Hunterston A ILW Store

Request for agreement to active commissioning

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Revision 0
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EXECUTIVE SUMMARY

Title
Hunterston A ILW Store: request for agreement to commence active commissioning.

Permission Requested
Magnox Limited, the licensee, has submitted a request that ONR agree to the commencement of active commissioning of its new ILW Store at Hunterston A. Magnox Ltd cannot introduce a radioactive waste package to the store to commence its programme of active commissioning of the store without this agreement.

Background
The site having been defuelled, the next main task in decommissioning the site is the retrieval of stored Intermediate Level Waste (ILW), and its conditioning into a passively safe form suitable for long-term storage. The site has large quantities of solid ILW, most of which is stored in bunkers in the Solid Active Waste Building (SAWB). It is principally material known as FED (Fuel Element Debris), largely metal (Magnox) and graphite, removed from spent fuel elements before they were sent to Sellafield. The site has smaller quantities of wet ILW, such as resin, sludge, and acid, which is stored in tanks.

The licensee has built a store suitable for the long-term storage of conditioned ILW, known as the ILW Store, and a plant for the conditioning of wet ILW, known as the Wet ILW Retrieval and Encapsulation Plant (WILWREP). A further plant, the Solid ILW Encapsulation Plant (SILWE), will be built for the encapsulation of solid ILW.

In WILWREP wet ILW will be placed in stainless-steel drums and encapsulated with cement. They are expected to remain in the ILW Store for many decades, as there is currently no disposal route for higher-activity wastes in Scotland.

A new plant, SAWBR, has been built on to the SAWB to retrieve the solid waste from the bunkers and put it in stainless-steel boxes. Before SILWE is built, these boxes will go into the ILW Store temporarily, without further conditioning. Thereafter, these boxes will go to SILWE to have their contents encapsulated, before returning to the ILW Store for long-term storage. Thus, together, SILWE and WILWREP will encapsulate all of the ILW intended for long-term storage.

The ILW store was begun in 2004 and was substantially complete by 2007. Since then it has gone through minor modifications and a period of inactive commissioning, which is almost complete. As usual, a period of active commissioning is now proposed, for the completion of those tests that cannot be completed in the absence of the radioactive material that the plant was built to handle.

Assessment and inspection work carried out by ONR in consideration of this request
ONR’s specialist inspector in waste management has assessed the licensee’s arrangements for the management of these packages, including their periodic examination by the licensee. She sought advice from the Scottish Environment Protection Agency (SEPA), primarily on the adequacy of the licensee’s proposals for managing the degradation of packages in the long term, so maintaining the ability to transfer packages into successive stores or to a possible final disposal facility—that is, to ensure the continued disposability of the waste.

An account of this assessment is given in an ONR Assessment Report. After negotiation, the licensee has proposed improvements to ensure that there will be a comprehensive record of the condition for each package as it begins its time in storage and thereafter throughout its life in storage. The specialist inspector records that neither she nor SEPA has any objection to the commencement of active commissioning of the store.
My own inspections have been intended principally to judge whether the purposes of inactive commissioning have been met. After negotiation, the licensee has amended the scope of the maintenance schedule for the store, the document that lays down the regime of examination, inspection, maintenance, and testing.

**Matters arising from ONR’s work**

Some of the issues arising from my inspection of maintenance are applicable to Magnox Ltd’s other sites, where they will be raised also.

**Conclusions**

I have inspected the ILW store to assure myself that it is ready to receive the first of the radioactive waste packages that it has been designed for. Among other things, this has involved inspections of the licensee’s work and results during the period of inactive commissioning of the store, which is almost complete. I have concluded that the store has: operators and maintainers that are suitably qualified and experienced; adequate provision to control and supervise those workers; adequate instructions for operation and maintenance, both in normal and fault conditions; and a regime of examination, inspection, maintenance, and testing that is capable of preserving the safety functions of the store for many decades.

ONR’s specialist inspector on waste management, advised by SEPA, has negotiated commitments by the licensee to inspect a sample of packages as they enter the store, and to improve the equipment installed to do this. ONR and SEPA judge that permission may now be given for the storage of the first packages.

**Recommendation**

I recommend that licence instrument 517 be issued, giving agreement to commence active commissioning.
### GLOSSARY AND LIST OF ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ALARP</td>
<td>As low as reasonably practicable</td>
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<tr>
<td>Baselining</td>
<td>Measurements of safety related aspects of the (radioactive waste) storage system, usually taken at the beginning of major lifecycle events, against which ongoing monitoring and inspection results can be compared. This system includes the waste package.</td>
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<tr>
<td>FED</td>
<td>Fuel Element Debris</td>
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<tr>
<td>ILW</td>
<td>Intermediate Level Waste</td>
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<tr>
<td>LC</td>
<td>Licence Condition (attached to a nuclear site licence)</td>
</tr>
<tr>
<td>LoC</td>
<td>Letter of Compliance (issued by RWMD)</td>
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<td>NDA</td>
<td>Nuclear Decommissioning Authority</td>
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<tr>
<td>ONR</td>
<td>Office for Nuclear Regulation (an agency of HSE)</td>
</tr>
<tr>
<td>PHM</td>
<td>Package Handling Machine</td>
</tr>
<tr>
<td>PMS</td>
<td>Plant Maintenance Schedule (required by LC28)</td>
</tr>
<tr>
<td>QA</td>
<td>Quality Assurance</td>
</tr>
<tr>
<td>(NDA) RWMD</td>
<td>Radioactive Waste Management Directorate (part of the NDA)</td>
</tr>
<tr>
<td>SAWB</td>
<td>Solid Active Waste Building</td>
</tr>
<tr>
<td>SAWBR</td>
<td>Solid Active Waste Bunker Retrieval (facility)</td>
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<tr>
<td>SEPA</td>
<td>Scottish Environment Protection Agency</td>
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<tr>
<td>SILWE</td>
<td>Solid ILW Encapsulation Plant</td>
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<tr>
<td>SSG</td>
<td>Site Stakeholder Group</td>
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<tr>
<td>WILWREP</td>
<td>Wet ILW Retrieval and Encapsulation Plant</td>
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1. PERMISSION REQUESTED

Magnox Limited, the licensee, has submitted a request [1] that ONR agree to the active commissioning of its new ILW Store at Hunterston A. Under the arrangements the licensee has made under condition 21(1) attached to its nuclear site licence, it cannot introduce a radioactive waste package to the store to commence its programme of active commissioning of the store without this agreement.

2. BACKGROUND

The Hunterston A site is operated by Magnox Limited on behalf of the Nuclear Decommissioning Authority (NDA). Its two Magnox reactors were shut down in 1990. The site has since been defuelled, and the current phase of decommissioning is known as Care and Maintenance Preparations. A key task in this phase is the retrieval of stored Intermediate Level Waste (ILW), and its conditioning into a passively safe form suitable for long-term storage, in accordance with Scotland’s policy on the management of radioactive waste. The site has relatively large quantities of solid ILW, most of which is stored in bunkers in the Solid Active Waste Building (SAWB). It is principally material known as FED (Fuel Element Debris), largely metal (Magnox) and graphite, removed from spent fuel elements before they were sent to Sellafield. The site has much smaller quantities of wet ILW, such as resin, sludge, and acid, which is stored in tanks.

The licensee has built a store suitable for the long-term storage of conditioned ILW, known as the ILW Store, and a plant for the conditioning of wet ILW into a passively safe form, known as the Wet ILW Retrieval and Encapsulation Plant (WILWREP). A further plant, the Solid ILW Encapsulation Plant (SILWE) will be built for the encapsulation of solid ILW.

In WILWREP wet ILW will be placed in 3m³ stainless-steel drums and encapsulated with cement. The drums will be approved for use by NDA’s Radioactive Waste Management Directorate (RWMD), who will issue a Letter of Compliance (LoC) setting out its requirements. The LoC process is intended to ensure that the waste packages produced are suitable for acceptance for disposal at the proposed repository for disposal of higher activity wastes in England and Wales. However, the policy for radioactive waste management in Scotland differs from that in England and Wales: for instance, Scotland does not intend to send waste to the repository. Nevertheless, despite the difference SEPA, ONR, and the Scottish Government continue to recognise the applicability of RWMD’s advice on the packaging of ILW, given by the LoC process, to the packaging of wastes in Scotland [2].

Conditioned ILW from WILWREP will be transferred to the ILW Store for long-term storage. These waste drums are expected to remain in the ILW Store for many decades, as there is currently no disposal route for higher activity wastes in Scotland. The need for long-term storage is thus a key feature of Scottish Government policy on radioactive waste management.

A new plant, SAWBR, has been built on to the SAWB to retrieve the solid waste from the bunkers and put it in 3m³ stainless-steel boxes. Before SILWE is built, these boxes will go into the ILW Store temporarily, without further conditioning. Thereafter, these boxes will go to SILWE to have their contents encapsulated, then return to the ILW Store for long-term storage. Thus, together, SILWE and WILWREP will encapsulate all of the ILW intended for long-term storage.
The ILW store was begun in 2004 and was substantially complete by 2007. Since then it has gone through minor modifications and a period of inactive commissioning. From a safety viewpoint some of the purposes of commissioning are to show that:

a. the structures, systems, and components in the store fulfil the safety functions for which they were designed

b. those safety functions can be fulfilled throughout the design life of the store
c. a regime of examination, inspection, maintenance, and testing has been established that will help ensure (b)
d. instructions for this regime have been written and validated

e. instructions for the operation of the store have been written and validated

f. the store has the equipment and instructions to deal with fault conditions and emergencies
g. the staff who will operate and maintain the store are suitably qualified and experienced to do so.

Ideally, to ensure that risks are ALARP, those purposes would be met while the plant contains no radioactive material. Inactive commissioning therefore constitutes by far the larger part of commissioning. Plainly, however, there will remain safety functions that cannot be fully tested in the absence of the active material that the plant was built to handle, in this case the waste packages. Accordingly, a period of active commissioning is proposed.

Until very recently it had seemed certain that the first active packages to be produced, and therefore the first to enter the store, would be drums of encapsulated wet waste from WILWREP. Commissioning of the store, and our inspection and assessment work, has been on that assumption. The commissioning of WILWREP has fallen behind programme however, with two consequences: no package is likely to be produced on site before March 2014, and the first package may well be a box from SAWBR rather a drum from WILWREP.

The subject of this Project Assessment Report is whether permission should be granted for active commissioning of the store. In regulating the store, ONR has taken the view that it will grant this permission when it judges that the store is ready to receive its first active package, whether or not the donor plants are ready to produce packages. Though ONR has assumed that this first package will be from WILWREP, our work and conclusions remain wholly relevant and valid if that package is from SAWBR. The inactive commissioning has prepared the store for the receipt of either package equally, and having finished this stage of its work ONR can now make that judgement.

ONR’s specialist inspector in waste management has undertaken an assessment of the licensee’s arrangements for the management of these packages, including their inspection by the licensee. The assessment was against the duties under condition 32 (Accumulation of radioactive waste) attached to the nuclear site licence, and used ONR’s guidance [3], ONR’s Safety Assessment Principles relating to radioactive waste management [4], and relevant parts of the Joint Guidance on the management of higher activity wastes [5].
She also sought advice from the Scottish Environment Protection Agency (SEPA) in accordance with the memorandum of understanding between the HSE and SEPA on matters of mutual concern at licensed nuclear sites in Scotland [6]. This advice was primarily on the adequacy of the licensee’s proposals to manage the degradation of packages in the long term, so maintaining the ability to transfer packages into successive stores or to a possible final disposal facility—that is, to ensure the continued disposability of the waste.

A full account of this assessment is given in an ONR Assessment Report [7]. It records that a number of concerns were raised about provision for monitoring and inspecting the packages in two respects. First, to ensure that the packages were being produced to specification by WILWREP (and by extension SILWE). Second, to ensure that there will be a comprehensive record of the condition for each package as it begins its time in storage (called baselining), and thereafter throughout its life in storage. After negotiation, the licensee proposed improvements, most notably the use of the inspection cell in the store for the inspection and baselining of a sample of incoming packages. Further, the licensee has committed to reviewing the imaging and recording capability of the equipment in that cell, to improve the quality and scope of the baseline records. ONR and SEPA will ensure that these improvements are implemented, and that the lessons of this assessment are incorporated in the design of SILWE.

The specialist inspector records that neither she nor SEPA has any objection to the commencement of active commissioning of the store.

My own inspections over the last year are recorded in Intervention Reports [8–12]. (Magnox Ltd’s work on actions placed during those inspections has also been discussed in telephone calls, and is recorded in correspondence [eg13,14].) The inspections have been designed to ensure principally that the purposes of inactive commissioning listed in ¶7 have been met. A summary of the main issues addressed follows.

**Maintenance:** Though the completed store was handed over to the licensee in 2008 the examination, inspection, maintenance, and testing of plant therein that may affect safety was not then fully integrated into the site’s general arrangements. Moreover, those arrangements changed subsequently, as did other related matters, such as the required format of safety cases. The licensee therefore conducted an exercise from first principles in 2011 that it termed a sentencing review. Its aim was to consider the safety functions that had been identified for every structure, system, and component in the store and decide how each function was to be periodically demonstrated and preserved, and how this intention was to be incorporated in the plant maintenance schedule (PMS). I judge the sentencing review to have been thorough and worthwhile.

However, my assessment was that the record of the review [15] revealed several differences between the licensee’s practice and ONR’s expectations. The chief of these differences was in the scope of the resulting plant maintenance schedule. First, some items of equipment that in my view plainly affect safety, for instance the equipment that is used to inspect waste packages, both in the storage vault and the inspection cell, was not on the PMS. Second, the package-handling machine (PHM) appeared on the PMS as requiring only statutory inspection. Though statutory inspection would provide assurance that the PHM could lift packages and move safely, it would not test its other safety functions, such as protecting against dropping packages or colliding packages with each other or the walls of the store. Discussions were held with the licensee on these and related questions, for instance the protocol by which new tests are added to the PMS. In these discussions I was joined by one of ONR’s inspectors who has specialised in arrangements for maintenance.
The upshot has been that the licensee is amending the PMS to deal with the objections outlined above. This work is progressing well [16], and Magnox Ltd assure me it will be completed before active commissioning begins.

Emptying the store: The store was designed on the basis that it would be emptied to the national geological disposal facility before the site underwent final site clearance. Though that destination is now ruled out on Scottish policy grounds, the store will need to be emptied nonetheless. Broadly, emptying will be simply the reverse of filling, and would not have attracted my attention were it not for a statement in [17] which implied that the safety case for this operation did not need to be considered now. I took the opposite view: that ONR could not allow packages to enter the store if the safety case for emptying it, which might occur as a contingency at any time, had not been fully considered. In response, the licensee prepared and submitted a paper [18] that justified the position. (Note that one change consequent on the intention to put some waste in the store initially unencapsulated (see ¶6) will be that the export of packages from the store will be a routine operation in the early years.)

Routine aerial discharges: As the waste is encapsulated in steel containers radioactive discharges from the store during normal operation will be negligible, and I had not expected to take an interest in them. However, when the deputy chair of the Site Stakeholder Group asked the licensee about them at the SSG meeting in December 2012 I judged that she did not receive a convincing reply. I therefore placed an action on Magnox Ltd to provide one. Magnox Ltd has submitted a short note [19] which I intend to table at the SSG in due course. It accords with the expectations of SEPA, who authorise routine radioactive discharges from the site.

Recovery of the package-handling machine: Packages are brought into and out of the storage vault, and stacked therein, by the package-handling machine. High dose rates prohibit entry to the vault by staff. It is necessary therefore that the PHM can be recovered remotely if it breaks down while in the vault. I asked Magnox Ltd to demonstrate this, particularly as during tests to demonstrate recovery during inactive commissioning there had been an event in which the manual recovery equipment was unable to effect a recovery, and a cable had been unexpectedly damaged. Magnox Ltd submitted a report of its investigation into that event [20]. I judged that this adequately explained the cause, and the modifications that were seen to be needed to the equipment, eg to clutch settings. We also discussed how recovery would be done after more-severe failures.

Scope of active commissioning. Plainly, some safety functions cannot be demonstrated, or cannot be completely demonstrated, until the active commissioning phase, when ILW packages are introduced to the store. With those exceptions, I have expected the licensee to be able to show that every safety function has been demonstrated while the plant is still inactive. A description of the tests to be done during active commissioning is contained in the Active Commissioning Schedule [21].

The head document that provides the safety justification for the active commissioning of the store [17] says that the active commissioning phase will involve the import and storage of 100 drums from WILWREP. This figure has been agreed with ONR as providing sufficient drums for the purposes of active commissioning, and some extra. The extra drums will allow the results of that commissioning to be written up, evaluated, and approved while the store continues to operate. Once the store has begun to import packages, it is not in the interests of safety for imports to cease for the sole purpose of waiting for the results of inactive commissioning to be approved.
Ref 17 says that active commissioning with boxes will be carried out separately, and be preceded by a separate safety submission. This remains true, but Ref 17 assumes that drums will precede boxes and this is now in doubt, as explained in Para 9. However, inactive commissioning of the store will be complete before the introduction of the first active waste package, whether drum or box, and inactive commissioning will have prepared the store equally well to receive either. At present, the only substantial outstanding item of inactive commissioning is the trials of box-stacking, which will be done in the store’s loading bay. These will be complete before active commissioning.

25 **Arrangements for modifications and commissioning:** I used this project to sample the adequacy of the licensee’s arrangements under LCs 21 and 22, that is for commissioning, and controlling modifications to existing plant. I found the arrangements and the licensee’s implementation of them adequate.

26 **Validation of instructions:** I inspected the suite of instructions for operation and maintenance of the store, and the licensee’s arrangements for approving them for use and then validating them, a major objective of inactive commissioning. I found them adequate.

27 **Package inspection schedule:** Before the assessment on waste management described above and published as Ref 7 I began my own inspection of the licensee’s plans to inspect waste packages. My own work was subsumed into that assessment and will not be described further here.

28 **Training and supervision:** At my visits I have discussed the operation of the store, and their understanding of the operating instructions with the operators. I have examined their training workbooks, which recorded their progress towards becoming suitably qualified and experienced for operating the store. I was satisfied that they had been sufficiently involved in the validation of the operating instructions. I have negotiated for some time the arrangements for the supervision of this and the other ILW projects listed above, it having seemed to me that as the ILW plants came on line the supervisory burden on the site’s single shift leader post would become too great. Magnox Ltd has responded by creating a new position of Duly Authorised Person for ILW plants, which I welcome. On these plants, the holders of this post will be responsible for the control and supervision of operations of higher safety significance, which cannot take place without their presence. On the store such operations will include taking packages in to and out of the vault.

4. **MATTERS ARISING FROM ONR’S WORK**

29 Wishing to improve practice at all the licensee’s sites I have asked Hunterston A to alert Magnox Ltd corporately to ONR’s criticisms of some of its arrangements for maintenance that are described above. I have also had preliminary discussions with Chapelcross, the other site I inspect, and have asked for a further meeting before the planned reformatting of Chapelcross’s PMS.

5. **CONCLUSIONS**

30 I have inspected the ILW store to assure myself that it is ready to receive the first of the radioactive waste packages that it has been designed for. Among other things, this has involved inspections of the licensee’s work and results during the period of inactive commissioning of the store, which is almost complete. I have concluded that the store has: operators and maintainers that are suitably qualified and experienced; adequate provision to control and supervise those workers; adequate instructions for operation and maintenance, both in normal and fault conditions; and a regime of examination, inspection, maintenance, and testing that is capable of preserving the safety functions of the store for many decades. ONR’s specialist inspector on
waste management, advised by SEPA, has negotiated commitments by the licensee to inspect a sample of packages as they enter the store, and to improve the equipment installed to do this. She has recorded her own and SEPA’s view that permission may now be given for the storage of the first packages.

6. RECOMMENDATIONS

I recommend that licence instrument 517 be issued, agreeing to active commissioning of the ILW Store.
7. REFERENCES

1. Magnox Ltd. Letter to ONR, referenced HNA50922R and dated 12 November 2013. TRIM 2013/421209

2. (SEPA). Email to Magnox Ltd, 10 August 2011, TRIM 2013/488711


5. The management of higher activity radioactive waste on nuclear licensed sites http://www.hse.gov.uk/nuclear/wastemanage.htm


7. ONR Assessment Report. Baselining and inspection of ILW packages prior to interim storage in the ILW Store at Hunterston. ONR-DFW-AR-13-048. TRIM 2013/302263

8. Intervention Report. ONR-HNA-IR-12-006. TRIM 2012/494274

9. Intervention Report. ONR-HNA-IR-12-007. TRIM 2013/34076


16. Magnox Ltd to ONR. Email. Update on Regulator Actions relating to ILW Store Active Commissioning. 28 October 2013. TRIM 2013/382703


