

# Dalgety Bay Radiological Support To MOD Investigation Plan (Ref: 23218N241i4)

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## 1. Introduction

### 1.1 Background

The Defence Infrastructure Organisation (DIO) has commissioned AMEC Environment & Infrastructure UK Ltd (AMEC) to undertake surveys and sampling for radioactive radium-226 contamination at various areas in Dalgety Bay, Fife. It is considered by the Scottish Environmental Protection Agency (SEPA) that the contamination originated from the Second World War Maintenance Unit at the former Dalgety Bay airfield, and that it was incorporated into soil, which was then inadvertently spread onto headland and foreshore areas during the redevelopment of the airfield to the modern settlement of Dalgety Bay.

Both DIO and SEPA have undertaken several surveying and intrusive investigation exercises of the beach areas in the past, which have been publicly reported. SEPA has recently undertaken a survey and recovery exercise on the beach at a much higher resolution and coverage than previously undertaken by either party. This has demonstrated the need for a programme of further investigation and for ongoing monthly surveys to provide continued assurance of public safety. DIO has requested that AMEC undertake this investigation as part of DIO's undertaking to continue to support the Dalgety Bay Forum in carrying on works at the site.

### 1.2 Aims and Objectives

The aims and objectives of the work are to undertake a walkover survey followed by intrusive investigation of areas of potential concern identified by the Site Conceptual Model and informed by the findings of the radiological walkover survey, geophysical and topographical surveys. The aim is to determine the extent and nature of any contaminated materials present.

## 2. Radiological Walkover Surveys

The nature and extent of radiological surveys for the area will be informed by the ongoing work on developing a Conceptual Site Model. We have presented details below of techniques which may be employed but the method used will depend on a number of factors including the depth of survey and the required confidence level of the findings. As such, the information presented below should be considered indicative at this stage and will be reviewed and revised in light of the Conceptual Site Model and other survey results.

### 2.1 Methodology

All radiological surveys shall be carried out as positionally-referenced surface surveys, using person-portable positionally-referenced sodium iodide (NaI) detectors recording count rate. This methodology will yield a data set which comprises GPS-positioned count rates.

The method employed, in particular the detector required to perform the survey, will need to be determined following the development of the Conceptual Site Model. This will ensure that the survey undertaken will provide the information relevant to validating and refining the Conceptual Site Model.

In addition, field trials of available equipment may be required to provide further confidence in the performance of available methods.

Where surveys are undertaken, following the completion of each zone, the data shall be downloaded onto a site laptop, and the findings across the survey area interrogated using GIS. Areas for further investigation will be identified by comparing the findings of the surveys with those from other non-intrusive surveys in the context of the Conceptual Site Model.

### 2.2 Survey of Shallow Sources

Where a survey of shallow sources (i.e. typically those within 30 cm of the surface) is proposed, the approach adopted for the monthly monitoring shall be undertaken, as follows:

- Detector to be positioned 0.1 m above the ground;
- Walking speed 0.5 m/s
- Maximum traverse separation of 0.46 m

Using the above method each GPS positioned count rate recorded will represent 0.17 m<sup>2</sup> of ground. A report providing evidence of the capability and the outcome of a trial carried out in February 2012 will be provided to SEPA and the Expect Group.

## 2.3 Survey of Deeper Sources

Information from subject experts is that commercially available, validated methods for undertaking surveys to detect sources at depths of 1 metre are currently limited in the UK. If the Conceptual Site Model indicates the need for surveys of sources at this depth, the available options will be investigated and the results of this investigation presented to SEPA and the Expert Group.

Where an appropriately robust and validated method can be identified and procured commercially, a survey will be proposed and undertaken.

## 2.4 Gamma Spectrometer Survey

An additional survey could be undertaken using in-situ Gamma Spectrometer measurements undertaken on a 25m grid. This would enable differentiation of natural background from areas of Ra-226 contamination and aid background correction.

# 3. Targeted Intrusive Investigation

Areas of potential concern identified by the Conceptual Site Model and the findings of the radiological walkover surveys, geophysical survey and topographical surveys will be subjected to targeted investigation. This could also be supplemented by a number of non-targeted investigations to provide further confidence in the Conceptual Site Model.

## 3.1 Methodology

Investigations will be conducted by trial pitting areas of elevated count where contaminated material is identified or suspected. Trial pits will be excavated using the following method;

- Excavated by tracked mini-digger or similar;
- Excavated in 0.1 m layers with each bucket of arisings monitored using a hand-held 2" x 2" NaI probe and count readings recorded. All arisings to be placed on plastic sheeting to minimise potential contamination spread;
- Base of trial pit to be monitored following each 0.1 m strip and results recorded;
- Trial pits to be logged in accordance with BS5930;
- Excavations to be continued until natural ground has been proven but not shallower than 1.0 m;
- Arisings to be replaced in the reverse order of excavation to limit vertical migration of contamination; and

- Completion walkover survey to be undertaken using a hand-held 2" x 2" NaI probe to ensure contamination has not been moved to the surface increasing risks to human health.

Contamination from identifiable point sources of radioactive material will be removed to the site storage in line with 23218Q240i2 presented in Appendix A. It should be noted that limits on the amount and/or nature of any contamination removed will be dictated by the need for compliance with the Ionising Radiations Regulations and the Radioactive Substances Act.

## 4. Non-Targeted Intrusive Investigation

If sufficient confidence regarding the location and extend of the contaminated material cannot be achieved, a non-targeted investigation approach will need to be adopted. The non-targeted approach may also be used to supplement the targeted investigation to provide additional confidence in the Conceptual Site Model.

### 4.1 Scope

The number of exploratory holes will be determined by the confidence level agreed for the investigation. Locations for investigations will likely comprise the following;

- Trenches excavated back from the inland edge of the rock armour to determine proximity of contaminated material to the edge of the beach and the potential volume capable of erosion.
- Trenches excavated on a grid pattern (density determined by confidence required) to determine the vertical extent of any contamination present.

### 4.2 Methodology

The methodology will be as described in Section 3.1 above.

## 5. Quality Control and Sample Management

Quality control and sample management procedures are detailed in 23218Q240i2.

### 5.1 Health and Safety Management

Health and safety management is the subject of additional documents, including the health and safety plan and the Local Rules (reference S23218Q049).

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