealing with waste arising from decommissioning. Discussion covered the two broad areas of dealing with the interests of staff and dealing with the interests of the local community. As regards staff as stakeholders as well as a valuable resource, it seemed that keeping them involved in plans and decisions and caring for their interests, including long-term employment prospects, was no more than the good management seen in many fields, and it did not seem that there is much scope for international work on this. As regards the local communities, the US work on environmental conflict resolution confirmed much of what has been emerging from the NEA Forum on Stakeholder Confidence, particularly in regard to the experience in Sweden and Finland, and in Canada and Belgium, where local communities have been involved in the development or led the development of strategies and management plans.

It seems that the end-state of decommissioning is one of the most important considerations for local communities. Consequently, it was felt that there are still issues to be explored and experience to be exchanged on matters such as identification of legitimate stakeholders, and it seems that further international work on this topic would be justified.

Ideally the planning of decommissioning and involving of stakeholders should begin already at the start-up of the nuclear facility. The key sentence would be “Plan the work & work the plan”.