

# **Identifying public concerns and perceived hazards for the phased disposal concept**

**A report by  
The Future Foundation**

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## Executive summary

Focus group research by the Future Foundation has shown that members of the public are able to respond sensibly and intelligently to the issues raised about the management of radioactive waste. This remains the case even when they are being asked to discuss the more complex and technical issue of the phased disposal concept.

The research exercise for this project was undoubtedly a demanding one: members of the public were being asked to read and discuss a considerable amount of printed material on a complex issue that they knew nothing about. Nevertheless, we found that people *were* able to engage with the subject matter and expressed considerable interest in the information that they had been given. Furthermore, they *were* able to comprehend the broad outline of the phased disposal concept and to articulate their responses to the concept and its different phases.

Many respondents expressed broad satisfaction with phased disposal ‘in theory’. They were concerned, however, about what would actually happen in practice, once the concept was put into action. In particular, they wanted to know:

- *What happens if something goes wrong?* People wanted to know what mechanisms would be in place to limit the damage from an accident or mishap.
- *How are you going to pay for it?* People wanted to know how a budget could be guaranteed over the enormous timescales involved. Underlying this concern was the suspicion that the nuclear industry would seek to offload the financial burden of waste management at the first possible opportunity.
- *How do you get the timing right?* People wanted to understand the basis for Nirex’s scientific and technical forecasts. The precision of these forecasts was regarded as crucial, given that the success of the concept rests on ‘getting the timing right’ – that is, on containing the waste and isolating it from the wider environment long enough for the radioactivity to decline to acceptable levels.

The transportation of radioactive waste was probably the largest concern expressed freely in response to the printed material. This phase was regarded as the weakest link in the chain, where both the potential for an accident and the potential for widespread damage to the human environment were at their greatest.

Respondents also expressed considerable unease about the post-closure phase. Most respondents were disturbed by the idea that there would ever be an end to the human management of radioactive waste. They argued that monitoring should continue for as long as the waste exists.

There was some reluctance among respondents to discuss the phased disposal concept. There were three main reasons for this reluctance:

- People felt that they lacked the scientific knowledge to form a valid opinion about phased disposal.
- People could not see a tangible output or benefit to having expressed their concerns.
- People were suspicious of Nirex's motives in having commissioned the focus groups.

It is crucial to recognise that any discussion of radioactive waste will operate in a general climate of public distrust towards the nuclear industry and the government. So, for instance, however much respondents were told about the workings of phased disposal 'in theory', they remained suspicious that in practice the industry would seek to cut corners to save itself money – and that the safe management of the waste would be neglected.

Most respondents came away from the focus group discussion more convinced than before that the issue of radioactive waste was important and needed to be addressed. Discussion of the phased disposal concept led people to 'revisit' the basic issues surrounding radioactive waste:

- the sheer quantity of waste in existence
- the enormous timescales involved
- the need for effective regulation
- mistrust of the nuclear industry and government

Given the low levels of public awareness about radioactive waste, any future communications strategy needs to concentrate on a restricted number of key points as the best means of ensuring rudimentary levels of knowledge. Respondents needed the 'building blocks' of knowledge about the general issues of radioactive waste before they can move on to discuss a more detailed, complex topic such as the phased disposal concept.

## Introduction

Nirex has developed the concept of phased deep disposal as an option for the long-term management of intermediate-level waste and certain low-level waste. According to the concept, waste would be stored in a deep geological repository. The repository would remain accessible and the waste would continue to be monitored for a period of up to several hundred years. During this period, the waste could still be taken out again if required. Future generations would then have the choice of either continuing to store the waste (by keeping the repository open and accessible) or disposing of the waste (by permanently closing and sealing the repository).

One of Nirex's roles is to conduct laboratory, field and theoretical studies into the phased disposal concept. As part of its commitment to wider public consultation, Nirex is keen that its research should take into account public concerns with regard to radioactive waste and its management. With this in mind, Nirex commissioned The Future Foundation to identify the issues and concerns that members of the public would have with regard to the concept. Enhanced understanding of the public perspective would demonstrate a genuine effort to break away from the nuclear industry's past tendency to approach waste management issues from a uniquely industry, 'expert' perspective. The aim would be for the issues raised by the public to inform the future direction of Nirex's technical work.

The Future Foundation agreed the key objectives for the project with Nirex:

- To articulate succinctly the concerns and risk perceptions of the general public resulting from a discussion of the phased disposal concept
- To provide guidelines as to how Nirex can better communicate complex issues and provide readily understandable information to the public
- To inform the technical process with suggestions for the kind of assessment work required to address public fears that may arise
- To assess the effectiveness of the research process as a means of public engagement and to suggest improvements

The Future Foundation is a think-tank that aims to bring a better understanding of social issues and public attitudes to business and organisational planning. As such, we are fully supportive of Nirex's stakeholder policy and its aim to develop a means of bridging the communications gap between the complex technical processes involved in phased disposal and public understanding of the process.

## 1. Research methodology

We believe that focus group discussions with members of the public, involving skilled facilitation by experienced Future Foundation staff, was the best means to meet Nirex's objectives. From the previous research that we conducted into public attitudes to radioactive waste, we knew that plenty of time and open-ended discussion would be required to generate thoughtful responses from the respondents. We also knew that, given the low levels of public awareness about the issue of radioactive waste, respondents would need to be given prompt material that explained the often complex issues and facts involved in the management of radioactive waste and, more specifically, the phased disposal concept. (The findings from the previous research are available in the report entitled *Establishing the Value of Wider Public Consultation*, November 2000.)

We held eight focus group discussions with members of the UK public. All groups comprised equal numbers of men and women but their composition varied in terms of age, lifestyle and socio-economic circumstances, allowing us to achieve a broad cross-section of the UK population. The groups were conducted in a variety of locations around the country: Carlisle, North London (Cockfosters), Paisley and Cardiff. The Carlisle and North London groups were held in late November/early December 2001, while the Paisley and Cardiff groups were held in January 2002.

The groups were composed as follows:

Carlisle	20-30 yrs	No children at home	ABC1
Carlisle	40-50 yrs	Children at home	C2DE
North London	30-40 yrs	Children at home	ABC1
North London	50-65 yrs	No children at home	C2DE
Paisley	30-40 yrs	Children at home	ABC1
Paisley	50-65 yrs	No children at home	C2DE
Cardiff	20-30 yrs	No children at home	ABC1
Cardiff	40-50 yrs	Children at home	C2DE

To avoid the distorting influence of anyone with specialist knowledge, we excluded people who are or have ever been employed by or connected with (i.e. no close family member employed by) the nuclear power industry or the Ministry of Defence or any other government department. We also excluded employees of environmental campaign organisations such as Greenpeace, Friends of the Earth and CND.

The recruitment of the focus groups was sub-contracted to a market research recruitment agency, Jill Lonsdale Research Services.

Given the complexity of the issues involved, we invited each group of people to attend two sessions. The first session was a general discussion of the issues of nuclear energy and radioactive waste, while the second session focused on the specific issue

of the phased disposal concept. Each session lasted approximately two hours. The two sessions were held on successive evenings in order to maximise the amount of learning and thinking that people retained from the first session and carried into the second session. In addition, by holding the sessions so close together, we hoped to minimise the degree of external ‘contamination’ – that is, the degree to which any individual respondent was able to discuss the first session with a relative, friend or colleague who might have specialist knowledge or interest in the issues involved and might, therefore, influence the respondent’s approach to the second session.

The purpose of the **first session** was to bring the respondents ‘up to speed’ in terms of their knowledge and awareness of nuclear energy and radioactive waste. This was essential for respondents to then be able to address the specific topic of phased disposal. It was also crucial for us to establish where the various respondents were starting from in terms of their knowledge and attitudes, so that we could better appreciate their subsequent responses to the idea of phased disposal.

At the start of the session, respondents were asked about their spontaneous knowledge of radioactive waste. They were then given printed material outlining the basic issues and facts involved in the management of radioactive waste. Respondents were encouraged to give their views on the information that they had been given: what was new to them, what they did or didn’t believe, what they did or didn’t understand, and whether or not the information had altered their understanding and attitudes.

The **second session** focused on the specific topic of the phased disposal concept. Respondents were asked to read an introductory pack that explained the overall framework of the concept. They were then encouraged to share their thoughts on what they had read.

Next, they were lead through a step-by-step discussion of the concept’s phases. For each phase, they were given a page of text and an illustration that explained the phase in greater detail. They were then encouraged to comment upon what they had read before moving on the next phase.

The **introductory material** used for the discussions (a combination of printed text and illustrations) was adapted from existing Nirex literature. Based on our previous work for Nirex, we decided that printed material was best suited to the purpose of disseminating the necessary information to respondents. In previous focus group discussions, we found that people tended to prefer a written text to, say, a video presentation because they felt that the text gave them a greater sense of control over the subject matter. They were able to read things at their own speed and to re-read bits that they weren’t sure about. Also, it was useful for both facilitator and respondents to be able to refer to the material during the course of the subsequent discussion.

Throughout this report, verbatim quotations from the focus group discussions are given in italics.

## 2. General attitudes to radioactive waste

### 2.1 The findings from the general discussion

The first session that respondents attended examined their general knowledge and attitudes towards radioactive waste. The session followed a similar structure to the previous group discussions that we conducted for Nirex in April and May 2000. (Again, the full results from those previous discussions are available in the report *Establishing the Value of Wider Public Consultation*.)

The tenor of the discussion – in terms of the respondents’ awareness and attitudes – was in keeping with the previous focus groups.

- By their own admission, people knew very little about the issues of nuclear energy and radioactive waste. They had never given much, if any, thought to the matter. Nevertheless, they expressed a strong but vague mistrust of nuclear energy and were cynical and suspicious about the nuclear industry.
- Once they had been given information about radioactive waste, they recognised the importance of the issue and were surprised at how little they – and, by extension, the public in general – knew about such an important topic.
- There was widespread agreement that radioactive waste was a problem that needed to be tackled by the current generation – and respondents were surprised and alarmed to read that no long-term solution had yet been agreed.
- For many people, the scale of the problem was a strong argument for stopping nuclear energy now. They were unwilling to separate the issue of waste management from the issue of waste generation. Given that no agreement had been reached on what to do with the existing waste, it was considered irresponsible and immoral to continue producing any more.
- There was strong support for the wider dissemination of information about radioactive waste into the public domain. This was regarded as a prerequisite to proper accountability.
- There was a common feeling that, whilst the public should be kept informed, the final decisions about the management of radioactive waste should be made on its behalf by representative organisations. It was crucial, however, that these organisations should be accountable to the public and open to public scrutiny.
- Respondents suggested that, in addition to the wider dissemination of information, accountability and scrutiny could be achieved through two key measures:
  - Involving a cross-section of interested parties in the decision-making process

- Establishing a credible, independent watchdog to oversee the management of radioactive waste
- There were very low levels of awareness of Nirex, with only a few respondents claiming even to recognise the name. After reading about Nirex, respondents expressed strong disapproval of Nirex's ownership by the nuclear industry. They argued that Nirex needed to be independent from the commercial interests of the wider industry.

The views that people expressed were often contradictory. For instance, respondents argued that the public should be better informed but they also said that Nirex should concentrate on finding a technical solution rather than wasting time on communicating with the public. They also admitted that they were unlikely in real life to read or watch any material that was produced on the subject. Partly such contradictions stemmed from the fact that people did not have established views on the subject. They knew little about the issue and had never given it much, if any, thought. Consequently, their views were fresh, spontaneous and easily changed in the light of other people's comments. Also, to be fair, there are genuinely contradictory issues involved in the management of radioactive waste – and, from the public's perspective, the nuclear industry only has itself to blame if people are cynical towards the industry and unreasonable in their expectations.

As we will see, respondents continued to express contradictory attitudes in their discussion of phased disposal. For instance, they said that they simply wanted to 'get rid of the stuff' but, at the same time, they argued against the idea that monitoring of the waste would ever cease.

## **2.2 The influence of Sellafield on Carlisle respondents**

The only notable difference between the groups in terms of knowledge and attitudes is that, on the whole, the older Carlisle respondents were better informed than other people about the general issues surrounding nuclear energy and radioactive waste. This is because Sellafield is very much a familiar aspect of life in Cumbria – and an active topic of discussion. Some respondents said that, in the wake of September 11th, they had discussed the threat of a terrorist attack on Sellafield in their everyday conversations with family and friends. Sellafield was recognised and valued as a major local employer, and several respondents knew someone who had worked there, either as full-time employee or as a contract worker. Furthermore, people had been to, or knew someone (often their children) who had been to, the visitor centre at Sellafield. A few people remembered the refusal of the rock characterisation facility (RCF) proposal, which they recalled as a plan to 'dump' the waste underground. It is worth noting, however, that the younger people from Carlisle were no better informed than any of the respondents elsewhere in the country – and knew far less than the older Carlisle respondents.

Although the Future Foundation facilitators recognised the Carlisle respondents as better informed than other people, the respondents themselves did not feel that they

knew much – and certainly we should not overemphasise their level of awareness or knowledge, which remained at a fairly rudimentary level.

## **2.3 The impact of September 11th**

During the first set of focus groups, conducted in late November and early December, respondents were very quick to express their considerable concerns about terrorism in relation to nuclear energy facilities. They were worried that terrorists might attack a facility or might get their hands on a quantity of waste and manage to turn it into some form of weapon. Clearly, respondents expressed these fears in the shadow of the September 11th attacks and the on-going conflict in Afghanistan.

It was very notable, however, that concerns about terrorism were greatly reduced by the time that we conducted the next set of group discussions in January 2002. While several people voiced concern about the security of facilities, the issue was no longer a prominent aspect of the conversation. When asked about this, people attributed their reduced concern to the fact that the issue of terrorism and international conflict had, by then, fallen down the news media agenda. This is a clear example of the degree to which public concerns can be heightened by heavy news coverage, only to fall back relatively quickly once the issue is dropped from view.

Beyond the immediate concern about facility security, the events of September 11th and the conflict in Afghanistan perhaps contributed to an increased global perspective among many respondents in the November/December groups. They were keen to know what other countries were doing with their radioactive waste, and they argued that the issue needed to be addressed at an international level. There was limited value in the UK sorting out its waste management policy if other countries didn't deal safely with theirs.

*“If theirs blows up, we get affected by it.”*

However, this global perspective was not a prominent aspect of the January group discussions.

### 3. Responses to the phased disposal concept

#### 3.1 Concerns about phased disposal in practice

Many people were reassured by what they read about phased disposal. The level of detail – especially in the information about the individual phases – reassured them that the experts were giving serious thought to the matter.

*“It’s the common sense option. I can’t see them coming up with anything better.”*

*“I’m happier knowing that they’re really working at it and trying to make it safe.”*

*“I’m convinced now that it’s a lot better organised and safer than I expected.”*

It is worth noting that, as in any focus group discussion, the critics of an idea or issue were far more vocal than those who were in favour or who did not have strong feelings. In these sessions, the respondents who said that they were reassured tended to be those who did not offer spontaneous opinions. Rather, they needed to be prompted to contribute to the discussion. Their quietness does not mean that their opinions are any less valid (or any less representative of the wider population), but it is inevitable that the discussion – and our account of the discussion – will be dominated by those who were more vocal. Also, in fairness to the more vocal respondents, the facilitator was encouraging people to express their concerns. By dwelling on the negatives – on their doubts, on the details that they weren’t happy about – people were only doing what was required of them.

Many respondents expressed broad satisfaction with the phased disposal concept ‘in theory’. They were concerned, however, about what would actually happen in practice, once the concept was put into action. In particular, they wanted to know:

- a) What happens if something goes wrong?
- b) How are you going to pay for it?
- c) How do you get the timing right?

#### **a) What happens if something goes wrong?**

Respondents were not concerned primarily about the routine, day-to-day operations of phased disposal. Rather, they wanted to know what would happen if something out of the ordinary occurred. They were worried about the scale of damage to the wider environment if there was, say, an explosion or a leakage – and they wanted to be reassured that there were mechanisms in place to limit the scale of the damage. Respondents queried whether there were back-up plans that anticipated and took account of potential accidents and mishaps. In particular, they were keen to know whether it was possible to close the deep repository immediately in an emergency situation. They wanted to hear that there was some form of ultimate safety option that would contain the potential threat to the wider environment.

*“They don’t say what they’ll do if there is a leakage.”*

*“Is there a safety feature in place - and I know it’s not the ideal option - where you could just seal it?”*

*“Flick a switch and it’ll fill up with concrete.”*

The concern about ‘something going wrong’ was crucial with regard to the post-closure phase, since people tended to regard the eventual corrosion of barriers and the leakage of radiation as ‘something going wrong’, rather than as anticipated aspects of the process. We will discuss this in more detail in the section (Section 3.2, viii) on attitudes to post-closure.

### **b) How are you going to pay for it?**

Respondents were concerned about how phased disposal would be financed over such enormous timescales. They wanted to know how a budget could be ensured for the hundreds and thousands of years that would be involved. People were worried that money for the project would eventually run out and the waste would not receive the proper attention to ensure its safe management.

*“How much money have they got?”*

*“Who’s going to keep funding it? Because if the company went bust, well, we’re not going to pay for all the people working [in the repository]. It’s going to be quite expensive, isn’t it?”*

*“Someone will have to be paid to look after this stuff. The more dangerous it gets, the higher the price.”*

There was a general fear that industry would cut corners – perhaps not now but sooner or later, and with disastrous consequences. One fear was that, at some point in the future, the owners of the waste would simply dump it in an effort to rid themselves of the on-going financial burden of proper management. Another worry was that, due to cost considerations, the owners would not build the repository deep enough underground or would not properly maintain the facilities once it had been built.

*“We need to be thinking about it and get it done so that it’s not just a half-hearted attempt at building a hole.”*

*“At the end of the day, is it going to come down to who’s offering the best price, who’s offering the best materials?”*

### **c) How do you get the timing right?**

Some respondents could see that the success of the concept rested on ‘getting the timing right’ – that is, on containing the waste for long enough for its radioactivity to decline to acceptable, background levels. Given that timing was critical, respondents were concerned that they were not being given more precise timescales. In this way,

the flexibility of the concept was seen as a negative attribute. They considered phrases in the prompt material ('at a future date', 'at a measured pace', 'at an appropriate time', 'for a period of up to several hundred years') to be too vague.

Respondents wanted to understand the basis for scientific and technical models and forecasts.

- How can scientists know how long a material will remain radioactive?
- Given that mankind has only been producing radioactive waste for a few decades, how are scientists able to extrapolate the waste's behaviour over the course of hundreds and thousands of years?
- And how do they know how the materials of the barriers (for instance, the stainless steel canisters, the backfill cement) will interact with the radioactive waste over the very long term?

*"I don't think they can forecast what condition the container or the cement will be in a thousand years."*

### **3.2. Prompted concerns about the phases**

In this section, we examine the concerns that respondents expressed with regard to the specific phases of the concept. We attempt throughout to give a realistic assessment of the degree to which people's concerns were freely expressed or were prompted by the facilitator's questioning. We also consider the strength with which these concerns were expressed and the causes of the concerns.

#### **i) Waste packaging**

Reading about the current arrangements for packaging the waste led respondents to revisit the issues about regulation and industry ownership. They were heavily critical of Nirex's advisory role on packaging. They wanted to read that Nirex was able to compel waste producers to comply with its specifications, not that it simply offered advice – which, presumably, the producers were free to ignore if they so chose. Some respondents wanted to know whether Nirex staff actually visited the producers' sites or took the packages away and subjected them to tests – or whether, worryingly, Nirex's role was simply to offer advice from a distance, with no power of sanction. At the root of people's concern was the perception that businesses have a tendency to cut corners to reduce their costs and to boost their profits. This tendency needs to be kept in check by effective regulation – which people wanted from Nirex, but did not feel that they were getting.

Many respondents did not immediately understand or take on board the point that the waste is packaged by the waste producers and currently stored on their premises.

People were unhappy at this because it meant that the industry's practices were not subject to sufficient scrutiny.

*“Shouldn't Nirex be doing it themselves?”*

Many respondents expressed doubts about the robustness of the waste packages. (However, as we discuss in Section 4.3, these doubts were encouraged by the perception that the supposed experts didn't have all the answers and wanted members of the public to come up with ideas and suggestions.)

- Many respondents questioned the efficacy of cement as a means of containing the waste. They assumed that Nirex was using ordinary builders' cement, which had no special properties.
- Many had heard that lead was most effective at blocking radiation. So, why wasn't it being used instead of, or in conjunction with, stainless steel?
- From the cross-section illustration of a 500 litre drum, some respondents were concerned that the stainless steel exterior was too thin – and would not be robust enough to withstand accidental impact e.g. if the container was dropped or punctured.

Underlying people's concerns was a resistance to the idea that the containers could not be guaranteed to last forever and would eventually corrode. We will return to this concern in the section on attitudes to post-closure (section viii below).

## **ii) Interim storage in surface stores**

People were concerned about surface storage because, given the relative proximity of the waste to human society, there was greater potential for widespread harm if something did go wrong – most notably, a leakage or explosion. Fears about terrorism and security (which, as we saw, were more pronounced in the November/December groups) were most commonly associated with this stage of phased disposal. A surface store was seen to present the clearest target for terrorists. A deep repository was regarded as safer because it was harder to gain access to, and also because there would be less impact on the wider environment if anything did go wrong.

Respondents fluctuated in their views on the merits of surface storage. They were alarmed that waste was still being stored on the surface – and was, therefore, more vulnerable to an accident that would harm the wider environment. Many people couldn't understand why the waste wasn't being transferred quicker underground, out of harm's way. This confusion was heightened by some people's misapprehension that an underground repository had already been built. If the repository was ready and waiting, why wasn't it being used? People assumed that there must be some unspecified technical reason for needing to keep the waste packages on the surface for several more decades.

At other times, people couldn't understand why the waste would ever be removed from the surface, where it could be easily monitored. They didn't feel that they'd been given a proper reason for placing the waste underground. The assumption was that the waste would need to be moved underground because there was something wrong with the surface stores – perhaps because the surface stores were full up.

### iii) Transport to a repository

The transportation of radioactive waste was probably the largest concern expressed freely in response to the printed material. This phase was regarded as the weakest link in the chain, where both the potential for an accident and the potential for widespread damage to the human environment were at their greatest. From the respondents' point of view, this was the stage at which disaster was most tangible, when radioactive waste entered the domain of people's everyday lives. And for some people, this was made all the more alarming by the fact that the transportation of waste is already taking place.

*“All sorts can happen between A to B.”*

*“It's worrying that you might be driving alongside it.”*

It was widely believed that there was more traffic and that there more accidents on both the roads and the railways than ever before. For this reason, it was not necessarily reassuring to be told that there had not yet been any serious accidents involving waste – the roads and railways had simply not been so dangerous in the past. (It is worth noting that the focus groups were conducted in late 2001 and early 2002, at a time of sustained public and media concern about the state of the railways and at a time of industrial action by train worker unions.)

*“There's a train crash every week.”*

Many people wanted to know whether a lorry carrying radioactive waste would be given a police escort. They could see both the advantage and disadvantage of this. On the plus side, there would be the extra protection afforded to the waste. The disadvantage would be that an escort would draw attention to the vehicle and make it a target for terrorists. But people then reflected that no one ever worried about the safety of lorries carrying petrol, even though they were potentially an enormous threat if something went wrong.

Most people were greatly reassured by the details of the train crash test that had been conducted to demonstrate the integrity of a transport container. However, some regarded the test as incomplete because the tested container had not contained any radioactive waste. Was it possible that in a real situation the impact of a crash would trigger some kind of reaction or explosion in the waste inside the container? Others were concerned about the impact of an aeroplane crashing into a transport container – a concern among those interviewed in November 2001, only a month after the September 11th attacks. They pointed out that a train runs on diesel fuel – but would

the containers be able to withstand the fire generated by aviation fuel, which is far more inflammable?

#### **iv) Storage in the repository**

Many respondents were alarmed by what they perceived to be inconsistencies in the proposed measures to be taken.

- They could not understand why the waste packages needed to be taken out of the transport containers on arrival at the repository. If the containers afforded an extra level of containment and protection, then why remove them?
- In any case, if the waste packages were safe, why did they need to be placed inside transport containers? The need for extra protection suggested that the original waste packages were inadequate?
- If the waste packages were safe, then why was there any need for shielded bays? The use of these bays suggested that the waste packaging was inadequate and threatened to expose workers to radiation.
- Why was there any need to monitor contamination of the rail tunnel and vertical shaft? If the packaging was effective in containing the radioactivity, why was there expected to be any build-up of contamination?

At a wider level, some respondents perceived a contradiction in the whole idea of storing the waste underground rather than disposing of it. If the waste was safely contained, then why was there any need to keep the repository open and monitored? And if the waste could not be left safely unattended, then why was it being put in a deep repository? Alarm bells started ringing in people's heads – surely the intention to monitor the waste packages was an admission that their safety could not be guaranteed.

*“If they're worried that it isn't safe, even when it's five miles underground or what have you, then what are we playing with here?”*

*“If there's an open vault that hasn't been backfilled and there's a war tomorrow and Iran took over Britain, would the Government fear that there are open vaults? ... Would the Government think, 'Shit, we've left these vaults open'?”*

These perceived inconsistencies undermined people's confidence in the levels of scientific expertise.

*“To me, it means that, even at this stage, they don't know about safety.”*

Respondents were suspicious about the “acceptable levels” of radiation that workers would be exposed to. They were not confident that the levels would actually be safe, and they feared that workers would be exposed to dangerous doses of radiation. This

might happen because of industry cost-cutting (e.g. making employees work longer shifts than they should do). Or else it would happen because scientists did not yet know enough, and what was deemed acceptable today would come to be recognised as dangerous in the future. In support of this, people cited the examples of coal miners who developed respiratory problems, factory workers poisoned by asbestos, and soldiers who had been used as human guinea pigs in atomic bomb tests.

People wanted to know whether it was more dangerous to have waste distributed at different sites or whether stockpiling the waste in a single location was likely to increase the chances of an explosion.

Many respondents assumed that the proposed repository would only accommodate the waste that is currently in existence. This led to concern about what would be done with the additional waste that would be generated in the future. Would more repositories need to be built? Concern about capacity encouraged the line of argument (which respondents kept coming back to) that nuclear energy should be stopped now so that no more waste is produced.

People were interested to know more about the integrity of the repository. Had such an underground repository ever been constructed before – and on such a scale? Would the vaults be able to withstand the weight of the overlying rock?

## **v) Monitoring and retrievability in the repository**

Respondents were reassured by details of the day-to-day operations of the repository. This was what they had been hoping to read: evidence of a well thought-out process, where all the i's had been dotted and all the t's crossed. It was “*pretty clinical*”, in the words of one respondent.

What respondents were concerned about was the capability to deal safely with an accident. What would happen in the contaminated areas if there was a spillage? What would happen if the overhead crane malfunctioned?

Before reading specific details about this phase, several respondents voiced the suspicion that putting the waste underground was an excuse for the waste producers to stop monitoring the waste. These respondents were concerned that monitoring would not actually continue for long before the repository was sealed and closed.

*“It’s a bit like ‘We tried to do an underground dump but we didn’t get that, so we’ll build an underground dump, monitor it for 10 years and then it’s an underground dump.’” “I don’t think they can stop monitoring if it’s on the surface. But I think they can if they do this [place the waste in a deep repository].”*

These fears were allayed when respondents went on to read that monitoring would continue ‘for a period of up to several hundred years’.

Many respondents were genuinely interested to know how the waste packages would be monitored. Would there be sensors and alarm systems? Would monitors be fitted on the inside or the outside of each container? If there was a leakage, would the monitors remain intact or would they be damaged by the radioactive materials? Respondents were keen to know the balance between human monitoring and mechanical, ‘remote’ monitoring.

## **vi) Backfilling of the vaults**

Many respondents regarded this stage as “*the point of no return*” – and it was here that they began to express their disagreement with the idea that there would ever be an end to human management. They argued that monitoring should continue for as long as the waste remained in existence. With this in mind, respondents wanted to know whether the waste could and would be monitored after backfilling. If not, how would scientists know if the waste packages had corroded and leakage had occurred?

Respondents wanted to know whether the waste packages were retrievable from the backfill. If they were, then why weren’t the vaults backfilled as soon as the packages were in place, as an additional level of protection and containment? And if they weren’t, then why was backfill treated as a separate phase from the closure of the repository?

Once again, there was widespread dissatisfaction about the use of cement. Respondents did not give Nirex the benefit of the doubt that the backfill would provide an effective means of containing the waste.

## **vii) Closure of the repository**

Respondents did not have much to say about this stage of phased disposal. They did not regard it as a separate phase from the backfilling of the vaults.

## **viii) After the closure**

Most respondents were disturbed by the idea that there would ever be an end to human management. They argued that monitoring should continue for as long as the waste exists.

Furthermore, many respondents resisted the idea that the containers – like any other material – could not be guaranteed to last forever. They were worried that, over the long timescales under consideration, the containers would eventually corrode and that the radioactivity would dissipate into the surrounding geology. Corrosion of the containers and leakage were regarded as ‘something going wrong’ rather than as being anticipated and acceptable developments in the phased disposal concept.

*“They can’t guarantee that the things they put them in will last forever, can they?”*

The potential for leakage was all the more alarming if the sealed repository was no longer being monitored.

*“It’s a bigger problem with it sealed than if it’s open.”*

*“Surely you can’t just lock it away and throw away the key and forget about it. Someone’s got to monitor it.”*

People expressed a fear that, without monitoring, the location of the repository would be forgotten and that future generations would build housing on contaminated land above the site.

*“I don’t like to think of loads of these places underground, under housing estates, under children’s playgrounds, or whatever. I mean, we’re going to move... and we’re going to build in different places.”*

The major concern about the post-closure phase was the question of ‘getting the timing right’ – that is, containing the waste and isolating it from the wider environment long enough for the radioactivity to decline to acceptable levels. Respondents were worried that there would be leaks while the waste was still dangerous and that the leaked radioactivity would reach the human environment on the earth’s surface.

*“What if it corroded quicker than expected?”*

Respondents were concerned about whether Nirex knew enough about future geological developments to be sure that the radioactivity would be contained.

- What would be the impact of earthquakes?
- Or the shifting of tectonic plates?
- Could the level of the land fall, so that the repository was no longer so deep underground after thousands of years?
- What were the implications of rising sea levels?
- Some of the Carlisle respondents, who were familiar with the RCF refusal, were concerned about the impact of groundwater and the need for the repository to be sited in a suitable geology.

Underlying people’s unease about post-closure was their desire for a ‘full stop’ to the whole process. Many people accepted that there was no ‘magic wand’ solution – and that the reality of the waste’s existence could not be simply wished away – but they continued to hope for a 100% guarantee of safety, which phased disposal does not provide.

*“They say ‘decrease the risk’, but they should say, ‘There’s no way it’s going to happen.’ It’s not very reassuring, is it?”*

This desire for a definitive resolution explains the popularity of partitioning and transmutation – the idea that radioactivity can be reduced or removed (but, again, we stress that respondents were not actually given any detailed information about P&T).

## 4. People's ability and willingness to discuss phased disposal

### 4.1 The discussion reflects people's lack of knowledge

Respondents found the exercise demanding – which is unsurprising, given that they were being asked to attend two two-hour sessions at the end of consecutive working days. Whilst there, they were being asked to read a considerable amount of printed material on a complex issue that they knew nothing about and had never before given any thought to. Then, with no time to digest and reflect on the material, they were being asked to discuss the issues that it raised. (More than one respondent commented that the exercise was a little like being back in a classroom.)

Whilst respondents found the exercise demanding, it should be noted that most of them expressed considerable interest in the information that they had been given and claimed to have enjoyed the ensuing discussion. An indication of their interest – and the importance that they attached to the issues raised – was given at the end of the second session, when respondents expressed enthusiasm at the idea of being sent a summary of this report.

Many respondents commented that there was a limit to the amount of information that they felt able to take on board in a single reading. While few claimed to have had trouble actually understanding the material, several people said that they would have liked more time to absorb what they had read. On the evidence of the discussion that followed, it was apparent that respondents had indeed followed much of the information – but also that there was plenty that they had not absorbed or had only half-understood. Crucially, it was clear that some respondents had not picked up all of the key elements of the phased disposal concept – either at the end of having read the prompt material or even at the end of the whole discussion.

Indeed, people's views and comprehension of the issues appeared to fluctuate over the course of the discussion. By the standards of focus groups on other subjects, the discussion moved back and forth to an unusual degree. It did not follow a linear progression. In our experience, people are normally able to progress from topic to topic in rough accordance with a facilitator's discussion guide. To put it crudely, when the facilitator says, "Okay, let's move on and talk about...", they are able to put the last topic to one side and move on to the next topic. During these discussions, however, people kept returning to a number of key issues that they did not fully comprehend or that they were uneasy about. The issues that caused people confusion or unease (and that they kept coming back to) were:

- the idea of continuing to store the waste on the surface
- the idea of removing the waste from the surface and placing it underground
- the idea that monitoring of the waste would eventually stop

- the idea that the containers – and, indeed, all the barriers – would eventually corrode, given the enormous timescales involved

The discussion moved back and forth over these same issues, sometimes as though the respondents had not discussed them before and were coming to them anew. For instance, respondents would discuss the merits of surface storage. They would apparently cover the issue to everyone's satisfaction and move on to another topic. Then, a while later, a respondent would return to the issue and query once again the merits of surface storage. Respondents 'revisited' and 'relearned' issues and facts over the course of the discussion.

This curious fluctuation in the discussion suggests that many respondents had only a tentative grasp on the information that they had been given, due to the complexity of the issues involved and the short length of time they were given to absorb the material. By moving onto the more detailed, complex issue of phased disposal, we were taking people further and further away from solid ground. After all, they had only been introduced to the general topic of radioactive waste on the previous evening and had not had any opportunity to consolidate their basic understanding before moving on to a discussion of the phased disposal concept.

This finding suggests the need for any communications strategy to concentrate on a restricted number of key points about the issues as the best means of ensuring rudimentary levels of knowledge. People need the 'building blocks' of knowledge about the general issues of radioactive waste before they can move on to discuss a more detailed, complex topic such as the phased disposal concept.

The low level of public awareness about radioactive waste meant that, in a sense, all concerns expressed about phased disposal were prompted. To put it simply, none of the respondents had any spontaneous, everyday concerns about phased disposal because none of them knew anything about it or had ever given it any thought. They were only able to make their comments in response to the printed material that they were asked to read.

## **4.2 Detailed discussion of phased disposal highlights the broader issues**

Most respondents came away from the discussion about phased disposal more convinced than before that the issue of radioactive waste was important and needed to be addressed. Consideration of the phased disposal concept led people to 'revisit' the basic issues surrounding radioactive waste – and, in particular, to appreciate anew the scale of the problem that faces society:

- The printed material's claim that the waste packages would be monitored in the repository for 'several hundred years' brought home the enormous timescales.

- Details about the proposed repository made people reassess the quantity of radioactive waste. Beforehand, in the first session, many of them had considered the scale of the problem ('enough waste to cover a football pitch to a height of about ten metres') to be manageable. Now that they had given some thought to storage, they regarded the quantity as dauntingly large.
- Above all, by making people think about the extent of the problem, discussion of phased disposal encouraged the line of argument that we should stop nuclear energy immediately. Respondents argued that it was irresponsible to produce any more waste when there was still no 'watertight' solution to the problem of the current waste.

The details of the plan and the complexity of the thinking behind the concept brought home to people how difficult it would be to manage the waste safely over such enormous timescales. Respondents returned to these basic issues throughout the discussion of phased disposal.

All the steps and precautions laid out in the prompt material reinforced the realisation that there was no 'magic wand' solution – and that the problem of radioactive waste was here to stay.

That said, respondents were enthusiastic about the possibility of partitioning and transmutation (P&T), which was mentioned briefly in the introductory text. P&T appeared to offer the 'magic wand' solution to the problem of radioactive waste that people (and, of course, the experts) would love to be in existence. Consequently, people felt that P&T should be the priority, and they wanted to hear that money and resources were currently focused on further research. By this reckoning, the phased disposal concept was a 'second best' option, offering a means of safeguarding the waste but not a permanent solution.

*"There should be 267 scientists if that's what it takes to research [P&T] properly."*

*"Make it 2000 scientists."*

It is crucial to acknowledge that the prompt material did not explain P&T in any detail – and did not explain, for instance, that P&T would not be suitable for all types of waste. The opinions expressed by respondents with regard to P&T were not, therefore, rooted in any established facts or arguments. By contrast, we note that Nirex recently commissioned a Citizens' Panel on the specific topic of P&T, where members of the public *were* given detailed information and came to the conclusion that there was no need for greater investment in P&T research and development. (See *Partitioning and Transmutation: Citizens' Panel*, Centre for the Study of Environmental Change (CSEC), Lancaster University, November 2001.)

From our own research, therefore, it needs to be recognised that the mere mention of P&T, without detailed explanation, encouraged people to believe that a 'magic wand' solution is possible and perhaps imminent. This perception undermined the credibility and desirability of the phased disposal concept. Many people suspected that the only

obstacle to the realisation of P&T is lack of funding or neglect by the industry and government.

### **4.3 A degree of reluctance to express opinions**

There was some reluctance among respondents to discuss the phased disposal concept. There were three reasons for this reluctance:

- a) people did not feel qualified to express an opinion
- b) people could not see a tangible benefit to expressing their opinion
- c) people were distrustful of Nirex's purpose in commissioning the focus groups

We will examine these reasons in turn.

#### **a) People did not feel qualified to express an opinion**

Respondents argued that they lacked the scientific knowledge to form a valid opinion – and, realistically, they would never acquire the levels of expertise possessed by scientists who deal with the issue on a daily basis. They had no means to assess the scientific and technical bases to the phased disposal concept. (By comparison, we suspect that they would have felt qualified to discuss, for instance, the possible regulatory framework for phased disposal because they would feel that they had valid opinions about the role and behaviour of government and industry, based on their own experience and media coverage.)

*“I don't feel I'm scientifically adept to meet all these needs, to answer all these questions.”*

*“You've got to accept that these scientists and engineers who are making these containers are making them as safe as possible....Are we qualified to say we should do it any different?”*

*“I'm a believer in people knowing more than I do. And if the scientists say, 'This is what should be done', I trust them. I think it only confuses matters to give people options. Or even tell people about what should or shouldn't be done.”*

People were especially resistant to the idea of expressing their opinion because they felt that they were actually being asked to choose the best option for the future management of radioactive waste – and for many, this feeling persisted even when the facilitator explained that this was not the point of the exercise.

*“We're being asked, we're not being told.”*

Respondents were unhappy because, as they had already said, they believed that the public should be kept informed but that it was inappropriate for the public to be responsible for decision-making about the technical management of radioactive waste.

Furthermore, some respondents argued that the little knowledge they did have (and which they based their opinions on) was derived solely from the introductory material that they had been given to read. They had no way of knowing how accurate or exhaustive this information was – and, therefore, they had no way of knowing whether or not their opinions were rooted in solid facts and sound arguments.

*“We can only be concerned about what we’re told.”*

Many people were unhappy that they were being asked to express an opinion about a hypothetical option. In reality, they wanted simply to be told what *was* being done, not what *could* be done. They didn’t want to know what the different options were. Rather, they wanted to hear about the option that the scientific experts had decided was best – and why they thought that it was best.

*“It’s all ifs and buts.”*

*“We’re not interested in hearing the hundred different issues. We want to know what the final decision is.”*

Some respondents said that they didn’t want to be given any details, let alone be told about the different options. They simply wanted to be given a guarantee of safety, to be told that the problem had been dealt with. Until they attended the focus group, they hadn’t given any thought to the issue – or even been aware that there *was* an issue – and now they wanted to be given reassurance that they wouldn’t need to worry any further about it.

*“I just want to know that it’s safe.”*

*“If the top scientists in the world agree that the best thing is to put it 5 miles underground, then put it 10 miles underground...Be doubly safe.”*

*“Explaining it raises doubts in people’s minds.”*

*“The more you make an issue out of it, the more people are going to be worried.”*

#### **b) People could not see a tangible benefit to expressing their opinion**

Several respondents argued that they did not want to be engaged in a two-way process with the nuclear industry. They wanted to be informed about the issues of radioactive waste but they did not want the industry to solicit their opinions. Mainly, this was because they could not see the benefit of having expressed their concerns about phased disposal – or about the issue of radioactive waste in general. They could not perceive a tangible output to their expression of concern.

*“My concern is worth nothing.”*

*“[The information] is no use to me because I can’t do anything about it.”*

*“If you’ve got concerns, there’s nothing physically that you can do about it.”*

As a comparison, a respondent said that she could see the tangible output to being better informed about pollution. She would be able to ‘do her bit’ – to make a contribution, however small, towards reducing levels of waste and pollution by changing her consumption habits. There was nothing, however, that she felt she could do about radioactive waste, even if she was better informed.

In any case, people did not believe that anyone would take notice of their opinions, just as politicians never listen to the public. Offering another comparison, a respondent said that she could see the purpose of a focus group on types of shampoo. In such a focus group, people would feel qualified to express an opinion – everyone, for instance, could say something about their use of shampoo and whether or not they liked the design of a shampoo bottle. It would be in the interests of the manufacturer to listen to what the public had to say because it would want to sell more bottles of shampoo. The public, in turn, would receive the product that it wanted and would, therefore, benefit from having expressed its opinion.

Respondents could see the benefit of the focus group research to Nirex – allowing it to gauge public opinion. But they could not see the benefit to the general public. Since they could not see a clear output to their expressions of concern, they suspected that there was an unacknowledged purpose on the part of Nirex.

### **c) People were suspicious of Nirex’s purpose**

Respondents assumed that they were being asked to express their opinions for one of two reasons:

- Nirex doesn’t know what to do about radioactive waste and is hoping that members of the public will come up with a solution;
- Nirex knows exactly what it wants to do but needs to win public approval for its plan – or, at the very least, to anticipate the public outcry that might occur when its plan is more widely known.

Nirex is suspected, therefore, of being either incompetent or underhand. We address each of these ideas in turn.

### **i) Nirex doesn’t know what to do**

Respondents suggested that Nirex was hoping that these focus groups would generate useful suggestions – things that the experts had missed – about the future management of radioactive waste. Clearly, this was a worrying idea: that the experts had become so desperate for ideas that they were asking the general public.

*“They’re asking the public what they think, but they’re not 100% sure themselves.”*

Crucially, the perception that Nirex and the wider industry don’t know what to do caused respondents to question everything that they read in the introductory material. With Nirex virtually admitting that it knew no better than the average person in the street, respondents assumed that everything was ‘up for debate’. They queried all the

details and made their own suggestions because they felt that this was what they were being invited to do. For instance:

- Respondents questioned Nirex’s use of stainless steel for the 500 litre drum, suggesting that lead was a more effective means to contain radioactivity, while titanium was more resilient and long-lasting.
- Many people queried Nirex’s use of cement in waste packaging and backfill. They assumed that Nirex was proposing to use normal cement from the local hardware store.
- A few respondents were worried by the apparent thinness of the walls of the 500 litre drum. Wouldn’t it be easily dented or pierced in an accident? Hadn’t Nirex thought about making the walls thicker?

It would be wrong to conclude that respondents had lost all faith in the expertise of industry scientists. But, certainly, Nirex’s seeming admission that it didn’t know what to do did much to undermine people’s confidence. This emphasises the need for clarity of purpose on Nirex’s part as a crucial element of any communications strategy.

## **ii) Nirex has a hidden agenda**

The other possible reason for soliciting public opinion was that Nirex wanted to win public approval for its phased disposal concept. Perhaps, respondents speculated, Nirex wanted to gather evidence of public approval and to use this as a lobbying tool in its talks with government. Otherwise, perhaps Nirex was seeking to learn more about the public response to the issues and information, so that it could anticipate and ‘neutralise’ any public outcry that occurred in the future, when its plans were more widely known.

Importantly, the discussion of phased disposal was not immune to the general sense of distrust that people feel towards the nuclear industry. Respondents had already expressed their belief that the industry was dishonest and underhand in its behaviour – and they carried their mistrust into a focus group discussion that was being sponsored by Nirex, a company that was part of the industry.

*“Are [Nirex] trying to sell themselves in any way, or to get their name known?”*

It should be recognised that, to a degree, respondents were willing to suspend their suspicions about Nirex, and its true purpose in commissioning the research, for the duration of the discussion. Partly, after all, they were being paid an incentive fee to attend and participate. And partly they had established a rapport with the Future Foundation facilitator and were prepared to ‘play ball’ by answering the facilitator’s questions.

We suspect that the presence of the facilitator dispelled some of the distrust that people felt. They were reassured that the facilitator wouldn’t be using Nirex’s material if he or she had reason to believe that it contained false information. In this sense, the participation of The Future Foundation (even though, to the best of our knowledge, no

one had previously heard of us) provided an additional level of security. The Nirex material was more likely to be ‘true’ (and respondents were more likely to take it at face value) if another organisation – in this case, The Future Foundation – was prepared to use it. As respondents had argued in the first session, the more organisations that were involved in discussing the issues, the less easy it was for the nuclear industry to hide or distort the ‘truth’. This relates to the widespread support for the idea of a cross-section of interested parties to ensure integrity and effective scrutiny in the decision-making process.

In reality, of course, any written communications would not have the benefit of a human intermediary (such as the Future Foundation facilitator) to introduce the material and to guide people through it, reassuring them and drawing their attention to the key points. Given that people felt unable to judge the validity of the prompt material, because of their limited knowledge, respondents said that they would like to hear other points of view from other interested parties, for instance environmental campaign groups and independent (i.e. non-industry) scientists. In the interests of balance, they wanted to hear from “*someone in the know*” who disagreed with Nirex and who would be able to point out the flaws in the phased disposal concept.

## 5. Conclusions and implications

We return to the main objectives for the programme in order to pull together and summarise the findings from the research and to highlight the implications for Nirex.

### 5.1. To articulate the concerns and risk perceptions of the general public resulting from a discussion of the phased disposal concept

Due to the lack of any real day-to-day awareness of issues surrounding the storage and management of radioactive waste amongst the public, it is not surprising that the focus group respondents had no prior concerns about the phased disposal concept. All the attitudes described in this report were generated in response to the provision of carefully structured information – and were, therefore, prompted. On the one hand, this appears to provide no more than the slimmest foundation to the discussion; whilst on the other, the commonality of the concerns expressed with those raised in previous focus group research suggests that the pattern of response to the issues is at least consistent when people are given the basic information about radioactive waste.

At the same time, there is evidence of considerable contradiction in public attitudes and shifting of opinion within the same discussion. Throughout the findings, contradictions and paradoxes emerge in attitudes expressed by respondents, no doubt resulting from the learning process and group dynamics alongside the inherent difficulty of the subject matter.

The key concerns affecting people's perception of the risks involved that emerge from the discussion were consistent across the different groups. They can be summarised at three levels:

- Mistrust of the nuclear industry
- Suspicion of the purpose of the research
- Concerns about the safety of the actual process itself

In order to answer the research objectives, and to ensure that the findings feed back into the design and communication of the phased disposal concept, it is necessary to separate the first two levels from the specific responses to the actual concept.

#### a) Mistrust of the nuclear industry

Any discussion of radioactive waste will operate in a general climate of public distrust towards the nuclear industry and the government. So, for instance, however much respondents were told about the workings of phased disposal 'in theory', they remained suspicious that in practice the industry would seek to cut corners to save itself money – and that the safe management of the waste would be neglected.

Therefore, respondents could not discuss phased disposal in isolation from the more general concerns that they have with regard to the issue of radioactive waste: the quantity of the waste, the enormous timescales involved, the need for effective

regulation, distrust of the industry and dissatisfaction with industry ownership of Nirex.

Following realisation about the scale and seriousness of the problem posed by radioactive waste, there was a tendency among respondents to question and then to reject the future of nuclear energy sources. This further exacerbated their dislike of the industry and hardened attitudes against it.

These points have all been dealt with effectively in other research and analysis covering the broader issues of public attitudes to radioactive waste. They reinforce the fundamental requirement for increased public confidence in the industry and the government. The favoured option to increase confidence is the establishment of an independent and credible watchdog. This would be an essential first step before the public would be able to accept and endorse any recommendation about the best solutions put forward by Nirex or the industry.

### **b) Suspicion of the purpose of the research**

Building on this platform of general mistrust, there was another layer of suspicion that needs to be identified and separated from specific responses to the phased disposal concept.

Some respondents were suspicious of Nirex's motives in having commissioned the focus group research. And in fact, the whole process of the focus groups increased their doubts and fears. Despite assurances to the contrary, people felt that *they* were being asked to choose the best option for the management of radioactive waste. They were alarmed that the experts appeared not to know what to do – and, by implication, were hoping that members of the public would come up with useful suggestions. This undermined their confidence in the levels of scientific expertise and increased the feeling that they didn't have enough scientific knowledge to express an opinion on such weighty and important issues.

### **c) Concerns about the safety of the actual process itself**

Having worked through the wider concerns raised above, and having spent time reading about and discussing the phased disposal concept, the degree to which the respondents could grasp and comment on the stages of the phased disposal concept was extremely encouraging.

Many respondents expressed broad satisfaction with the phased disposal concept 'in theory'. The concept was seen to be a sensible solution to the long term problem, but respondents were concerned about what would actually happen in practice, once the concept was put into action.

The phase that prompted the greatest 'spontaneous' concern was the transportation of waste. This was the phase where both the potential for an accident and the potential for widespread damage to the human environment were seen to be at their greatest.

The other main area of concern was post-closure. Underlying people's unease about post-closure was their desire for a 'full stop' to the whole process. Most respondents

were disturbed by the idea that there would ever be an end to human management. They argued that monitoring should continue for as long as the waste exists. Furthermore, many respondents resisted the idea that, over the long timescales under consideration, the barriers involved would eventually corrode and the radioactivity would dissipate into the surrounding geology. Corrosion of the containers and leakage were regarded as ‘something going wrong’ rather than as being anticipated and acceptable developments in the phased disposal concept.

The implications of these concerns in the context of the timescales involved further highlight the challenges facing Nirex in communicating these matters and convincing the public as to the best solution at any point, given the possibility of new scientific solutions to the problems emerging in the future.

Our research shows that, having overcome the hurdles of basic lack of knowledge, mistrust of the industry and concern about the research process, the respondents clearly *can* comprehend the phased disposal concept and, within limits, assess the process against possible risks at each stage.

## **5.2. To provide guidelines as to how Nirex can better communicate complex issues and provide readily understandable information to the public**

The research further emphasises the difficult task facing Nirex in communicating with the public at any level. For as long as Nirex remains under industry control and lacks the teeth necessary to be seen as a credible and independent watchdog, any communications from Nirex – or, indeed, the wider industry – will be received with suspicion. At the same time (and paradoxically given the suspicions expressed), the very fact that Nirex was putting out information and was, therefore, making itself open to scrutiny was appreciated and reassuring, contributing in a small way to the building of trust required.

Bearing in mind the detailed level of information required to inform the public about the specific topic of phased disposal, a number of useful lessons emerged about the way in which complex information can be communicated. Again, these relate to different levels of information and the public response to the issues.

- General awareness of the issues related to radioactive waste
- Specific information about the phased disposal concept
- Source and tone of information – the need to build trust
- Getting the message across

### **a) General awareness of the issues related to radioactive waste**

Given the rudimentary level of public knowledge about any aspect of radioactive waste storage and management, the subject matter needs to be communicated in a way that overcomes the common reactions to the overwhelming timescales and potential risk factors involved:

- Material must focus on a number of key points and not attempt to cover too much ground, particularly in the introductory stages
- The key points must be clearly laid out in a way that allows people to return to earlier stages of the process, so that they can reconfirm any key points. A common reaction over the course of the focus group discussion was to revisit and question the most basic points several times in response to the introduction of new material.
- People need time to absorb the information. It is not possible to quickly take in and retain the necessary information from a short reading.
- It is clearly helpful for people to be able to discuss the material and its implications with other people, especially with someone with greater knowledge (a role played by the Future Foundation facilitators in this research).

### **b) Specific information about the phased disposal concept**

The discussion of phased disposal was not immune to the general sense of distrust that people feel towards the nuclear industry. However, certain useful guidelines do emerge:

- The methodology of holding two sessions (one to introduce the general issues, one to address phased disposal) proved valid. People need the ‘building blocks’ of knowledge about the general issues of radioactive waste before they can move on to discuss a more detailed, complex topic such as the phased disposal concept.
- In considering a specific solution such as phased disposal, people are reassured by a wealth of details – it shows that the experts have done their thinking and that every possibility has been taken care of.
- The more information that respondents were given, the more detailed were the questions that they raised. The research generated an extensive list of questions about every stage of the process (included in the Appendix of this report).
- At the same time, the need to be able to revisit key points in the description proved essential, as it is difficult for people to absorb all the information in a single reading. Even at the end of the whole discussion, it was clear that some respondents had not picked up all of the key elements of the phased disposal concept.

### **c) Source and tone of information – the need to build trust**

In all the discussions, whether general or specific, the issue of trust was constantly raised. Despite the disadvantaged starting point of low confidence in Nirex and the industry as a whole, a number of key points emerged as to how trust might be enhanced by a particular communication.

- There is a need for a ‘trusted intermediary’. In these focus groups, this role was played by the Future Foundation facilitator. This raises the question about how this role can be filled in other circumstances.

- People want to hear from ‘someone in the know’ who disagrees with Nirex’s ideas. This echoes the process in the recent CSEC Citizens’ Panel, where the panel requested an anti-nuclear expert as a witness. (See *Partitioning and Transmutation: Citizens’ Panel*.) This reiterates the importance of including views from other interested parties.
- The emphasis on scientific details is vital. In this and previous research, scientific expertise emerges as the one positive quality that people associate with the nuclear industry. Lack of information tends to heighten doubts and uncertainty in the industry and its scientists.

In terms of the tone of the communication, whilst the research process required people to respond and express their views, on the whole, respondents said that they want a one-way process between themselves and the experts. Communications should be designed to keep the public informed in a comprehensible way – but people do not necessarily want to be asked their opinion.

#### **d) Getting the message across**

Despite all the learning about improving effectiveness, we need to recognise that, being realistic, most respondents (by their own admission) would never read anything like the introductory material in their normal, everyday lives. This poses a central question about the purpose of any public communications programme. It is certain that any such programme must be undertaken with clear and certain objectives or, again, the perception of a ‘hidden agenda’ could sabotage the process. However a few pointers emerged:

- Introducing the topic to the wider public through popular culture was seen as being the only real chance of raising interest across the wider population – perhaps through a plot-line in a popular soap.
- Pictures and diagrams are invaluable as part of the communications process.
- Having read the prompt material and discussed the issues, many respondents were engaged in the subject and said that they would be more likely to read or watch something now that the issue had been brought to their attention. Television was seen as the best means of communicating issues to the public, although many said they wouldn’t necessarily choose to watch a documentary on the subject despite their new-found interest in the subject.
- Additionally, the degree to which public concerns can change in accordance with wider events and media coverage was highlighted by this research. Respondents in the first set of groups expressed considerable concerns about security and terrorism in the wake of the September 11th attacks, but these concerns had died down only a few weeks later. This suggests that a future communications strategy would need to be able to provide a response to events that might raise questions or change people’s perspectives in the short term – even though the research indicates that there is little effect on attitudes in the longer term, due to the very low levels of day-to-day interest and awareness.

Overall, the findings highlight the extent of the communications challenge facing Nirex at every level.

### **5.3. To inform the technical process with suggestions for the kind of assessment work required to address public fears that may arise**

The research process worked well to identify the type of information and assessment work that would reassure the public. Despite respondents' general acceptance of the concept of phased disposal, they had a number of overarching questions. These questions reflected the risk assessment process that people felt needs to be made clearer:

- What happens if something goes wrong?
- How are you going to pay for it?
- How do you get the timing right?

Therefore, there is a need for increased emphasis on explaining contingency planning, the commitment of the Government to resolving these issues in the longer term and the basis for current calculations on degradation of the materials involved (that is, both the waste itself and the barriers that contain the waste).

There was also the question as to how the research was going to be used by Nirex, further confirming the need for clarity of purpose in all such exercises. Since they could not see a clear output to their expressions of concern, respondents suspected that there was an unacknowledged, underhand purpose on the part of Nirex. The creation of a 'feedback loop' is reflected in our recommendation below for the establishment of a consumer panel.

The clearest finding is that it would be invaluable to have an accessible, understandable checklist of the tests that have been carried out so far – to show that everything has been addressed, that all the i's have been dotted and all the t's crossed. This could take the form of a flow-chart or FAQ type summary for the public to double check how all the main decisions have been arrived at. We have provided a full list of the precise questions that were raised by respondents in this exercise in the Appendix. The questions tend to fall under the following broad headings:

- Reasons for the specific materials used, including the tests that the materials have been subjected to
- What would happen in 'worst case' scenarios, including the impact of possible accidents or disasters on the human population
- What are Nirex's forecasts and models based on – and how do they know that they've got them right?
- What is Nirex's precise role in advising the industry?

### **5. 4. To assess the effectiveness of the research process as a means of public engagement and to suggest improvements**

The research confirms the public interest and ability to address sensibly and intelligently the profound and difficult issues involved in a discussion of radioactive waste. As this report testifies, the methodology used for this project (holding two group discussions on consecutive evenings) proved to be an effective means of bringing out public attitudes to the general issues of radioactive waste management and to the more specific details to the phased disposal concept.

However, this research is designed to be part of a wider programme of public consultation and communication that Nirex embarked upon some two years ago as part of its repositioning as an open and transparent organisation. As noted, we fully support this intention and believe that research has to be a key part of the organisation moving forward and building the necessary public trust in order to effect a long term solution to the issue of radioactive waste. In this spirit of openness and the commitment to maximising learning at every stage, it is worth highlighting some of the points that this programme has raised – and that future work needs to address.

- Respondents could not see how the focus group research contributed to the process of public consultation. They did not recognise the group discussion as a suitable mechanism for disseminating information to a wider audience. For instance, some respondents wondered whether, having read the introductory material and discussed the issues, they were now supposed to go out and somehow ‘spread the word’ among the wider population. Respondents could see the benefit of the focus group research to Nirex (allowing it to gauge public opinion) but they could not necessarily see the benefit to the general public. The need for clarity of purpose when engaging with the public is further emphasised.
- Several respondents argued that they did not want to be engaged in a two-way process with the nuclear industry. They wanted to be informed about the issues of radioactive waste but they did not want the industry to solicit their opinions. Nor could they see the benefit to the public of having expressed their concerns about phased disposal.
- Confirmation of the contradictory attitudes held by the public emerged time and again from the process. For instance, people liked the openness displayed by Nirex but at the same time were worried by the intimation that their views might make a difference to the scientists (who, after all, were meant to ‘know’ what was for the best).
- The artificial environment of a focus group (where members of the public are paid an incentive to attend and where they are asked to read and discuss printed material that they would probably never look at in their everyday lives) is valuable but has limitations. It cannot provide an accurate reflection of how people would actually receive any communications ‘in the real world’. We need to recognise, therefore, that there are limits to the research in terms of the amount of learning that might be possible before an actual communications programme is put to the test.

That said, our view is that the process of research is generating invaluable insights and learning for Nirex. However, it is clear that each methodology will have limitations and that there should be a constant review of methodologies and approaches that might add new knowledge and help Nirex to achieve its objectives.

## 5.5 Outline of the consumer panel approach

Whilst the methodology employed for this project (group discussion over two evenings) worked well, we acknowledge that it has its limitations. Our view is that, given the depth and complexity of the points raised and the questions asked about the phased disposal concept, the potential for some kind of ‘consumer panel’ should be considered for future research that is primarily designed to feed into the design and communication of a highly technical process.

Rather than starting from scratch with a new group of people, it may prove useful to identify a panel of individuals who are prepared to participate over time. This will enable the scientists to feed back directly on key points and allow for the development of an iterative process with a two-way flow of information.

The panel could comprise of different groups, in different parts of the country who have agreed to be consulted on a regular basis (say once or twice per year) by Nirex. This is a method used by large organisations such as BT and the BBC to obtain a depth of feedback and information on complex issues by ensuring that participants build up a base of knowledge over time. We suggest that this approach could make a useful contribution to building the necessary knowledge base over time.

In summary, the research has been extremely useful in gaining public feedback to the phased disposal concept. However, a number of key questions remain for the longer term strategy:

- How can Nirex effectively undertake public consultation which is seen as valid by the public itself?
- Should Nirex aim to build up a base of knowledge in the population so that such consultation could be possible and effective in future?
- What role should on-going research have in the future?
- How can the public most effectively be involved in the process?

## **Appendix: Technical questions that people would like to be answered**

### **Questions asked during the Future Foundation focus groups on phased disposal**

Why does Nirex use stainless steel for its containers? Isn't lead a more effective means to contain radioactivity? Isn't titanium more resilient and longer lasting?

Aren't the walls of the 500 litre drum too thin? Wouldn't they be easily damaged or pierced? Hasn't Nirex thought about making the walls thicker?

Is cement effective as waste packaging and backfill? Is Nirex proposing to use normal cement from the local hardware store?

Why has Nirex chosen 4 cubic metres as the size for a box? And why a 500 litre drum? Why not use a bigger container – or smaller?

Why can't you just keep on repackaging the waste?

Why would you ever need to repackage the waste? Why not get the packaging right in the first place?

How do you put waste into a container without contaminating the outside of the container?

Does conditioning produce more waste?

Can I stand safely next to a container?

Is anyone else testing and monitoring Nirex's specifications?

Do Nirex staff visit the waste producer sites? Does they take the waste packages away and test them at Nirex's laboratories?

Why do the waste packages need to be placed inside transport containers? Does this mean that the packages aren't adequate?

Would a lorry carrying radioactive waste be given a police escort? Would the vehicle be marked or unmarked?

Has a test crash been conducted on a transport container with actual waste inside? Is it possible that the impact of a crash would trigger some kind of reaction or explosion in the waste?

Would transport containers be able to withstand a fire generated by aviation fuel?

Why do the waste packages need to be taken out of the transport containers on arrival at the repository? If the containers afford an extra level of containment and protection, then why remove them?

If the waste packages are safe, then why do workers need to be protected by shielded bays?

If the packaging is effective in containing the radioactivity, then why would there be any need to monitor contamination of the rail tunnel and vertical shaft?

Is it more dangerous to have the waste distributed at different sites or to stockpile the waste in a single location? Does putting all the waste together increase the risk of an accident or explosion?

Has an underground repository already been built? If yes, then why isn't it already being used? Is there a technical reason for needing to keep the waste packages on the surface for a few more decades?

Where will the repository/repositories be built?

How will you dig a hole big enough for a repository? Won't the earth on top of the repository be looser than before (because you've dug it up)? And won't that affect the ability of the geology to contain the waste?

Has anyone ever built anything this far down? On this scale?

What is the capacity of the repository?

How many vaults are there going to be?

How quickly will the vaults be filled up?

What will be done with the additional waste that is generated in the future? (Based on an assumption that the proposed repository would only accommodate the waste that is currently in existence.)

Is the repository a fixed size? Or can it be expanded to accommodate additional waste?

How many repositories need to be built?

Won't the weight of all the overlying rock crush the vaults and the containers?

Will it be possible to close the repository immediately in an emergency situation?

What would happen if there was a spillage in the contaminated areas? How would it be dealt with?

What would happen if the overhead crane malfunctioned? How would it be retrieved and repaired?

How would the waste packages be monitored? Would monitors be fitted on the inside or the outside of each container? If there was a leakage, would the monitors remain intact or would they be damaged by the radioactive materials?

What are the 'acceptable levels' of radiation that workers would be exposed to? What does 'acceptable' mean?

How do you decontaminate things?

What happens to the water that is used to decontaminate things? Does it wash away into the wider environment?

Are you going to have a drift tunnel or a vertical shaft – or both? Why can't you decide which is best?

Will you backfill everything (ladders, rooms, etc) – or just the vaults containing the waste packages?

Would it be possible to retrieve the waste packages from the backfill?

Can the repository be accessed after closure? Is anything ever really sealed and closed?

Have you got enough cement to carry out all the necessary backfilling and the sealing of the repository?

What would be the impact of earthquakes on the repository and the waste?

Or the impact of shifting tectonic plates?

Could the level of the land fall, so that the repository was no longer so deep underground after thousands of years?

What are the implications of rising sea levels?

How do scientists know how long a material will remain radioactive?

Given that waste has only been generated for a few decades, how are scientists able to predict the waste's behaviour over the course of hundreds and thousands of years?

How do scientists know how the materials of the barriers (for instance, the stainless steel canisters, the backfill cement) will interact with the radioactive waste over the very long term?

How can scientists be sure that the materials won't behave differently once they're placed at deep levels?

Once the repository has been closed, how will people know if there has been a leakage?

Are you expecting that waste will eventually leak out of the containers?

Is rock effective at stopping the spread of a leakage? How long does it take for radioactivity to travel through rock?

If there's a leak underground, does the radiation go up or does it go sideways?

How do you limit the spread of a leakage into the surrounding geology once it has started?

What would be the impact if the radiation did leak to the surface?

What impact will groundwater have on the vaults and containers?

If you dropped a bomb on a storage facility, would there be a nuclear explosion?

Can you make a bomb from the waste? Can containers be turned into weapons?

If there was an explosion or leakage, how far away would people need to be to be safe?

What is going to be done with high level waste?

What are the precise timescales for each phase?

Would the repository take in other country's waste? Or are we just dealing with UK waste?

What are other countries doing with their waste?

[Note: many people cannot understand distances that are expressed in metres.]