

Development of Stylised Inadvertent Intrusion Scenarios for a Purpose-built Near-surface Disposal Site for Radioactive Waste



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Introduction

The Environment Agencies' Near Surface Guidance on Requirements for Authorisation (NS-GRA)⁽¹⁾ requires an assessment of the potential consequences of inadvertent human intrusion into a planned near-surface disposal facility after controls on the site have ceased. The NS-GRA considers that inadvertent intrusion into a near-surface facility is inevitable, although the timing and nature of the inadvertent intrusion is impossible to predict. It suggests that the consequences of inadvertent intrusion are explored through a series of stylised scenarios, but does not define the scenarios. The Scottish Environment Protection Agency (SEPA) asked the Health Protection Agency (HPA) to provide guidance on appropriate stylised inadvertent intrusion scenarios for a radioactive waste facility located between 15 and 65 m below ground surface.

In this context 'inadvertent intrusion' is taken to mean:

- intrusion with no knowledge of the facility or
- intrusion with incomplete knowledge of the facility; the intruder is aware of the facility but not its purpose.

After considering all potential inadvertent intrusion scenarios, the HPA selected five that were suitable as stylised scenarios. Each scenario includes between one and four exposed groups.

Stylised Scenarios and the Associated Exposed Groups for Inadvertent Intrusion into a Near-surface Radiological Disposal Facility

Borehole	<p>Geotechnical worker (includes drill rig operators and core sample collectors.)</p> <p>Spoil truck driver (drivers of trucks taking spoil to landfill.)</p> <p>Resident living on spoil (residential use of land is likely to be the most cautious land use for most radionuclides. This group ingests some garden produce.)</p> <p>Drinking abstracted water</p>
Tunnelling	<p>Spoil truck driver (drivers of trucks taking spoil to landfill.)</p> <p>Resident living on spoil (residential use of land is likely to be the most cautious land use for most radionuclides. This group ingests some garden produce.)</p> <p>Tunnel worker (operator of a tunnelling mole that passes through the waste facility.)</p>
Surface excavation	<p>Spoil truck driver (drivers of trucks taking spoil to landfill.)</p> <p>Resident living on spoil (residential use of land is likely to be the most cautious land use for most radionuclides. This group ingests some garden produce.)</p> <p>Quarry worker (exposure occurs to contaminated dust released by an explosion.)</p>
Controlled intrusion	<p>Controlled intrusion worker (representing a worker involved in a cautious investigation of the facility taking a small core sample.)</p>
Uncontrolled intrusion	<p>Uncontrolled intrusion worker (representing a curious worker breaking into the facility without care of its contents, includes time handling objects from the facility.)</p> <p>* Scenario only considered applicable if the facility is located at not more than 30 m depth</p>

Whilst other exposure scenarios and groups could be postulated, the doses are expected to be less than those for the stylised scenarios and groups.

This work was published as a contract report to SEPA

References

(1) Environment Agency, Northern Ireland Environment Agency and Scottish Environment Protection Agency (2009). Near-Surface Disposal Facilities on Land for Solid Radioactive Wastes: Guidance on Requirements for Authorisation. Available at <http://publications.environment-agency.gov.uk/PDF/GEHO0209BPJL-E-E.pdf>

Borehole Scenario

Boreholes to investigate geology or abstract water could be drilled through the waste.

Exposure occurs to radionuclides in spoil, core samples or contaminated water brought to the surface.



Tunnelling Scenario

An underground transport tunnel is drilled through the waste facility.

Exposure occurs to waste *in situ* and in waste in spoil.



Surface Excavation Scenario

Use of explosives in open cast mining penetrates the facility and releases waste.

This scenario is only applicable to facilities located at a depth of around 30 m or shallower.



Controlled Intrusion

Some event, eg, tunnelling, uncovers the facility. Professional help is sought to investigate the facility.

Exposure to waste *in situ* occurs whilst workers collect samples from the facility to investigate its contents.



Uncontrolled Intrusion

A recently discovered facility is broken into by a curious worker using locally obtained tools.

The worker is exposed for a limited amount of time to both waste *in situ* and from handling small objects.