

Establishing sustainable practices in managing very low level waste and free-release construction materials in nuclear industry decommissioning

**Scoping study report to the Safety Issues Task
Force of the DTI's Liabilities Management Group**

By

Jeff Kersey
Research Manager
CIRIA

28 March 03



Executive summary

This report is the outcome of a scoping study carried out for UKAEA and the DTI Liabilities Management Group's Safety Issues Task Force (SITF). The work was undertaken by CIRIA in association with UKAEA, Prof. Peter Guthrie and The Environment Council, under the guidance of a project steering group comprising representatives of nuclear licence holders, the Health and Safety Executive and the Environment Agency and other bodies.

The scoping study has successfully achieved what it set out to do - it has initiated a process for establishing sustainable practices in managing very low level waste and free-release construction materials in nuclear industry decommissioning.

In doing this it has engaged in 3 worksteps. It has carried out preliminary quantification of the construction materials that will arise from the decommissioning process as demolition waste. It has reviewed CIRIA's experience of implementing sustainable construction indicators with the UK construction industry. And it has initiated a preliminary stakeholder dialogue, particularly through a stakeholder workshop held in October 2002. These activities will inform the any future development of the initiative.

The range of radioactivity levels which is covered by the definition of LLW is very wide at five orders of magnitude (0.4 - 4000Bq/g). In addition, within this LLW category there are wastes that can be classified as either very low level waste or exempt materials. (Refer to Appendix 10 for some existing waste classifications).

As decommissioning proceeds at the UKAEA Dounreay site we are able to say for illustrative purposes that 120,000 cubic metres of clean/exempt wastes and 33,000 cubic metres of what might be described as very low level waste will arise. This will give a total of 153,000 cubic metres of the lower waste categories.

At the stakeholder workshop delegates were asked what they thought the future stakeholder dialogue would be about. In terms of radioactivity levels to be considered it was seen as appropriate to initially focus on materials of less than 4Bq/ g.

There are likely to be challenges to disposing of or reusing any decommissioning or surplus materials from a nuclear site, perhaps more because of their provenance than their level of activity. This could potentially lead to a situation where all materials have to be managed in the same manner as wastes from the upper end of the LLW range. This does not appear to represent a sustainable solution. If all materials are disposed of at Drigg, existing facilities would soon reach capacity and costs would be very high.

As well as summarising the stakeholder workshop, this scoping study report captures the discussions of the project steering group and project team meetings. It then makes a number of conclusions and

recommendations which indicate how the project's participants envisage the initiative being taken forward.

In particular it was concluded that a detailed proposal should be written to establish a project for the next stage. Building on the findings of the scoping study, including the stakeholder workshop, this should be a more comprehensive process with broader stakeholder participation to produce a 'route map' for how detailed practical industry guidance could be developed through the process of stakeholder dialogue.

The next stage of the project will require more detailed quantification and a more detailed examination of disposal options and related costs. Both on-site and external disposal & reuse options will need to be considered - although there are likely to be difficult issues to address within each option.

The future focus will be broadened out from the UKAEA site at Dounreay to reflect the needs of the rest of the nuclear industry. The project may fit under the SAFEGROUNDS 'umbrella' but this requires further discussion with SAFEGROUNDS participants. Future SITF sponsorship of the project has been agreed.

Keywords									
Sustainability, contaminated land, stakeholder dialogue, nuclear-licensed sites, health and safety management, environmental protection, best practice guidance, collaborative programme, learning network, construction materials									
Reader Interest	Classification								
Non Government Organisations/ Community Based Organisations, Nuclear liability managers, nuclear site owners and operators, environmental scientists and engineers, health and safety professionals and regulators, environmental regulators, contractors and consultants to the nuclear industry, government departments.	<table> <tr> <td>AVAILABILITY</td> <td>Open</td> </tr> <tr> <td>CONTENT</td> <td>Scoping study Recommendations</td> </tr> <tr> <td>STATUS</td> <td>Commissioned, committee guided</td> </tr> <tr> <td>USER</td> <td>Nuclear industry and related stakeholders</td> </tr> </table>	AVAILABILITY	Open	CONTENT	Scoping study Recommendations	STATUS	Commissioned, committee guided	USER	Nuclear industry and related stakeholders
AVAILABILITY	Open								
CONTENT	Scoping study Recommendations								
STATUS	Commissioned, committee guided								
USER	Nuclear industry and related stakeholders								

© CIRIA 2003

Construction Industry Research and Information Association
6 Storey's Gate, Westminster, London, SW1P 3AU
Telephone: 020 7222 8891 Facsimile: 020 7222 1708
E-mail enquiries@ciria.org.uk

Foreword

This report is the result of a commission entrusted to CIRIA by the UKAEA on behalf of the DTI Liabilities Management Group's Safety Issues Task Force (SITF). The instruction to proceed with the commission was given by letter of 25 February 2002 from UKAEA under Consultancy Agreement number NS12977. CIRIA carried out the work in association with UKAEA, Peter Guthrie and The Environment Council. The report was written by J R Kersey. In accordance with CIRIA's long-established practice the study was guided by a steering group. This comprised:

Andy Thomas (Chairman)	BNFL
Bob Mathews	UKAEA
Carl Reynolds	The Environment Council (TEC) independent facilitator
David Bennett	Environment Agency
David Owen	BNFL
Dick Francis	DTI
George Linekar	UKAEA
George Wall	AWE
Jeff Kersey	CIRIA
Joyce Rutherford	HSE
Juliet Long	UKAEA
Lucy Parnall	The Environment Council (TEC)
Malcolm Wakerley	DEFRA
Mark Hannan	Magnox
Michael Massey	DTI
Peter Guthrie	independent technical expert
Rob Storrie	Amersham Plc
Terry Selby	DTI
Tony Free	British Energy
Tony Hart	BNFL

The following project team members were concerned with the more detailed aspects of managing the project:

George Linekar	Project Client, UKAEA
Jeff Kersey	Project Manager, CIRIA
Prof Peter Guthrie	Technical expert
Lucy Parnall	Stakeholder dialogue, TEC
Carl Reynolds	Stakeholder dialogue, independent facilitator

Acknowledgements

In carrying out the work, CIRIA wishes to acknowledge the support of the project funder UKAEA and the DTI sponsoring body SITF. Acknowledgements are also due for the advice and help given by members of the steering group and the project team and those who took part in the stakeholder workshop. In particular, the success of the stakeholder workshop is largely to be credited to the advice, preparation and facilitation of Carl Reynolds of Carl Reynolds Associates and Lucy Parnall of The Environment Council.

Contents

1	Introduction	8
1.1	Background	8
1.2	Elements of scoping study	8
1.3	Project management and Project Steering Group	9
1.4	Post scoping study report	9
2	Preliminary quantification of materials	11
2.1	Headline figures based on Dounreay estimates	11
3	Report on quantification	13
3.1	Introduction	13
3.2	Site visit to Dounreay	14
3.3	Stakeholder meeting	14
3.4	Next steps for quantification	14
4	Sustainable development and CIRIA's experience of sustainable construction indicators	15
4.1	Purpose of this part of the scoping study.....	15
4.2	Defining sustainable development.....	15
4.3	UK Government.....	15
4.4	Peter Guthrie on sustainable development.....	15
4.5	Other sustainable issues.....	15
4.6	CIRIA's experience in implementing sustainable construction	16
4.7	CIRIA's resource related sustainable construction indicators for design activities.....	17
4.8	CIRIA's resource related construction indicators for construction activities.....	18
5	Preliminary stakeholder dialogue	19
5.1	Introduction	19
5.2	Stakeholder workshop 'photo report' and transcription	19
5.3	Attendees at stakeholder workshop	19
5.4	Objectives, agenda and grounds rules for the meeting	20
5.5	What issues should be discussed?	20
5.6	What is this dialogue about?	22
5.7	Way forward for the dialogue	22
5.8	Who else needs to be involved	22
5.9	Steering group membership (for the next phase of the project).....	23
5.10	Potential funding	23
5.11	Way forward	23
6	Summary of Project Steering Group discussions	25
7	Policy/ regulation summary	28
8	Conclusions and recommendations	29
8.1	Conclusions	29
8.2	Recommendations	30
9	Appendices	32

Introduction

1.1 Background

UKAEA and a number of other liability holders in the nuclear industry recognised the need to develop guidance with stakeholders to deal sustainably with their historic nuclear liabilities, particularly very low level waste, exempt and free-release construction materials produced by the industry.

CIRIA held a contract with UKAEA to produce a study for the DTI Liabilities Management Group's Safety Issues Task Force (SITF). This was originally entitled, "Sustainable development in the discharge of historic nuclear liabilities". In the development of the workplan it was agreed that the project was to be a scoping study and was to be re-titled, "Establishing dialogue and sustainable practices in meeting historic nuclear liabilities".

The use of terminology and issues relating to the definition and categorisation of material types became of key importance for the project's stakeholders. As reflected on the front page of this report, the project title underwent one further iteration.

At the time the project was set up the focus for this scoping study was on matters connected with the sustainable management of very low level waste, exempt and free-release construction materials in relation to the processes of decommissioning, with a view to ultimately informing an understanding of broader sustainability practices.

Similar methods to those used for the SAFEGROUNDS project were adopted for this scoping study in order to engage stakeholders and to ensure the project's processes were open and transparent. In this sense the project was to be 'auditable' by its stakeholders. It was the intention that the project would build relationships between stakeholders and the nuclear industry and create a good relationship for the future by improving communication and mutual understanding.

A publicly available scoping study report (this report) was to be the main output of the project. This was to be produced by CIRIA and published via SITF.

1.2 Elements of the scoping study

There were 3 elements to the scoping study:

- 1 Preliminary quantification
By Prof Peter Guthrie, independent technical expert
A preliminary inventory of materials (very low level waste, exempt and free-release construction materials), focusing on materials on UKAEA's Dounreay site as a pilot for the whole of the nuclear industry, comprising:
 - Outline of research methodology for quantification
 - Materials descriptions, definitions and categories
- 2 Sustainable construction indicators
By Jeff Kersey, CIRIA

A presentation by CIRIA on its experience developing and implementing sustainable construction indicators with the UK construction industry

3 Preliminary stakeholder dialogue

The preliminary Stakeholder Dialogue was run by Lucy Parnall and other staff of The Environment Council and Carl Reynolds, independent facilitator. The workshop identified the issues that need addressing to achieve sustainable practices in meeting historic nuclear liabilities on the nuclear industry's sites and discussed the way forward for the whole project. The workshop's aims were to:

- Inform stakeholders on the current ideas in the industry for the scoping study including producing a sustainability framework, data collection, and investigation of sustainability indicators
- Explore comments from stakeholders on the overall process
- Explore with stakeholders the main issues for a sustainability framework, and how these can be addressed
- Agree on a way forward for stakeholder engagement in this project
- Ensure the process is open and transparent by providing a transcribed photo report for scoping study report

1.3 Project management and the Project Steering Group (PSG)

CIRIA acted as central co-ordinator for the programme of work, providing the formal link between Client, the technical consultant, stakeholder dialogue facilitators and the Project Steering Group. CIRIA's project manager took responsibility for the delivery of the project Milestones under the guidance of the PSG. The PSG met in August and November 2002. A third and final PSG meeting was held on 13 February 2003.

1.4 Post scoping study report

It was agreed that once stakeholder expectations were initiated by the scoping study, it would be important to provide information as soon as possible about the planned follow-up activities. Therefore at the stakeholder workshop attendees were given an indication of how the initiative would be developed.

From the outset it was clearly envisaged that following completion of the scoping study a stakeholder dialogue process would be implemented in order to take the initiative forward. At the time the scoping study was developed it was anticipated that this more detailed process, which would be informed by the scoping study report, would have the following types of aims:

- Produce a 'route map' for how detailed practical industry guidance would be further developed through the process of stakeholder dialogue, based around the specific topics drawn out of the scoping study.
- Produce a draft framework of sustainable practices, with a particular focus on internal resource efficiency and the management of very low level waste, exempt and free-release materials:
 - define sustainable practices
 - provide examples of existing sustainable practices within the industry

- include a set of criteria to enable the discharge of liabilities including management options which have been appraised in terms of cost and other systematic criteria
- Provide guidelines for the industry to enable all stakeholders to monitor the implementation of good practice guidelines.
- Produce a report to define sustainable practices in the discharge of historic nuclear liabilities, including information that can be used as guidance to address immediate industry concerns.

2 Preliminary quantification of materials

2.1 Headline figures based on Dounreay estimates

The following table contains illustrative figures derived from Prof. Peter Guthrie's preliminary quantification of materials. It indicates relative volumes of decommissioning waste. As decommissioning proceeds at Dounreay approximately 120,000 cubic metres of clean/exempt material and 33,000 cubic metres of very low level waste will arise. This gives a total of 153,000 cubic metres of the lower waste categories.

Table 1: Relative decommissioning waste volumes (raw volumes)

Material	Decommissioning volumes (,000 m ³)	Total LLW from the Dounreay Site Restoration Plan (,000 m ³)
clean/ exempt	120	83
very low level waste (material less than 4Bq/ g)	33	
LLW includes VLRM	50	

The following table contains illustrative estimates of relative disposal costs for wastes arising from the decommissioning process.

*Table 2: Estimates of relative disposal costs**

Material	Disposal cost (£ per m ³)	Decommissioning volumes (,000 m ³)	Broad estimates of total disposal costs (£ million)
clean/ exempt	40 – 60	120	5 - 7
very low level waste (material less than 4Bq/ g)	40 – 60	33	1 - 2
LLW if VLRM included	3,000 – 5,000	~ 50	150 - 250

*Note**

Disposal costs are dependent on which management option is available. The above estimated disposal costs for very low level waste and clean/ exempt materials are based on estimated costs for fit-for-purpose disposal arrangements based on a risk assessment regarding avoidance of harm to humans and the environment. Obviously the total costs would be astronomical if these categories had to be disposed alongside LLW wastes in a Drigg - type repository (at costs of £3,000 -£5,000 per m³).

The following figure contains illustrative estimates derived from the preliminary quantification of materials for arisings of waste materials over time.

Figure 1: Arisings of waste materials 2002 – 2012*



Note*

Figure 3 contains illustrative estimates of very low level waste materials that will be produced at Dounreay. The graph plots wastes arisings over the first 10 years of a 60 year decommissioning and waste management programme at Dounreay. Approximately 10,000 cubic metres of very low level waste will be produced in the first ten years of the programme. (Dounreay is likely to produce a further 143,000 cubic metres in the following 50 years or so).

The following table contains illustrative estimates of proportions of very low level waste and clean/ exempt materials that will be produced at Dounreay.

Table 3: Estimates of proportions of very low level waste and clean/ exempt materials

Material	% of total mass
Concrete, brick & tile	~75
Plaster & Plasterboard	~10
Ferrous metals	~10
Timber	~1-5
Non Ferrous metals	<5
Soil	<2
Glass	<1

3 Report on quantification

3.1 Introduction

The preliminary quantification process, which was based on the steps discussed below, followed in principle the draft methodology agreed at the first Project Steering Group meeting on 9 August 2002. This is included in this report in Appendix 1. It is anticipated that certain elements of the quantification process will be carried forward into the next phase of the project providing more detail as required.

Step 1. Identify the sites

It was agreed by the Project Team and the Project Steering Group that the Dounreay site would be used for the quantification exercise, due to the following reasons:

- Dounreay contains almost all of the activities found generally at UKAEA sites
- The decommissioning process is well advanced at Dounreay
- Demolition arisings are already being generated there

The work will produce quantification methods that will be usable as a template for other sites. Work on other sites did not form part of the scoping study.

Step 2. Within each site identify the buildings and infrastructure to be included

Quantification at this level of detail has not been done yet. This element may be undertaken in the next phase of the project if it becomes apparent that more detailed quantification is required. It is acknowledged that the records that exist will allow this to be done with relative ease. Records held at Dounreay are probably more complete than at any other conventional construction of a similar scale anywhere in the UK. In effect all the buildings on the Dounreay site, with the exception of the Dounreay Fast Reactor (DFR) (which is a listed building), are planned to be demolished in the sixty year Site Restoration Plan.

Step 3. Identify/ agree on material types

The definition of the material types were agreed at the first Project Steering Group meeting on 9 August 2002, subject to being tested should more detailed quantification be required in the next phase of the project. Refer to Appendix 1 for details of material types.

Step 4. Identify treatment options

It is here that perhaps the greatest opportunity exists for the project to be influential in reaching a position of increased sustainability. The definitions of the waste categories (HLW, ILW, LLW) in legislation were drawn when operation was the dominant concern. Now that decommissioning is a mainstream activity, the implications of the categories are becoming very clear. The range of radioactivity levels which is covered by the definition of LLW is very wide at five orders of magnitude (0.4 - 4000Bq/g). This leads to materials of very different activity potentially being treated equally. This difficulty has led to the subdivision of the category with VLRM and very low level waste at the lower end of the range.

Within the LLW category there are wastes that can be classified as either very low level waste or exempt materials. Even for these materials it has proved problematic to dispose of surplus materials from sites, more because of their provenance than their level of activity.

In this context there is scope for dialogue with stakeholders and statutory bodies to reach a more reasonable position in respect of the treatment, handling, secondary use and disposal options for materials from decommissioning and demolition.

Step 5. Assess quantities by material type

This process has not yet started as the quantification so far has been confined to gross figures for all buildings and infrastructure on site at Dounreay. Refer to Table 4 for preliminary estimate of the different proportions of material types.

3.2 Site visit to Dounreay

Peter Guthrie visited the Dounreay site from 6 to 8 October. This was an invaluable activity as it has allowed the special site conditions to be appreciated. The special circumstances of a highly controlled site such as Dounreay, its setting and location, and the range of construction types were all far better understood as a result of the visit than would have been possible by a desk exercise alone. In addition it was possible for Peter to meet many of the key players at Dounreay and to gain a far better understanding of the context of the project. Peter's itinerary is included at Appendix 2.

3.3 Stakeholder meeting

Peter Guthrie presented his findings at the scoping study's stakeholder dialogue meeting held at Salford University 16 October 02. His presentation is included in this report at Appendix 5.

3.4 Next steps for quantification

Peter Guthrie suggests that the next step is to advance the quantification exercise. This will be done by taking the total quantities already given by UKAEA for the whole of the Dounreay site and relating them to particular buildings and infrastructure grouped by the phases of decommissioning in the Site Restoration Plan. The degree of detail will depend on the time available and the perceived value in going to additional levels of precision. The activity will be undertaken in close collaboration with George Linekar or other appropriate personnel at Dounreay.

4 Sustainable development and CIRIA's experiences of sustainable construction indicators

4.1 Purpose of this part of the scoping study

The purpose was to begin examining some of the definitions of sustainable development and to consider how sustainable practices may relate to construction resource use for the nuclear industry. In doing this CIRIA's experiences of implementing sustainable practices within the UK construction industry were examined.

4.2 Defining sustainable development

Both Peter Guthrie and Jeff Kersey alluded to some existing broad definitions of the concept of sustainable development and in all meetings there were discussions surrounding the possible need for a more detailed working definition of "sustainable practices" for the initiative. Therefore an aim for the next phase of the initiative may be to develop an agreed definition based on key principles and issues of concern to stakeholders.

4.3 UK Government

As highlighted in Jeff Kersey's presentation the UK Government strategy bases its vision of sustainable development on four broad objectives:

- Social progress which recognises the needs of everyone;
- Effective protection of the environment;
- Prudent use of natural resources; and
- Maintenance of high and stable levels of economic growth and employment.

4.4 Peter Guthrie on sustainable development

In his presentation at the stakeholder workshop Peter expressed the concept in the following broad terms:

"...development that meets the needs of the current generation without compromising the ability of future generations to meet their own needs". (Brundtland 1987)

In the context of the scoping study this definition would embrace the following aspects:

- Actions now must provide protection for the present community; and
- Take due account of the risks; and
- Build in protection for future generations.

And:

- Actions must be proportional to risk now and in future; and
- Disproportionate response as an expedient is non-sustainable, diverting resources for unreasonable levels of protection.

Building on his experiences with the quantification process at Dounreay his presentation went on to say:

- The scale of very low level waste, exempt and free-release materials means that decisions have significant consequences in terms of cost
- Strategies for dealing with the materials have to be:
 - scientifically robust; and
 - consistent with policy.
- Management processes should begin with clarity as to quantities.

4.5 Other sustainability issues

During the development of the scoping study UKAEA provided a list of issues which it considered appropriate to consider within the context of sustainability. Included as Appendix 8 these issues indicate that the concept of sustainability extends far beyond the concerns of demolition waste management. It is appropriate that these and other sustainability topics emerging from discussions be taken forward in the next stage of the project.

4.6 CIRIA's experiences in implementing sustainable construction

It was felt that the scoping study would benefit from some of the lessons derived from CIRIA's extensive experience in working with the UK construction industry on sustainability issues. One particular project, the Pioneers Club, was examined.

Through a 2 year process of consultation with the UK construction industry CIRIA has developed a suite of 77 sustainable construction indicators (SCIs) which build on the 4 Government sustainable objectives listed above. These indicators and the specific economic, social and environmental issues they relate to are contained in CIRIA's RP609 report listed in this report at Appendix 9.

Following the development of the indicators CIRIA then initiated a flagship project entitled, "Pioneers Club: implementation of targets & indicators". This is a 2 year programme of implementation involving 10 leading construction companies (both designers and contractors are involved). Through the project these companies are trialling the environmental and social sustainable construction indicators from the RP609 report.

The project is about sustainable practice – and not just about theory. The participating companies have varied experience in the use of indicators but are happy to come together within a club approach to explore ideas, share practical lessons and compare progress. The project holds a series of meetings and workshops around key topics to facilitate this process.

Workshop topics include:

- Data collection, management and use
- Sustainability training and communications
- Resources efficiency
- Formal benchmarking processes

Through the project, each company has developed a bespoke programme of activity for the process of implementing sustainable construction practices, using where appropriate existing management systems.

Summary of aims for the participating companies:

- Understand the role of SCIs in improving performance in relation to key sustainability issues for their business
- Consider internal people issues and the processes for building support for sustainability through effective communication
- Identify the most appropriate CIRIA indicators – usually about 25 for each company
- Establish effective data collection processes
- Measure company performance and consider future improvements - then report

For the companies the process of implementation involves the following stages:

- Identify key issues for the business
- Choose indicators for these issues
- Establish data compilation procedures
- Collect and analyse data
- Identify necessary improvements

Within the CIRIA indicators there are both strategic level indicators and operational level indicators. Strategic indicators quantify the company systems in place which can help deliver improvement. (e.g. % of turnover of company operations with a formal Environmental Management System). Operational indicators measure performance at site and project level (e.g. tonnes of unused construction materials disposed to landfill).

Many benefits are associated with sustainability performance measurement. The participating companies are clearly increasing their awareness of sustainable construction issues. They are also improving the management of information and identifying priority improvements. Ultimately the process will better equip them for more formal benchmarking which will assist company reporting procedures.

Key aspects of the project's club approach:

- Exchange of ideas amongst club members leading to creative solutions
- Support from CIRIA
- Input from specialist advisers and workshops
- Participation in the Project Steering Group
- Collective marketing strategy

Jeff Kersey's stakeholder workshop presentation on CIRIA's experiences in implementing sustainable construction is included in this report in Appendix 6. The full list of CIRIA's 77 sustainable construction indicators is included in Appendix 9. Below are listed those CIRIA indicators that relate to resources use.

4.7 CIRIA's resource related sustainable construction indicators for design activities

- Percentage of projects for which life-time costs have been derived and were a material consideration in the design
- Percentage of secondary and recycled aggregate used in construction
- Percentage of timber used in construction from well managed, sustainable sources
- Predicted treated water consumption for new buildings in litres per person per day (lpppd) averaged over all projects of a similar type
- Design capacity of grey-water and rainfall collection systems
- Energy efficiency of the building design for domestic buildings – The average SAP rating for all dwellings designed
- Energy efficiency of the building designs for non domestic buildings – Average % beyond building regulations (either for insulation, levels of building fabric or an overall energy target)
- Percentage of projects (by turnover) incorporating renewable energy systems or combined heat and power
- CO2 emitted per £ turnover (DETR, 1999b)
- Percentage of energy demand by structure provided from: Renewable sources, Combined Heat and Power
- Percentage of relevant projects (by turnover) for which a BREEAM score (or similar system) been calculated
- Percentage of projects achieving an “excellent” rating using BREEAM (or similar system) for new construction projects
- Percentage of projects achieving an “excellent” rating using BREEAM (or similar system) for refurbishment projects

4.8 CIRIA's resource related sustainable construction indicators for construction activities

- SO₂, PM₁₀ and NO_x released (in tonnes) per £ turnover arising from construction activities
- Average distance traveled per tonne of materials from suppliers to site (km)
- Number of complaints received per project site for noise and dust
- Tonnes of wastes arising to landfill per £ turnover
- Tonnes of hazardous wastes arising per £ turnover
- Tonnes of unused construction materials disposed to landfill
- Percentage of materials intentionally over-ordered by value
- Percentage of recycled and secondary aggregate used
- Percentage of timber used in construction from well managed, sustainable sources
- Water consumption in (m³) per £ turnover arising from construction site activities
- CO₂ released (in tonnes) per £ turnover arising from construction activities (DETR, 1999b)
- CO₂ released (in tonnes) per £ turnover (DETR, 1999b) arising from business related non-site activities
- Percentage of projects (by turnover) for which the M4I index of project sustainability has been calculated. The average score of projects measured

5 Preliminary stakeholder dialogue

5.1 Introduction

Within the scoping study The Environment Council, with the support of independent facilitator Carl Reynolds, was responsible for guiding and implementing a preliminary stakeholder dialogue process. The vehicle for this was a full day stakeholder workshop entitled, “Establishing sustainable practices in managing very low level waste and free-release construction materials in nuclear industry decommissioning”.

This workshop was held at Salford University on 16 October 02. It identified the issues that need addressing to achieve sustainable practices in meeting historic nuclear liabilities on the nuclear industry's sites and discussed the way forward for the whole project. The workshops aims were to:

- Inform stakeholders on the current ideas in the industry for the scoping study including producing a sustainability framework, data collection, and investigation of sustainability indicators
- Explore comments from stakeholders on the overall process
- Explore with stakeholders the main issues for a sustainability framework, and how these can be addressed
- Agree a way forward for stakeholder engagement in this project
- Ensure the process is open and transparent by providing a transcribed photo report for scoping study report

For this process the The Environment Council prepared for presentation at the first Project Steering Group meeting on 9 August 02 a methodology entitled, “Scoping phase stakeholder dialogue summary”. This was modified and circulated to and agreed by the Project Steering Group. This methodology is included in this report in Appendix 3.

5.2 Stakeholder workshop ‘photo report’ and transcription

Following the stakeholder workshop The Environment Council produced a ‘photo report’ including a transcription of the notes taken throughout the day by their facilitation team. Consistent with their normal working practices no interpretation of the workshop discussions was provided by them. This ‘photo report’ is included in this report at Appendix 4. What follows is the author's summary of the transcribed section of that “photo report”. To avoid misinterpretation The Environment Council's original transcription has been included in Appendix 12.

5.3 Attendees at the stakeholder workshop

In addition to the Project Team and members of the facilitation team the following people attended the workshop:

Mr Dave Bennett	Environment Agency
Mr Adam Bradbury	BNFL
Mr Richard Bramhall	Low Level Radiation Campaign
Ms Natalie Christou	Atomic Weapons Establishment Plc
Mr Simon Clark	Ministry of Defence
Mr Andrew Cooney	BNFL

Mr Robert Dudgeon	Highways Agency
Mr Anthony Hart	BNFL
Mr Paul Hughs	Environment Agency
Dr George Hunter	Scottish Environment Protection Agency
Mr Nigel Lawson	University of Manchester & UMIST
Mr Mark Liddiard	UKAEA
Mr R Matthews	UKAEA
Mr David Owen	BNFL
Mr John Pell	Cumbria County Council
Ms Deb Potter	Atkins
Mrs Joyce Rutherford	Health & Safety Executive
Ms Rachel Smith	National Radiological Protection Board
Dr Graeme Stonell	UKAEA
Mr Rob Storrie	Amersham Plc

5.4 Objectives, agenda and ground rules for the meeting

At the beginning of the workshop ground rules were established (refer to Appendix 3). The group also agreed objectives and an agenda. The objectives were to: inform attendees about the scoping study; explore their response; agree the main areas to focus on; and agree a way forward. The agenda included the following items:

- Introduction
- Speakers
- What are the key issues?
- Addressing the issues
- How to take this project forward

The following presentations were made on the preliminary work and scope of the project:

- George Linekar - background to the project
- Jeff Kersey - CIRIA's experience with sustainability indicators
- Prof Peter Guthrie - preliminary quantification work at Dounreay

Each presentation was followed by opportunities for asking questions or making observations. Copies of all slides from the presentations are included in this report at Appendices 5, 6 and 7.

5.5 What issues should be discussed?

Participants worked in small mixed groups to identify their 3 key issues. These were then reported back in a plenary session and recorded. Four overarching themes were identified after some discussion about groupings. An attempt was made to attribute each issue to a grouping, but this was abandoned as it was felt that all issues needed to be considered under each grouping.

Groupings

- 1) Fate of construction material
→ possibilities
- 2) Environmental impacts

- inc. radioactive issues
- impacts of the possibilities of 1
- 3) Influencing wider contexts
 - Government, implementation
- 4) Process

Issues

- Environmental impact of current disposal technology
- How do you practically characterise materials? (Physical)
- Long-term disposal strategies
- Definitions of characterisation of radioactive waste – are they suitable for this project?
- How does this actively relate to the bigger picture – Government strategy on waste
- Potential use, re-use of recycling options and disposal options and minimisation option
- Risk assessment should look at whether fit for purpose
- Effect on human health? radioactivity ? the environment – pay attention to work going on and continuing to go on with particular attention to assumption that 0.4Bq/g is appropriate level
- Acceptability of organisations that may accept material off site
- Highlight inconsistencies in Government policy and implementation
 - How can this group add to other consultations and dialogues
- Public acceptability of proposed options overarching
- Consistent with best practice elsewhere overarching
- Whoever is involved represents as broad a span as possible
- Participants in process are well informed and can make sound decisions
- Implications of lack of strategy and its affect on other programmes
- Ability to characterise material in terms of likely end-use (analytical and sampling process emphasised) radiological
- Long term reuse of materials needs to be compatible with long-term use of site
- Artificial and naturally occurring radioactivity in the context of background levels. Need to take account of speciation, environmental pathways and health context
- Demonstrable and enacted sustainable practices – to go beyond the bare minimum
- Drigg – how appropriate is it that material at very low end to go to Drigg? Appropriate degree of control
- Consider whole life cycle of material not just first re-use
- Our deliberations should not just consider Dounreay
- Work needs to be timely but not rushed
- Criteria for acceptable risk or acceptable basis for processes proposed
- Defining when material becomes waste
- Re-use materials as part of waste treatment
 - e.g. use as grouting when dealing with LLW and HLW

5.6 What is this dialogue about?

There was some discussion about what the dialogue should address. Two themes emerged:

- 1) what type waste should it consider, and
 - 2) what level of radioactivity.
- Define "VLLW" – 4Bq per g and look at this
 - There needs to be strategies for all waste
 - Want to address very low level waste and exempt material as they have been excluded from current Government consultation
 - In the 2nd phase of work need to look at impact of waste
 - Need to prioritise material and look at large volume materials first
 - Look at all options
 - Re-use, minimisation, waste disposal etc
 - If someone takes the material will probably be registered legally to hold them
 - Custodian

5.7 Way forward for the dialogue

The group discussed possible ways forward for the dialogue, representation, funding and information needs.

5.8 Who else needs to be involved?

- Nirex
- LMU/A
- People who might buy or use material
- Greenpeace, FoE, other bodies with overarching responsibility for environment
- BRE
- People who are registered legally to hold materials
- Royal Commission for Environmental Discharges
- Citizens' Jury – representatives of people without overt agendas
- Consumers' Association
- Ethical specialist
- Academic in social construction of knowledge (Brian Wynn, Ian Welsh, P. Dorfman)
- Plant managers
- Landfill operators
- NFLA
- DEFRA, DTI (were invited)
- Small Users Liaison Group (Scotland) / Small User Group (England)
- Federation of Demolition Contractors
- Drigg – Jeff Shaw
- EU –DG Environmental Luxembourg
- RTPI
- LAs in proximity of sites
- CORE

- Trade Unions?
- Expertise from SAFEGROUNDS process?

Comments:

- If can't/ won't attend find other ways to keep them informed
- Resourcing a big issue in NGO and CBO attendance
- Look at possibility of paying NGO representatives (more than expenses)

5.9 Steering Group membership (for the next phase of the project):

- A sustainability expert (Forum for the Future, University of Manchester)
- NGO
- CBO
- Nuc. Industry (Liabilities Management Group or Clearance and Exemptions Group)
- Regulator
- Potential user of recycled material (e.g. HA? Or BRE)
- People who deconstruct (Federation of Demolition Contractors)
- People who dispose of material (landfill operators)
- Academic?
- Local Authority / LGA / NFLA
- Government (DTI/DEFRA)

Comments:

- What information needs to be or can be fed into the process?
- How to ensure other people who may be affected are included
→ Where is it going to end up?

5.10 Potential funding (for the next phase of the project)

- Landfill tax credit scheme
- Industry
- Sustainability fund (WRAP for DEFRA)
→ Separate allocation for Scotland
- Partners in Innovation (DTI yearly funding)
- Joint industry funding

5.11 Way forward

After the workshop The Environment Council and CIRIA met to discuss the options for a future dialogue process that would take forward the outputs from the meeting and the scoping study. There are 2 broad ways of taking this forward;

Traditional Dialogue

Stakeholder Steering Group

Due to the problems of getting certain groups represented at long running stakeholder dialogues The Environment Council feel that the Stakeholder Steering Group would be the best way forward for this project. This option would involve a small group, with all the groups identified at the meeting,

overseeing the whole process. They would commission any work that needs to be done, oversee other consultation processes (e.g. electronic consultation), review responses and make recommendations. These recommendations would go out to consultation to a wider stakeholder group. If necessary, the group could also engage in larger stakeholder meetings on certain issues similar to a traditional dialogue. Please see Appendix 11 for further detail on these options.

6 Summary of Project Steering Group discussions

It was agreed that the Project Team should write a proposal for implementing the next phase of the initiative. As well as being informed by the stakeholder workshop, this proposal should consider the following points which arose from the first and second project steering group meetings:

- The next phase project should not just be about a single company. The lessons from the scoping study should be broadened out from the UKAEA site at Dounreay to the rest of the nuclear industry.
- The relationship of the proposed project to other related industry initiatives needs to be understood and overseas lessons learned. Duplication of effort should continue to be avoided. In particular differences from the work of the Clearance and Exemptions Working Group should continue to be made clear.
- The Safety Issues Task Force (SITF) enables an overview of related initiatives and can provide feedback to Government. Future SITF sponsorship of the project has been confirmed by the DTI representatives who participated in the scoping study through the PSG. It was considered possible that the project would fit under the SAFEGROUNDS 'umbrella'.
- The project should request in the next 6 months that the DEFRA national materials inventory includes lists of all low level materials in UK. This would help make the inventory practical and useful, providing a national picture of the materials arising.
- The next phase of the project would require more detailed quantification. This would be done taking the total quantities already given by UKAEA for the whole of the Dounreay site and relating them to particular buildings and infrastructure grouped by the phases of decommissioning in the Site Restoration Plan.
- The next phase of the project would require more detailed examination of disposal options and related costs.
- Both on-site and external use or disposal of demolition materials should be considered. There are potential problems associated with each option
 - internal recycling and stockpiling opportunities may be limited.
 - Project Managers may have technical problems specifying recycled materials (although some alternative specifications are available)
 - Recycled materials would not necessarily be available at the time their use was required.
- The question of whether the Environment Agency and the Scottish Environment Protection Agency would favour a 'concentrate and contain' approach needs to be considered further.
- The range of radioactivity levels which is covered by the definition of LLW is very wide at four orders of magnitude (4 - 4000Bq/g). In addition, at the lower end of this LLW category there are wastes that can be classified as either very low level waste, exempt or clean materials.

- There are likely to be challenges to disposing of any decommissioning or surplus materials from a nuclear site, more because of their provenance than their level of activity. This could potentially lead to a situation where all materials have to be managed in the same manner as wastes from the upper end of the LLW range. This does not represent a sustainable solution.
- If all materials go to Drigg it will be filled too fast.
- Category definitions need clarification.
- There are difficulties in interpreting regulations and applying them to a particular site. Malcolm Wakerley of Atkins produced a draft document on policy/ regulatory issues (refer to Chapter 7).
- Government will initiate consultation looking at 'end-states' which are acceptable for de-licensed nuclear licensed sites. 'End-states' other than 'green-field' could have a significant effect on the volumes of wastes produced and options available for their management.
- Stakeholder perceptions would be the main obstacle to some options. Although stakeholder dialogue is expensive and is not a short term process it has long term benefits.
- Transfer of liability would be an important issue.
- Concern was expressed that the stakeholder workshop was not fully representative as there were not enough representatives from the demolition contractors and potential end-users of demolition materials ie construction contractors. It is important that there should be a consultation process managed by a separate third party. However, it would be possible to undertake more intensive recruitment for an extended dialogue if required in the next phase of the project.
- CIRIA could assist in addressing the make-up of stakeholders by attempting to engage industry representatives through its members and partner organisations – for example it could contact the National Federation of Demolition Contractors.
- Write a specification for a contractor to compile a national waste inventory for these types of materials to be included in the National Inventory.
- Map all other similar initiatives in the UK.
- Commission a document which clarifies the discussion about when a waste becomes a waste - what are the constraints on use of materials?
- Examine a range of options from on-site to off site use and disposal considering local conditions and developing a framework for decision making. It is not feasible for this project to provide very short term solutions for off-site use.
- 'On-site' options need to be looked at:
 - curve for demand

- curve for supply
 - cost of disposal
 - scope current routes
 - (current conditions preclude Drigg)
- Write specification on best practice guidance to all on characterising materials:
 - characterisation of material
 - sampling
 - measuring radioactivity
 - build on existing initiatives (David Owen has relevant experience of other initiatives)

7 DEFRA draft document summarising current policy/ regulation

At the second Project Steering Group meeting Malcolm Wakerley of Atkins tabled a draft document (CON82/PSG2/12) which he had prepared specifically for the project. This draft document summarises current policy/ regulation and was felt to be a very useful contribution to the scoping study. Consultation comments on the paper were invited from the PSG members, although none were received. Therefore a final draft has been included in Appendix 13 and is available for wider circulation.

Conclusions and recommendations

8.1 Conclusions

This scoping study has initiated a process for establishing sustainable practices in managing very low level waste and free-release construction materials in nuclear industry decommissioning. It has done this through 3 worksteps. It has carried out preliminary quantification of the construction materials that will arise from the decommissioning process as demolition waste. It has reviewed CIRIA's experience of implementing sustainable construction indicators with the UK construction industry. And it has initiated a preliminary stakeholder dialogue. Similar methods to those used for the SAFEGROUNDS project were adopted in order to engage stakeholders and to ensure the project's processes were open and transparent.

It was concluded that a detailed proposal should be written to establish a project to further develop the initiative. Building on the findings of the scoping study this should be a more comprehensive process to produce a 'route map' for how detailed practical industry guidance could be developed through the process of stakeholder dialogue. The aim is to produce guidance on sustainable practices and guidelines for the industry to enable all stakeholders to monitor the implementation of good practice. Various funding sources for the next stage project will need to be investigated.

The next stage project will be broadened out from the UKAEA site at Dounreay to reflect the needs of the rest of the nuclear industry and the project will fit under the SAFEGROUNDS 'umbrella'. Future SITF sponsorship of the project is under consideration.

The range of radioactivity levels which is covered by the definition of LLW is very wide at five orders of magnitude (0.4 - 4000Bq/g). In addition, within this LLW category there are wastes that can be classified as either very low level waste or exempt materials. (Refer to Appendix 10 for some existing waste classifications).

At the stakeholder workshop delegates were asked what they thought the future stakeholder dialogue would be about. In terms of radioactivity levels to be considered it was seen as appropriate to initially focus on materials of less than 4Bq/ g.

There are likely to be challenges to disposing of any decommissioning or surplus materials from a nuclear site, more because of their provenance than their level of activity. This could potentially lead to a situation where all materials have to be managed in the same manner as wastes from the upper end of the LLW range. This does not appear to represent a sustainable solution. If all materials are disposed of at Drigg it would be filled too fast and costs would be astronomical.

The next phase of the project will require more detailed quantification and would require more detailed examination of disposal options and related costs. Both on-site and external disposal & reuse options will be considered - although there are likely to be difficult issues to address within each option.

The question of whether the Environment Agency and the Scottish Environment Protection Agency are likely to favour a 'concentrate and contain' approach will be considered further.

Waste category definitions will need further clarification. Also, there are difficulties in interpreting regulations and applying them to a particular site. This should continue to be addressed.

Stakeholder perceptions are likely to represent an obstacle for most disposal/reuse options. Although stakeholder dialogue is expensive, and should not be considered a short term process, it should continue to be central to the initiative. However, the stakeholder workshop for the scoping study was not fully representative and therefore this needs to be addressed in the next stage.

8.2 Recommendations

- For future initiatives initially focus on materials of less than 4Bq/ g.
- Carry out more detailed quantification of wastes arising by taking the total quantities already given by UKAEA for the whole of the Dounreay site and relating them to demolition phases and designation of re-use of buildings - using scenario building to indicate where materials might be utilised. Costs and commercial impacts should also be quantified. (Quantification will need to be applied to the whole industry).
- Request that the DEFRA national materials inventory includes lists of all low level materials in UK. This would help make the inventory practical and useful, providing a national picture of the materials arising. Write a specification for a contractor to compile a national waste inventory for construction materials that will arise from the decommissioning process as demolition waste. Arrange for this data to be included in the National Inventory.
- The relationship of the proposed project to other related industry initiatives needs to be understood and overseas lessons learned. Duplication of effort should continue to be avoided. In particular differences from the work of the Clearing and Exemptions Working Group should continue to be made clear. Therefore, the initiative should track all other similar initiatives in the UK.
- Commission a document which clarifies the discussion about when a waste becomes a waste - what are the constraints on use of materials? Seek consensus on definitions of materials/ define terms.
- Broaden the initiative out from the UKAEA site at Dounreay to reflect the needs of the rest of the nuclear industry
- Funding opportunities for the next stage should be investigated
- Examine a range of options from on-site to off site use and disposal considering local conditions and developing a framework for decision making. It is not feasible for this project to provide very short term solutions for off-site use.
- Examine 'on-site' options need to be looked at:

- curve for demand
 - curve for supply
 - cost of disposal
 - scope current routes
 - (current conditions preclude Drigg)
- External disposal and use also has to be looked at (internal recycling and stockpiling opportunities may be limited)
 - Write a specification on best practice guidance to all on characterising materials:
 - characterisation of material
 - sampling
 - measuring radioactivity
 - build on existing initiatives (David Owen has a lot of experience)
 - Develop the next stage project under the SAFEGROUNDS umbrella - where this is appropriate and agreed by participants
 - Establish a consensus based definition of sustainable development. Explore the possibility of developing specific indicators.
 - Carry out more intensive recruitment of stakeholders to ensure stakeholder dialogues are fully representative. CIRIA and the Environment Council should attempt to engage industry representatives through their contacts, members and partner organisations.
 - Explore ways to address the difficulties in interpreting regulations and applying them to a particular site. Consider further development of Malcolm Wakerley's (Atkins) document.

9 Appendices