SD:SPUR Scoping Document
Waste Management Framework Guidance Note No.4

Implementation of Management Options

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Martin Bjerregaard and George Towler

PREFACE

This is the fourth in a series of four scoping reports that have been developed on behalf of the SD:SPUR Learning Network by Quintessa and Golder Associates. The scoping reports are intended to support the development of detailed guides relating to the management of decommissioning wastes and items from nuclear licensed sites. The need for such guides, covering activities and decision processes implemented by waste management practitioners, has been identified by members of the SD:SPUR Project Steering Group.

It is important to stress that the scoping documents are not themselves intended to serve as formative guidance. They are deliberately short in length, being aimed at identifying key issues that will need to be addressed, rather than developing such ideas to the level at which they can be considered to represent practical guides. A common format is followed in each case; following a brief introduction to the document, the text is then structured to provide a discussion of:

- Context: identification of the main considerations associated with this particular stage in the management process, including any relevant policies and regulations.
- Need: discussion of any existing guidance that may be relevant, and the scope of the guidance that ought therefore be provided by SD:SPUR.
- Relevance: consideration of the target audience and how the guidance might be used, wider concerns and developments, and the potential for referencing existing good practice guidance.
- Format: anticipated length and other features relating to presentation of the guidance document.

At the time of preparing this draft, there remains uncertainty as to whether the guidance itself is best presented as a single document, or in four separate guides. A single document would have advantages in terms of emphasising the degree of feedback and iteration that is inherent in developing and implementing a management strategy; however, it could prove to be of considerable bulk. For present purposes, the scoping documents assume that separate guides will be produced. If this path continues to be followed, a companion general 'handbook' for the process as a whole (drawing on outlines in existing SD:SPUR material) could help to present a more integrated picture and avoid duplication in the individual guides.

1 INTRODUCTION

This scoping report considers the implementation of management options for wastes and materials arising from the decommissioning of nuclear licensed sites.

Implementation starts with the development of relevant plans, procedures and work instructions. It involves monitoring (of the workplace and the environment) and verification that procedures and instructions have been followed (for example, measurements to show remaining levels of contamination are within appropriate standards). A key considerations is the provision of relevant information to stakeholders, providing verification that relevant procedures have been followed; this is particularly important when segregating and sentencing wastes as clean, excluded, exempt or LLW.

In practice, as part of an iterative overall management approach, information gained from quality control, verification and communication is an important element of the continuous review of performance. In principle such feedback can, in turn, lead to modifications to procedures for characterisation (Needham and Penfold, 2009), or changes in site strategy (Egan and Walker, 2009) or management options (Penfold and Paulley, 2009). Hence, whilst such considerations are a fundamental component of confidence building in the implementation of management options, they are also an integral part of the overall management lifecycle. In what follows, the primary considerations relating to data gathering and quality control apply equally to information gained at all stages in the management lifecycle.

2 CONTEXT

The actual implementation of the waste characterisation and optioneering processes as presented in the previous three SD:SPUR review and scoping documents require a robust quality control procedure as well as the ability to feedback into the decision making life cycle. Such a feedback loop ensures that the procedure is flexible enough to cope with necessary adaptations during implementation.

This scoping document seeks to present the key steps in establishing implementation procedures for the waste characterisation and optioneering processes and is intended to support the further development of detailed guidance on this activity.

Relevant policies and regulations are as specified in the previous three tasks, and will be supplemented by the necessary site-specific applicable health, safety and environmental management requirements.

3 NEED

There is currently limited guidance in the present SD:SPUR documentation relating to specific requirements for the actual implementation of the waste characterisation and waste management optioneering activities. There is therefore a need to detail such implementation procedures and relationships between the implementation process with the strategy development steps.

Further development is therefore proposed for the following key requirements relating to the implementation phase:

3.1 Adopting the Principles of Data Quality Objectives

The Data Quality Objectives (DQO) process seeks to establish a systematic approach for ensuring that data are acquired and evaluated in accordance with their intended use. Applying the principles of the DQO process helps to ensure that the purpose of the waste characterisation work is aligned with the overall decommissioning objectives.

3.2 Sampling, Analysis and Non-intrusive Surveys

A process that applies the principles of DQO should identify requirements for characterisation, and define the process to be followed to obtain representative samples, analytical data, and non-intrusive survey data, which includes radiation scanning to obtain direct measurement. If existing data or process knowledge are not available to support a decommissioning and demolition decision for a building/area, specific sampling, analysis and non-intrusive surveys may be required.

Statistical sampling

To ensure that the sampling and assessment process is robust and defensible, the Nuclear Industry Code of Practice (NICoP) (CEWG, 2006) recommends a statistical approach, and details the process for undertaking this approach. Once this has been completed, sampling zones should to be set based on the perceived level, nature and type of contamination.

Radiological measurements

Radiological monitoring and sampling is required to provide a numerical estimate of surface or bulk activity levels which can be compared to regulatory and guidance levels. The basis of the monitoring and sampling requirements is regulatory control on clearance of materials from site as clean, exempt, excepted, or radioactive.

Non-radiological measurements

For non-radiological waste/material streams, sampling will be required to characterise hazardous wastes as well as classify wastes which, as confirmed non-hazardous, can readily be reused and recycled.

3.3 Quality Assurance (QA) and Quality Control (QC)

QA and QC procedures are required to ensure that the necessary requirements and controls are employed in order to conduct building/area characterisation with adequate technical defensibility.

3.3.1 Personnel Training and Qualification

All personnel conducting surveys or performing activities should be suitably qualified to complete the required procedures. Their relevant experience should be confirmed prior to them undertaking the task, or training provided/requested to enable them to complete the task.

Work Process

All characterisation activities – from initial scoping to eventual treatment and processing – should be executed according to an *Integrated Work Control Programme* (IWCP) (see, for example, RFETS (2000)). The IWCP requires the preparation of work packages that provide work control and incorporate the *Integrated Safety Management* (ISM) principles. The ISM principles ensure workers

are involved in the planning, hazard identification, and implementation of relevant activities. The IWCP review process evaluates the activity, hazard identification, mitigation measures and compliance with the authorization basis documents.

Survey/Sample Handling and Custody Requirements

Samples should be managed to ensure there is an accurate record of sample collection, transport, analysis, and disposal to ensure that samples are neither lost nor tampered with and that the sample analysed is traceable to a specific location in the field.

Analytical Methods and Quality Control Requirements

Laboratory sample quality control (QC) checks should include, as appropriate, inter-laboratory comparison studies (single- or double-blind standards), performance evaluation standards, laboratory control samples, laboratory duplicates, preparation blanks, trip blanks, field blanks, and duplicate samples.

External laboratories should be subject to audit procedures to validate their quality control systems and competence. As a minimum all external laboratories should have achieved the following accreditation:

- ISO 9001 Quality Management System; and
- ISO 17025 General requirements for the competence of testing and calibration laboratories.

Field Survey/Sampling Quality Control Requirements

The number of QC measurements is determined by the degree to which assurance is needed for adequate control of the measurement process. The process is simplified when the scope of the survey is narrowed to a single method, crew, or laboratory. Similarly, the number of required QC measurements increases proportionately with the number of samples or surveys and as action levels approach a given instrument's detection limit.

3.3.2 Data Collection Design

The requirements and rationale of the design for the collection of characterisation data should be derived from the quantitative outputs of the DQO Process. Pre-demolition Survey data are considered critical because they are required to achieve project objectives or limits on decision errors. Therefore, the level of QA/QC is more stringent for a Pre-demolition Survey than that of Reconnaissance Level Characterisation (i.e. during the initial stages for the scoping of the actual sampling/analysis work) or In-process Characterisation (i.e. that sampling and analysis which occurs during the decommissioning works).

Inspection and Acceptance Testing

All characterisation measurement results should, at a minimum, be identified by actual result (not “less than minimum detectable concentration”), date, instrument, location, type of measurement, and surveyor. Characterisation data should be reported with gross measurement results, reduced measurement results, and all associated parameters and calculations (e.g. instrument model identification, and parameter inputs and outputs) required in order to verify the reduced result. Calibration and maintenance of instrumentation shall be consistent with UK best practice and guidance, or site-specific best practice.

Any deviations from recognised UK best practice or guidance, or site-specific best practice, should be documented and technically justified in the characterisation survey reports.

Inspection/Maintenance Testing of Instrumentation

Inspection, maintenance, and calibration of radiation instrumentation should be performed as specified in the Site Radiological Control Manual.

3.4 Data Reviews

Data collected during characterisation should be reviewed prior to incorporation into final reports to determine quality, usability, validity, and whether it meets the objectives set out in the task-specific DQOs. Collectively, data review includes verification and validation (V&V), and quality assessment of the data. Precision, accuracy, representativeness, completeness, comparability and sensitivity are specific aspects of the data review that are summarily covered by the data review process.

Verification and Validation

Verification should be performed on sets of data produced by the project on which decisions are based. Validation should be performed on minimum percentages of data/data packages as stipulated in project-specific characterisation packages and sampling and analysis plans.

Verification ensures that data produced and used by the project are documented and traceable per applicable quality requirements.

In contrast to verification, validation is an in-depth technical review of the data that determines whether characterisation was performed within quality control requirements and tolerances.

Data validation should be undertaken in line with the NICoP (CEWG, 2006), as appropriate.

Precision

Overall project precision is the measurement of the variability associated with the entire sampling, analysis and survey processes within the project. It is determined by analysis of duplicate or replicate field samples, or undertaking duplicate surveys of the same area and measures variability introduced by both the laboratory and field operations.

Accuracy

Analytical accuracy can be measured by comparing the percent recovery of analytes (spiked into a laboratory control sample duplicate) to a control limit. Analysis of Performance Evaluation samples should also be used to ensure quality control for atypical contaminants or radionuclides of concern, or when interference is an issue. Measurement uncertainties, both quantitative and qualitative, should be reported for all data sets used in decision-making.

Representativeness

Objectives for representativeness must be defined for each sampling and analysis, and survey task and are a function of the investigative objectives. Representativeness can be achieved through use of standard field, sampling, and analytical procedures following method statements for each project task, which will outline industry best practice. Representativeness can also be determined by appropriate

program design, with consideration of elements such as sample locations, matrix and sample type, and number of samples.

Completeness

To produce credible and defensible data sets for decision-making, the data must be complete relative to the original sample plan(s). Therefore, completeness should be calculated and reported for each method, matrix and analyte combination.

Comparability

Comparability is the confidence with which one data set can be compared to another data set. One of the objectives of characterisation is to produce comparable data. The number of matrices that are sampled and the range of field conditions encountered are considered in determining comparability. Comparability can be achieved by using standard methods for sampling and analysis, reporting data in standard units, normalising results to standard conditions, and using standard and comprehensive reporting formats.

Data Quality Assessment (DQA)

DQA is a scientific and statistical evaluation that determines if the data are of the right type, quality, and quantity to support their intended use, which in this case, is to make decisions regarding decommissioning and demolition. More specifically, DQA is an evaluation of the data specifically with respect to the project's DQOs and action levels, and could, as applicable, encompass statistical methods as described in US EPA (1997).

Non-conformance

During all aspects of the project work, if any non-conformances in procedures are identified (e.g. not following DQO, errors in laboratory data) they must be reported and their impact on the phase of the project should be established.

3.5 Input of Waste Characterisation Data to Development of Management Strategies

On confirmation that the waste characterisation data are both applicable (i.e. conforms to DQO) and of the necessary quality, the data results can be fed into the Development of Management Strategies (Egan and Walker, 2009). These data will thus provide the basis on which decisions can be made on how to manage the waste streams arising, along with information relating to site specific conditions, waste treatment and handling options as well as waste management objectives.

Since this is often a cyclical process, whereby waste characterisation leads to a decision on a specific waste handling option for a particular waste stream within a particular location of the site (where should that waste be found elsewhere it may require a different method of handling), then there would potentially be several feedback loops.

3.6 Stakeholder Engagement and Feedback to Management Strategy

Ongoing communication with stakeholders, beyond involvement in the initial phases of options evaluation, provides an important basis for maintaining confidence during the implementation of management options. Such communication can and should be centred around an open and ongoing dialogue with a range of non-statutory stakeholders, an element of which may include routine

reporting via the relevant sub-committees of the Site Stakeholder Group; however, making monitoring and verification more widely available to the general public (e.g. by publishing on the relevant SSG or site licence company website) also helps to assurance openness and transparency in the wider process.

Information provided to stakeholders during implementation could be expected to include, among other things:

- Progress reporting on the implementation of management options and progress in carrying out the overall strategy;
- Discussion of any changes to the strategy or options that are being made during implementation (for example, because technological developments have occurred);
- Data summaries from ongoing sampling and monitoring activities during materials processing, for comparison with relevant acceptance criteria; and
- Arrangements for feedback from the ongoing stakeholder dialogue and consultation process into ongoing review of overall materials management strategy for the site.

Arrangements for providing information need to be reviewed at intervals, particularly over decommissioning projects that will span many decades.

3.7 Data and Document Management

Throughout the process vast amounts of data will be generated and documents created or reviewed that will need to be stored in a robust system that may require access over a period of decades or even centuries.

Data Management

Data management consists of a number of different operations/activities. In a simple file-based system it is common that these take place in the same environment at the same time. Data that are required for a report are entered on the relevant page (e.g. Word or Excel), which can be later printed out. In a more complex system, however, this is not the case, and to understand the differences between the varied approaches it is important to be aware of the different specific activities.

Document Management

Document management is essential in controlling, for example:

- Documents currently in use (e.g. issue or versions);
- Old versions or issues of the same documents;
- Documents that are ‘controlled’, i.e. have a unique identifier assigned to a particular person or location (e.g. a method statement or quality control document);
- Centralised documents that are regularly updated by different users.

4 RELEVANCE

There is currently no known holistic best practice guidance on “implementation” of this type of task. Its development for nuclear licensed sites in the UK would therefore be useful, both to guide local

procedures adopted by the site operators and to enable some streamlining of the information reported to the site owner and other stakeholders.

The development of guidelines in accordance with the above is therefore likely to be highly relevant for waste practitioners, as well as providing a consistent approach across all nuclear licensed sites.

5 FORMAT

Whilst it is likely that further consultation with potential users will be needed, simple features like flowcharts, textboxes and checklists would help to ensure a more accessible document. The format of this guidance document is therefore envisaged to be in a 'handbook' style with flowcharts and templates to support its actual adoption. An interactive portable document format (pdf) may also be considered.

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