SAFEGROUNDS: Case study on application of the SAFEGROUNDS key principles and guidance: management of the very low level waste disposal area at Hunterston A Site

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Introduction and summary

Background

The five SAFEGROUNDS key principles were developed nearly a decade ago and first published in 2002. They represent a widely shared set of expectations for the management of land contamination on nuclear and defence sites. This case study sets out how those expectations have been addressed during the management of a closed authorised very low level (radioactive) waste (VLLW) disposal area adjoining the Nuclear Decommissioning Authority's Hunterston A Site in North Ayrshire, focusing on the period 2005–2009. That period overlaps with the production of the revised main SAFEGROUNDS guidance document and the associated flow diagram. This case study is the first published example of application of the revised guidance.

Intended audience

The case study is primarily aimed at technical practitioners using the SAFEGROUNDS guidance, but it is hoped that this summary and some of the commentary addressing "stakeholder engagement perspectives" may be informative to a wider audience.

Aims

The case study aims to show that, even with the revised guidance and flow diagram, the process of managing even a relatively small area of land can be a protracted and complex process, with many iterations and revisiting objectives as emerging issues change the context. The flow diagram can only be a rough guide, and it should not be expected that it will be easy to identify an orderly sequence of activities and outputs following the logic of the flow diagram (not least because, as the diagram itself states, it may be applied to one or more different contamination issues relevant to a given area, such that management of different contamination issues may follow different routes). To some extent, this case study is simplified so that the main relevant points in the flow diagram are highlighted, while other points in the flow diagram that were in fact undertaken are "hidden" within summaries of activities that covered a number of points in the flow diagram.

How to navigate this case study

The case study should be read in conjunction with the accompanying slides from the presentation given by Hugh Richards of Magnox North Ltd to the CIRIA Nuclear Networks conference *Radioactive and chemical contamination on nuclear and defence sites – best practices in land and waste management* held in Manchester on 3–4 June 2009. The presentation illustrates many of the activities described in the case study. Specific references to the presentation are indicated by **[Slide #N]**, where N is the slide number in the presentation.

The case study is presented in the following sections:

- a "scene-setting" section (1) that sets out the context as it existed before 2005
- two sections (2 and 3) on the risk assessment and characterisation stage of management of the area in two sections:

    - one section before the revised main SAFEGROUNDS guidance was available in any form
    - a second section covering activities during the period when the revised SAFEGROUNDS guidance started to take shape during 2007–2008
- a section (4) on the options appraisal stage, which was substantially influenced by the emerging SAFEGROUNDS guidance on comparison of options. This section is supported by an accompanying copy of the published non technical summary of the options appraisal.

All the sections indicate:

- how the various activities relate to the SAFEGROUNDS flow diagram
- points at which the existing or emerging SAFEGROUNDS guidance documents were influential
- key principles that were particularly relevant
- comments on specific points of interest and learning points from both technical and stakeholder engagement perspectives.

Summary of main messages and learning points

The main messages from the case study can be summarised as follows:

- in relation to Key Principle 1 (expectation of "a high level of protection to people and environment") both technical quantitative risk assessment and lay qualitative perceptions of risk had to be addressed. Uncertainties in both quantitative risk and perceived risk were successfully reduced using a phased approach to characterisation reflecting the conceptual model of contaminant distribution
- in relation to Key Principle 2 (expectation of proportionate stakeholder involvement) there was a move from reactive engagement prompted in part by stakeholder and political concerns (reflected in press reporting), to a proactive engagement with local stakeholders, facilitated by setting up a land quality sub-group of the site stakeholder group. Having reached a broadly shared view on the very low hazard and risks present, the level of stakeholder concern was reduced and stakeholder "involvement" in subsequent decision making was not expected
- in relation to Key Principle 3 (expectation of a systematic approach to identification of the preferred land management option) the (then draft) SAFEGROUNDS guidance was used to inform the choice of options comparison methodology. A strategic options appraisal using a "direct evaluation" methodology was used to identify a preferred option, which is understood to be acceptable to all identified stakeholders
- in relation to Key Principle 4 (expectation of "immediate action"), small-scale remediation (to achieve the intent of the original authorisations) was undertaken following discovery of minor surface radioactive contamination. In addition, sea defences were reinforced, eliminating the short-term risk of coastal erosion impinging upon the VLLW disposal area
- in relation to Key Principle 5 (expectation of good record keeping), it is acknowledged that a lot of the stakeholder concern arose due to the loss of original detailed disposal records. The site has since developed a land quality file as part of the site's records system that provides the functionality recommended by the relevant SAFEGROUNDS guidance.

Main learning points identified from this case study are as follows:

"Could have done better":

- loss of records has caused much cost, time and trouble for site and stakeholders – but a robust land quality file approach should avoid similar recurrence (KP5 – record keeping)
- the magnitude of the problem perceived by some stakeholders reflected lack of information – but this was subsequently rectified by setting up the land quality sub-group of the site stakeholder group (KP2 – stakeholder involvement).

"Went well":

- interim actions (KP4 – immediate action) have paid dividends in stakeholder perceptions.
- risk assessment used more onerous criteria than required by the relevant legal framework (KP1 – high level of protection)
- the land quality sub-group facilitated consensus on facts and a proposed way forward (KP2 – stakeholder involvement)
- peer review was useful to confirm an appropriate approach to options appraisal (KP3 – identifying the preferred option)
- in this instance, stakeholders did not wish to be "involved" or "consulted" in the decision making process (KP2 + KP3)
- stakeholder involvement was "proportionate".

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Land quality specialist and author of this case study: Hugh Richards

Golder Associates: main site characterisation contractor and risk assessment consultant

VT Nuclear Services (and predecessors): specialist radiological characterisation contractor

ERM + Royal Haskoning: coastal erosion assessment

(BAM) Nuttall: coastal defences improvement works

Enviros Consulting: independent peer review for land quality work

1 Scene setting

Position on SAFEGROUNDS flow diagram	Approximately sequential narrative	Relationship to SAFEGROUNDS key principles and other guidance	Comments and specific learning points
1 Define the context etc	During 2004, the Hunterston A site was required to present a new "near term work plan" for decommissioning work at the site, including plans for management of contaminated land. In describing the potential scale of contamination at the site, the near term work plan mentioned that (on one basis of calculation), a volume of up to around 81 000 cubic metres (m^3) of ground could potentially be contaminated by radioactivity (mainly caesium-137)		
1 Define the context etc	This figure of 81 000 m^3 was picked up in a draft business plan document published for public consultation by the shadow Nuclear Decommissioning Authority (NDA) and was highlighted in discussions at the shadow NDA's Scottish stakeholder forum meeting in October 2004	KP2 (stakeholder involvement): the advent of the NDA was bringing in a new level of open sharing of information with stakeholders at national and local level	**Stakeholder engagement perspective:** Had the provenance of this figure been checked more thoroughly, it might have been presented differently (or not at all), with less likelihood of alarm being caused
1 Define the context etc	The published estimate of low level radioactive waste predicted to arise from remediation of radioactive land contamination at Hunterston A was 5200 m^3. The apparent discrepancy between the two published figures led to a feature *Exposed: scandal of nuclear leaks at Scots plant* in the Sunday Herald (31 October 2004), concerns being expressed that the extent of land contamination was "far more than has been admitted at other nuclear sites in Scotland". This was followed by a Westminster Parliamentary Question about apparent gaps in waste volume estimates, put by Llew Smith MP (November 2004)	KP5 (record keeping): the operators of the site had been maintaining records of the estimated volume of radioactive land contamination since the late 1990s	
1 Define the context etc	In response, the site pointed out that the 81 000 m^3 figure was an indication of the volume that could potentially be contaminated, not an estimate of the actually contaminated volume		
1 Define the context etc	In discussions with the regulator (SEPA), the site also pointed out that the 81 000 m^3 figure included an estimated volume of 6500 m^3 of very low level waste (VLLW) that had been disposed of under authorisation from SEPA's predecessor regulator in the late 1970s and early 1980s, by burial in excavated pits on an area of land reclaimed from the foreshore [**Slides #3 to #9**]. This volume was not included in the published estimate of low level radioactive waste predicted to arise from remediation of radioactive land contamination at Hunterston A, because the waste had been legally disposed of and was not expected to need further remediation		

2 Risk assessment stage prior to revised SAFEGROUNDS guidance being available

Position on SAFEGROUNDS flow diagram	Approximately sequential narrative	Relationship to SAFEGROUNDS key principles and other guidance	Comments and specific learning points
1 Define the context etc	The operator recognised that, in view of public concerns and the relative lack of hard information on the VLLW disposal area, the context for management of this area had changed, and objectives were set as follows: • to provide enough information to make a robust assessment of the potential risks associated with the area • to determine whether remedial action would be warranted, based on current land-use. No overarching objectives were identified, such as redevelopment or divestment of the area, change of land-use etc		
2–3 Preliminary safety and environmental risk assessment/are there potential risks?	A review of available desk study information qualitatively confirmed the potential for risks in terms of source-pathway-receptor linkages, but there was insufficient information to confirm or dismiss such linkages. In view of the location outside the site security fence, the first step was to survey the ground surface for potential radioactive contamination, while the risk to groundwater was seen as another risk to be assessed in the longer term	KP1 Protection of people and the environment	
4 Collect more site data	The operator commissioned a thorough radiological survey of the VLLW Disposal Area using mobile high resolution gamma spectrometry. This revealed a very small patch (less than 2 m square) of surface soils contaminated by caesium-137 at levels just below the threshold for exemption from regulation. Follow-up sampling by the operator delineated the contamination more precisely. Results of the survey were lodged in the site records system and reported to the regulators, and a decision made to include a report to the next meeting of the site stakeholder group, due in three months' time	KP2 Stakeholder involvement KP5 Record keeping	**Stakeholder engagement perspective:** Illustrates a more proactive approach to providing information to stakeholders
4 Collect more site data (planning)	In March 2005, the operator submitted a new "lifetime plan" to the newly-constituted NDA, which now included plans to extend the scope of land contamination investigations (ongoing in stages since 2001) to include the VLLW disposal area		
4 Collect more site data	The initial exploratory investigations of the VLLW disposal area sought to find whether the boundaries of the original disposal pits could be identified using geophysics and/or trial pit excavations, and also included a small number of boreholes that could check for any leaching of radioactivity into groundwater		

1 Define the context etc (context changed)	On 31 December 2005, particularly severe winter storms resulted in visible erosion of the shoreline near to the vllw disposal area, highlighting the potential for the contents of the disposal pits to start to be eroded within a decade if no further action were taken		**Stakeholder engagement perspective:** This unforeseen event re-defined the context for management of the area
3 Are there potential risks?	The operator commissioned consultants to further quantify the risks from further erosion of the shoreline. This concluded that more information on erosion rates was needed		
1 Define the context etc (context changed)	In January 2006, the finding of surface contamination on the VLLW disposal area was shared with regulators and the Hunterston Site Stakeholder Group. The latter expressed concern that the existence of the VLLW disposal area had not hitherto been discussed	KP2 (stakeholder involvement): (the sharing of this information with the site stakeholder group was done proactively, rather than in response to a request for information)	**Stakeholder engagement perspective:** The site's lack of pro-active communication up to this point about the VLLW disposal area and about the loss of records was based in part on an assumption that because the disposals has been authorised according to the standards of the time, there was no continuing requirement to actively manage the area, and no continuing liability, and therefore no need to advertise the existence of the disposals
1 Define the context	The concerns of some site stakeholder group members increased when the site and regulator stated that both organisations' copies of detailed records of the wastes consigned to the VLLW disposal area had been lost. The site records had been disposed of after being damaged by water ingress to the building (not designed for record keeping) where the records were being stored, while the regulator's copies were effectively lost through not being transferred from the Scottish Development Department to its successor (SEPA)	KP5 (record keeping): (the loss of detailed records is an example of the importance of robust, long-term record keeping)	**Technical perspective:** Both physical and institutional arrangements for long-term record keeping need to be robust. **Stakeholder engagement perspective:** Had the original record not been lost, much if not all the cost of subsequent investigations and assessment could have been avoided
1 Define the context	A further article appeared in the Sunday Herald (15 January 2006) under the headline '*Fiasco' of secret nuclear waste tips* **[Slides #12 to #13]** in which a member of the Hunterston Site Stakeholder Group was quoted as saying that the industry had "dumped contaminated waste on public land for years and then managed to lose the records of what it had dumped. As a result, we now have no clear idea of the threat that the pits pose to public health"		**Stakeholder engagement perspective:** The perceived basis for the "secret nuclear waste tips" headline arose in part from a lack of pro-active communication about the VLLW disposal area
5–6 Immediate controls (breaking pathway)	At the end of January 2006, the operator excavated the most contaminated soils exposed at the surface in the VLLW disposal area and capped the excavated area with at least 0.3 m of clean soil, leaving no soils exceeding exempt levels present at the ground surface **[Slide #15]**. A report on this action was prepared and lodged in the site records	KP4 (immediate action) KP5 (record keeping)	**Technical perspective:** This remedial action dealt with the immediate issue of radioactive contamination exposed in a publicly accessible area, while leaving the longer term management of the area to be determined at a later date

16 Detailed quantitative risk/hazard assessment (done "out of sequence" with respect to the SAFEGROUNDS flow diagram – see *Comments* for explanation)	During 2006, internationally respected consultant Mike Thorne (working for ERM) assessed the potential radiological doses to members of the public from scenarios in which coastal erosion completely disrupted the VLLW disposal area. Using results from the 2005 exploratory investigations of the VLLW disposal area, the study concluded that such hypothetical doses would be below 10 microsieverts/year – a level generally regarded by regulatory authorities as trivial	KP1 (protection of people and the environment)	**Technical perspective:** Despite the low immediate likelihood of such disruption occurring, the assessment was undertaken using the best available information and considering the most stringent statutory radiological protection criteria. Also, a detailed quantitative risk assessment for this scenario was undertaken without going through a generic quantitative risk assessment first (the concept of generic quantitative risk assessment in a tiered assessment framework (much used in non-radioactive contamination risk assessments) is not yet well established in the context of radioactive contamination assessments)
Continued stakeholder involvement (applies throughout the SAFEGROUNDS process)	At site stakeholder group meetings during 2006, some stakeholders continued to express concern about the VLLW disposal area and especially the potential for its erosion	KP2 (stakeholder involvement)	**Stakeholder engagement perspective:** The stakeholders' perception was that, in view of the loss of records, wastes with contamination levels well above those encountered by the exploratory investigations might have been (illegally) disposed of. In that case, the assessment based on exploratory data alone was not giving sufficient assurance
4/14/18 Collect more site data (to inform risk assessments at any tier)	During 2006, the site commissioned contractors to undertake detailed topographic surveying of the shoreline and initiate monitoring of coastal erosion, with a view to designing repairs/improvements to the coastal defences		
4/14/18 Collect more site data (to inform risk assessments at any tier)	During 2006, the site reviewed the results from the 2005 exploratory intrusive investigations and concluded that the only way to obtain a well-founded understanding of the radioactivity levels in the VLLW disposal area was to make several hundred subsurface measurements. However, there was also a need to avoid generating large amounts of potentially radioactive waste through drilling of many boreholes. Through dialogue with specialist contractors (Golder Associates and British Nuclear Group Project Services – now VT Nuclear Services), an innovative method was developed whereby a powerful ground probing rig was used to advance boreholes using a "direct push" or "positive displacement" method, not involving bringing drill cuttings or core to the surface. The resulting plastic-lined temporary boreholes were then used for measurements using a bespoke down-borehole gamma spectrometry system capable of detecting caesium-137 and other radionuclides at levels well below any regulatory threshold. The fieldwork was completed in March 2007 [**Slides #18 to #21**]. This work won an internal company/NDA award for implementation of a technical innovation	SAFEGROUNDS site characterisation guidance contains specialised advice on the use and limitations of down-borehole radiometric measurements	**Technical perspective:** Advice in the SAFEGROUNDS site characterisation guidance was taken into account when specifying the combination of borehole advancement and down-borehole measurement methods Although the chosen method allowed over 600 subsurface measurements to be made at a fraction of the cost of conventional drilling and sample analysis, a substantial number of boreholes could not be advanced to their intended full depths, and some conventionally drilled boreholes were used to fill key gaps in data coverage With hindsight, some sensitivity of the measurements could have been sacrificed to allow use of a smaller down-borehole measurement device, in turn allowing use of narrower diameter direct-push tubes, which might have had more success in reaching the intended depths

1 Define the context etc (new input from stakeholders)	During 2006, the NDA engaged in a consultation (sponsored by a sub-group of the site stakeholder group) on the ultimate end-state to be reached for the nuclear licensed site at Hunterston A when NDA has finished its business at the site (ie after final site clearance is complete). The VLLW disposal area is outside the nuclear licensed site and therefore was not within the formal scope of the consultation. As a precondition for engaging with this consultation, SSG members required the independent consultants' report to record a "premise that all wastes associated with the (VLLW) pits will have been removed and the land remediated prior to the final site clearance stage of decommissioning" (this is reflected in the NDA document *Output from stakeholder consultation for the site end state: Hunterston 'A'*, ref SMS/TS/A2/1/1/R009, October 2009)	KP2 (stakeholder involvement)	**Stakeholder engagement perspective:** This was the first time NDA sought non statutory stakeholder views on decommissioning strategy (affecting land contamination management) in a structured manner. The documented outcome of the consultation, especially concerning the VLLW disposal area, further changed the context for management of the area
5–6 Immediate controls (mitigating risk of new pathways)	During 2007 and early 2008, the site commissioned contractors to place new rock armour on the shoreline adjoining the VLLW disposal area, to reduce the risk of further coastal erosion of this part of the foreshore reclaimed area [**Slide #16**]. The rock armour was designed to be resistant to "normal" storm events (indicatively 1 in 10 year frequency) but upgradeable to withstand more severe storms [**Slide #16**]	KP4 (immediate action)	**Technical perspective:** This remedial action dealt with the immediate presenting issue of erosion approaching the VLLW disposal area, while leaving the longer term strategy for coastal management to be determined at a later date

3 Continuation of risk assessment stage taking account of SAFEGROUNDS main guidance (v2)

Position on SAFEGROUNDS flow diagram	Approximately sequential narrative	Relationship to SAFEGROUNDS key principles and other guidance	Comments and specific learning points
1 Define the context etc and develop the preliminary land quality management strategy	In late 2007 and early 2008, the operator developed a new land quality strategy for the site as a whole, structured around intended land uses for various zones of the site, proposing an adapted version of the regulators' CLR-11 guidance flow diagram as a basis for future development of detailed strategies for each zone	General alignment with SAFEGROUNDS main guidance document flow diagram	**Technical perspective:** Adoption of the CLR-11 approach allowed the operator to start developing its strategy in a manner that anticipated the revised SAFEGROUNDS main guidance document (2009)
Continued stakeholder involvement (applies throughout the SAFEGROUNDS process)	At the June 2008 site stakeholder group meeting, the site explained the approach to land quality strategy that had been under development during the preceding year, and stated the intention to engage with stakeholders in the course of strategic options appraisals for specific zones affected by radioactive contamination **[Slide #27]**	KP2 (stakeholder involvement)	**Stakeholder engagement perspective:** This marks the first occasion on which a Magnox North Ltd licensed site has actively engaged with external stakeholders during options appraisals dealing with land contamination
Continued stakeholder involvement (applies throughout the SAFEGROUNDS process)	Also at the June 2008 site stakeholder group meeting, the operator explained that the results of the detailed intrusive investigations of the VLLW disposal area had provided no evidence that wastes exceeding the threshold for the recently defined category of high volume VLLW (suitable for disposal to landfill with non-radioactive waste) had been disposed of, and indeed that residual levels of radioactive contamination were even lower than assumed in the ERM/Mike Thorne assessment based on the 2005 exploratory investigations **[Slide #21]**	KP2 (stakeholder involvement)	
2–3, 10–16 Tiered risk assessments (see following entries for details on water environment and human health)	In preparing an interpretative report on the results of all previous investigations of the VLLW disposal area, consultants Golder Associates undertook tiered risk assessments considering protection of human health and the water environment **[Slide #23]**	KP1 (protection of people and the environment)	**Technical perspective:** The use of a tiered approach reflects the risk assessment part of the detailed flow diagram in the revised SAFEGROUNDS main guidance document (2009). It ensures a high level of protection, by undertaking appropriate quantitative risk assessments where preliminary qualitative risk assessment indicates one or more actual or potential "pollutant linkages" between a contaminant source, pathway and receptor. An assessment for the water environment was included in this assessment as an appropriate means of considering protection of the environment as well as people

2–3, 10–13 Preliminary qualitative and generic quantitative risk assessments for water environment (two tiers of risk assessment needed)	For the water environment, the preliminary qualitative risk assessment indicated the potential for pollutant linkages. Indeed, the measurement of traces of contamination (strontium-90) above background levels in groundwater beneath the VLLW disposal area showed that a pathway to groundwater existed (or had existed in the past). However, the generic quantitative risk assessment showed that levels of contamination were not significant, even if a hypothetical receptor were present, and in any case the affected groundwater body in the made ground is of poor (brackish) quality due to its coastal location		
2–3 Preliminary qualitative risk assessment for human health: are there potential risks?	For human health risk assessment, the preliminary qualitative risk assessment was based on the assumption that patches of surface contamination like that dealt with previously might arise in future, so there are potential risks **[Slide #24]**		
5 Can risks be reduced by immediate controls?	No further immediate actions were warranted, so the next step was generic quantitative risk assessment		
11 Choice of generic assessment criteria	Generic quantitative risk assessment was undertaken with respect to two types of quantitative generic assessment criteria, as set out in the next two entries		
11–13 Generic assessment criteria and generic quantitative risk assessment (with respect to Part 2A criteria)	One set of criteria was the draft radioactivity in soil guideline values (RSGVs) developed for the Department for the Environment, Food and Rural Affairs in England and Wales. The RSGVs are many times higher than the observed concentrations of radionuclides, and on this basis the VLLW disposal area can be eliminated as a potential site of "radioactively contaminated land" as defined in the Radioactive Contaminated Land (Scotland) Regulations under Part 2A of the Environmental Protection Act 1990. These regulations consider an annual dose of 3000 microsieverts/year or more as a basis for formally designating "radioactively contaminated land" that could warrant remedial intervention. On this basis, there was no possibility of a direct regulatory requirement for remedial action **[Slide #22]**		
11 Generic assessment criteria (with respect to parity of risks associated with nuclear licensed site)	Recognising that the VLLW disposal area is adjacent to the Hunterston A nuclear licensed site, it was decided to assess the parity of risks with respect to the risk criterion that would be applied for de-licensing of a nuclear site, which broadly equates to an annual dose rate of 10–20 microsieverts/year **[Slides #22 and #25]**	KP1 (protection of people and the environment)	**Technical and stakeholder engagement perspectives:** A particularly high level of protection of people (human health) is assured by assessment for parity with nuclear site de-licensing (an increased individual fatality risk of less than one in a million per year). This criterion is more than 100 times more demanding than that required by the regulations relevant to the VLLW disposal area.

11–13 Generic quantitative risk assessment	For the generic quantitative risk assessment with respect to parity of risks associated with the nuclear licensed site, the Health Protection Agency's NRPB-W36 methodology was used, which provides the means of assessing doses from a number of generic land-use scenarios, representing realistic land uses, including "recreational" scenarios considered appropriate to the VLLW disposal area. On this basis, calculated dose rates were all well below 10 microsieverts/year, ie less than would be required for de-licensing of a nuclear site. On this basis, no unacceptable risks were identified, and no remedial action was warranted in terms of protection of human health [**Slide #25**]		

4 Options appraisal stage

Position on SAFEGROUNDS flow diagram	Approximately sequential narrative	Relationship to SAFEGROUNDS key principles and other guidance	Comments and specific learning points
21 (Re)define the context	Despite the outcomes of the risk assessments, it was recognised that there remained the potential for patches of trace radioactive contamination to arise at the ground surface in future. This would lead to a need for continued monitoring of the land surface and potentially further minor clean-ups for housekeeping reasons. So the operator decided to proceed to options appraisal to determine the medium-term strategy (on a timescale of decades) for management of the VLLW disposal area		
22 Refine land quality management strategy	The operator undertook preliminary work to identify a preferred method for options appraisal. The preferred method identified was a simple "direct evaluation" method using a pros and cons assessment of strategic options against relevant attributes **[Slide #28]**	The proposed options comparison method was identified using draft SAFEGROUNDS guidance on comparison of contaminated land management options. The then available draft guidance was the near-final second published consultation draft (February 2008)	**Technical perspective:** Magnox North involvement in the SAFEGROUNDS project steering group provided early access to this draft guidance document
23–24 Identification of feasible remediation options	The operator developed a long list of potential strategic options and then reduced this to a short-list of feasible strategic options, namely: • stop monitoring • continue to monitor and maintain • improve containment • remove hazard (involving full or selective excavation of waste). **[Slide #29]**		
Continued stakeholder involvement (applies throughout the SAFEGROUNDS process)	In July 2008, a land quality sub-group of the site stakeholder group was convened. The initial meeting specifically reviewed the VLLW disposal area, including a site visit. The operator presented the detailed characterisation information **[Slide #21]** undertaken since the January 2006 site stakeholder group meeting and the Sunday Herald article. A summary was given of an initial assessment of current radiological risks associated with the VLLW disposal area, based on work being undertaken by Golder Associates **[Slide #25]**		**Stakeholder engagement perspective:** The site visit dispelled some sub-group members' perceptions that there was still one (or more) large open waste disposal pit present in the VLLW disposal area. This perception possibly arose from the frequent use of the term "VLLW pits" used by the operators' staff, which would have been appropriate when the disposals took place in the 1970s–1980s, but not after they were closed

Continued stakeholder involvement (applies throughout the SAFEGROUNDS process)	At the same meeting, the operator also presented the proposed method for determining the preferred strategic option for management of the VLLW disposal area over the next few decades, and outlined the feasible options	KP3 (identifying the preferred land management option)	**Stakeholder engagement perspective:** A broad range of stakeholders was engaged at the early stages of this options appraisal process
26 Detailed evaluation of options	The four identified options were assessed by an expert panel in a workshop setting, using a set of attributes that had previously been defined for a waste strategy options appraisal for another site. The attributes covered public and workforce safety, additional waste volume for disposal, additional long-distance transport (including CO_2 emissions), additional local traffic flows, other local environmental impacts, risk of technical failure of the option, and overall cost. For each attribute, the four options were ranked in order (**see Slide #30** and the Magnox North non technical summary of the options appraisal)		
27 Can the most appropriate option(s) be identified?	The options appraisal clearly showed that the fourth option of excavating wastes for segregation, sentencing and re-disposal was the least favoured, but the other options were closely matched. However, when attributes with only marginal difference between the other options were excluded, the third option to improve the containment of the area and reduce the scope of monitoring was more clearly favoured and was identified as the preferred option		
Continued stakeholder involvement (applies throughout the SAFEGROUNDS process)	A non technical summary of the options appraisal study was provided to the land quality sub-group of the site stakeholder group and taken forward to the main site stakeholder group meeting (see Magnox North non technical summary of the options appraisal). The outcome of the options appraisal was generally well received, although some site stakeholder group members wished to see specific features incorporated in the implementation, particularly concerning demarcation and signage of the area after restoration		**Stakeholder engagement perspective:** Even though the regulators and site stakeholder group members were not directly involved in the options appraisal process, the outcome was not controversial and generally supported
29–30 Development of the remediation strategy (ie an implementable plan)	Implementation of restoration work is currently scheduled for 2010–2011 (subject to availability of funding). The chair of the land quality sub-group has asked to be kept informed of progress and any potential changes to this plan **[Slide #31]**		
Additional information	Magnox North delivered a presentation on this case study at the CIRIA Nuclear Networks conference on *Radioactive and chemical contamination on nuclear and defence sites – best practices in land and waste management* held in Manchester on 3–4 June 2009		
Additional information	In an article on 20 September 2009 relating to the adjacent Hunterston B site (run by a different operator) the Sunday Herald has referred again to its 2004 and 2006 articles, without update or caveat		**Stakeholder engagement perspective:** The media are not stakeholders and are not accountable for accurately updating the public on stories that they cover