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## **Storage of Radioactive Wastes: Meeting with Health & Safety Executive Nuclear Directorate (HSE ND), 3 September 2008**

### **Summary**

1. Members of Working Group B, and a member of NuSAC met with HSE ND to discuss interim storage of radioactive waste. The information obtained will be used in a CoRWM report to Government in March 2009. This will cover the interim storage of radioactive waste, and the management, including the storage, of spent fuel, plutonium and uranium. At least one draft of the report will be sent to HSE for comments on factual accuracy before publication for general comment.

### **Introduction**

2. Present: Frans Boydon, Steve Griffiths, Joyce Rutherford and Neil Blundell (HSE ND); Marion Hill, Margaret Burns (by telephone) (CoRWM); David Horsley (NuSAC); Adam Scott (by telephone) (CoRWM Secretariat). The agenda for the meeting is in the annex to this note.

### **NDA National Storage Review**

3. HSE had commented quite extensively on drafts of the NDA report on the national storage review. However, they emphasised that the report was the NDA's, based on information from their site licence companies (SLCs), and did not necessarily reflect HSE views. No one present at the meeting knew when the report would be published but it was agreed that this must be before the stakeholder workshop on 28 October.

### **Store Lifetimes and Robustness of Arrangements**

4. HSE thought that it was possible to aim for 100 year store life but that it would not be possible to guarantee that such a life would be achieved. It would be necessary to continually monitor the condition of such a store and take action in a timely way if it appeared that the store would not reach its design life. Other requirements for storage for 100 years included good inspection arrangements, additional knowledge about waste packages and extra equipment for monitoring the condition of packages. HSE would like standard design principles to be developed for stores (including, for example, building-in the ability to replace equipment when necessary) and would wish to see an industry code of practice for storage.
5. Existing stores, many of which were built with a short design life, should be made fit for purpose or replaced, on a case-by-case basis. The objective should be for robust storage arrangements, which could include refurbishment and replacement of stores, provided there was monitoring to determine when such action was needed. In response to a question from CoRWM, HSE agreed that security of funding was essential for robustness. They discussed funding allocations with the NDA and if necessary could take legal action to compel the NDA to provide funding in a particular case. HSE could

also go to Treasury with the NDA if they were of the view that whole NDA budget was insufficient.

6. HSE would apply the same standards for stores in Scotland as in England and Wales, that is the same principles and approaches. It was for the Scottish Government to select a storage period to aim for.
7. In the case of new build, HSE would take a view on waste management and decommissioning plans and funding arrangements as a whole.
8. There was some discussion of the difficulty of determining exactly when in the lifetime of a legacy waste facility or store it was essential to take action to reduce risks. In many cases risks could not be quantified and there was insufficient knowledge of the wastes and the facilities in which they were kept. More "forensic engineering" was needed to identify "cliff edges", ie the points beyond which risks could increase substantially unless action was taken.

## **R&D**

9. HSE had a process for reviewing licensees' nuclear safety R&D (see NuSAC Annual Report 2007/08 for details). For existing facilities, they would only be likely to identify specific R&D requirements during reviews of safety cases. They had some concerns about the safety of old stores but felt it would be difficult to identify R&D to help to resolve them. For new facilities HSE were confident that enough was known to substantiate safety, but the question remained of whether more R&D would lead to safer designs.
10. HSE supported the conclusions of the Environment Agency's Nuclear Waste Assessment Team (NWAT) report on waste package longevity and expected NDA to comply with the recommendations. They were members of the Product Performance Industry Group, which enabled them to influence R&D on waste package performance.
11. In the past, much of the R&D related to waste packages and storage had been based on the assumption that a geological disposal facility (GDF) would be available by 2020 (or earlier). The knowledge gained would be just about adequate for storage for 20-50 years from now. However, R&D requirements might be different if a 100 year storage period was taken as the target. This issue should be addressed in the NDA R&D strategy and, at a later stage, in their more detailed R&D plans and in the sites' TBuRD (technical baseline and underlying R&D) documents.

## **International Benchmarking**

12. HSE was a member of, and was active, in the Western European Nuclear Regulators' Association (WENRA). The WENRA working group on waste and decommissioning had established "safety reference levels" for the storage of waste and spent fuel. These were used to benchmark national regulatory systems and practices. The latest HSE Safety Assessment Principles for Nuclear Facilities (SAPs) implemented most of the WENRA levels; the remainder were being addressed in the review and revision of HSE's Technical Assessment Guides (TAGs). There had also been benchmarking of storage practices at Sellafield and Dounreay. This involved HSE assessing three stores, with input from the SLCs on factual accuracy. Regulators from other countries then peer reviewed the HSE assessments. The process was resource intensive but very worthwhile. One of the issues identified for Sellafield was a lack of compliance with inspection requirements at one of its stores.

## **Waste Conditioning and Package Standards**

13. HSE pointed out that a Letter of Compliance (LoC) from NDA was not sufficient to demonstrate compliance with regulatory requirements. HSE needed safety cases, which were also assessed by the relevant environment agency (see draft joint HSE/EA/SEPA guidance on the management of higher activity wastes on nuclear licensed sites).
14. For most legacy and committed wastes, and all new build wastes, there would be few problems in meeting high package performance standards. This was not the case for some legacy wastes where there would be difficulties in identifying an appropriate conditioning process and special cases might have to be made for acceptance in a GDF.
15. In answer to a question about potential conflicts between meeting NDA waste package specifications and reducing near-term hazards, HSE gave two examples of wastes from the Sellafield legacy ponds and silos. In one case it had been agreed that a less than optimal waste form would be used because this enabled the waste to be retrieved earlier and stored safely. Sellafield would be characterising the waste as it was retrieved and carrying out R&D to understand its future behaviour. The expectation was that they would make a special case for acceptance of the waste for geological disposal. However, the Lifetime Plan (LTP) would also include a study of options for reworking the waste packages. In the other case the waste was to be placed in a buffer store and left in raw form while R&D was carried out to identify an appropriate conditioning method. The buffer store would be safer because the waste would be in discrete boxes, in a new structure, rather than in an old silo.
16. There was discussion of the potential difficulties in transporting some legacy wastes. The transport regulations were prescriptive with little scope for pragmatism, and were not designed to cover bulk waste transport. Some legacy waste that had already been conditioned might not be able to be transported under the current regulations because not enough was known about its radionuclide content and other characteristics. HSE considered that a study was required of example legacy wastes to investigate this potential problem. R&D was also needed on characterisation of conditioned wastes, especially those in cement-based matrices. Experience from the Waste Isolation Pilot Plant (WIPP) in the US had shown the costs and technical difficulties involved if packages arrived at a GDF without sufficient records and had to be returned to source for emptying, characterising the contents and repackaging them.

## **Magnox Sites**

17. HSE said that Magnox South were looking at a “mini-stores” concept in which ILW would be stored in large (5m<sup>3</sup>), cast iron, self-shielding boxes, in a simple building. Wet ILW (eg ion exchange resins) would be dewatered but otherwise unconditioned. Dry ILW (eg magnesium alloys, graphite, steel) would be in raw form. The boxes would be transportable (they already had German certification) and Magnox South believed that they would be disposable in a GDF. The concept is reported to be considerably less expensive than constructing, operating and decommissioning substantial stores at Magnox sites and could also save on conditioning costs. Magnox South were in discussions with HSE and EA (NWAT) about the concept. They had yet to apply for an LoC from NDA RWMD.
18. It was noted that the mini-stores concept would differ from current baseline plans for Magnox sites in terms of conditioning and packaging methods, storage strategy and financial requirements. It would be more flexible than the baseline in that the large boxes could be moved to other sites if site clearance plans were brought forward and a GDF was not available. British Energy were believed to be interested in the concept for their AGR sites. UKAEA’s southern sites might also find it attractive for some of their wastes.

## **UKAEA Sites**

19. In addition to the ILW to be placed in the existing modern store and the planned store, there were also old sea dump drums at Harwell that needed overpacking or reworking. The building in which they were currently stored was unsuitable for use for much longer. There was also an issue of storage of PCM on the site, now that it could no longer be sent to Sellafield. There was a general problem that Sellafield did not take into account the strategies of other NDA sites and vice versa.
20. The existing waste store at Winfrith was restricted by licence instrument to LLW. The planned store is the only true ILW store at the site.
21. Dounreay was known to be concerned about the NDA annualised funding arrangements and the risks it posed to the site's longer term plans. HSE were concerned about compressed putrescibles in wastes and the possibility that their degradation could lead to bursting of the encapsulation medium.

## **British Energy**

22. At AGR sites the reference plan was to build stores for accumulated operational ILW at the time of decommissioning. HSE were of the view that the ILW held in vaults in the reactor buildings was not vulnerable and could be left there until stage 3 decommissioning. There was on-going R&D on the management of bulk graphite from decommissioning. At Sizewell B British Energy was focusing on selecting a conditioning option for ion exchange resins and would firm up on storage plans after that.
23. There were a number of issues arising on the management of AGR fuel. At Sellafield the AGR Dismantler Store was nearly full and some raw steel and graphite was being stored in EPS1 and EPS2, and would be stored in EPS3 when it started operating. There was a lack of storage capacity at Sellafield for AGR fuel. The THORP pond water chemistry could not be changed to be optimum for AGR fuel until the foreign-owned LWR fuel in the pond had been reprocessed. Dry storage of AGR was being considered by Sellafield and the NDA as a contingency to pond storage, as well as for AGR fuel that will not be reprocessed. There were questions to be resolved about the dry storage of high burn-up AGR fuel and of fuel that has corroded during wet storage.

## **MoD**

24. MoD was assessing options for managing ILW at Rosyth and Devonport. At Aldermaston there were licence instruments about ILW retrieval, characterisation and conditioning, and considerable progress had been made in recent years. There was a proposal to supercompact ILW and encapsulate it in cement, and a licence instrument that specified that 1,000 drums of conditioned ILW be produced by 2014.

## **GE Healthcare**

25. At Cardiff the ILW was mainly waste containing tritium or carbon-14. At Amersham there was ILW that had arisen some time ago. It was believed that GE had work in progress on options for the longer term management of their ILW.

## **Sellafield**

26. *Magnox encapsulated product (MEP) drums*: Sellafield research on the cause of the swelling of MEP drums removed from the stores for inspection was on-going. It was planned to remove four more drums, bringing the total removed to twenty. Sellafield had

work in progress on remediation of other ILW packages that would be relevant to the MEP drums, should it be decided that remediation of these was required. Changes had been made to operational procedures to ensure that relatively large pieces of uranium were removed from waste prior to encapsulation.

27. *Encapsulated Product Stores (EPS1, 2, 3)*: There was a generic issue of access to these stores for inspection and removal of drums and equipment. The only access to EPS2 was through EPS1. Access to EPS3 would be through EPS1 and EPS2; the design of this store was too far advanced to change. EPS1 and EPS2 contained boxes of raw AGR steel and graphite, and drums from the Waste Product Encapsulation Plant (WPEP), as well as MEP drums. This was because the AGR dismantler store and the WPEP store were nearly full. These arrangements were covered in the safety cases for EPS1 and EPS2 but were not ideal. It was important to address the conditioning and storage of AGR steel and graphite in a strategic way in the near future.
28. *Miscellaneous Beta Gamma Waste Store (MBGWS)*: This store had a limited life and is considered to contain raw waste of an unreactive nature. Sellafield had no firm plans for conditioning the waste or for replacing the store. It may also be necessary to characterise some of the waste in more detail before it could be transported or disposed of. For historical reasons, the boxes in the store are of a non-standard size.
29. *Box Encapsulation Plant Product Store (BEPPS1)*: This was designed for waste from the silos conditioned by a process that has now been superseded. It would now be used for conditioned waste from the wet silo and raw waste from the dry silo. HSE and the EA were working together to ensure that the store and the way in which it would be operated met standards appropriate for its new use.

## **Way Forward**

30. The following actions were agreed:

- CoRWM to send HSE a draft note of the meeting for factual checking, before it is placed on the website
- CoRWM and HSE to keep in touch on NDA strategy development work
- a further CoRWM/HSE meeting to be arranged to discuss management of spent fuels, plutonium and uranium.

## **ANNEX**

### **AGENDA**

#### **CoRWM Meeting with HSE ND on Interim Storage of Radioactive Waste, Bootle, 3 September 2008, 1.30 pm-4.30pm**

1. Introductions, note taking arrangements
2. CoRWM's work on radioactive waste storage
  - objectives and timescales for CoRWM's work
  - meetings held to date (NDA, BE, DfT, OCNS, MoD, Sellafield Ltd)
  - current understanding of storage situation and plans (from draft NDA report on their national storage review)
  - preliminary ideas for criteria for judging whether a storage programme is robust
  - information needs and how they might be met
  - interest in coordination between regulators
3. Discussions of storage issues at each type of nuclear licensed site
  - Magnox sites
  - UKAEA sites
  - British Energy – AGR sites
  - British Energy – Sizewell B
  - MoD
  - GE Healthcare
  - Sellafield (store by store discussion, see list in Annex B, including MEP drums issue)
4. Way forward
  - NDA/regulators stakeholder event on storage (28 October)
  - CoRWM's work in 2008 (meetings, information collection, report drafting and issuing for comment)
5. AOB