

International Workshop on
**Disposal of Radioactive Waste at Intermediate Depth:
The Safety Basis and its Realization**

Gyeongju City, Republic of Korea,
8-12 December 2008

The international workshop on “Disposal of Radioactive Waste at Intermediate Depth: The Safety Basis and its Realization” (Gyeongju City, Republic of Korea, 8-12 December 2008) was attended by about 75 participants. The presenters took a great deal of care to make clear and informative presentations. The lectures, panel discussions, the working group session, and the development of the findings and recommendations all benefited from a high level of engagement from participants¹. This level commitment resulted in a very successful outcome to the workshop. What follows are the workshop findings and recommendations that were drafted collectively by the participants on the morning of Thursday, Dec 11, 2008.

Findings and Recommendations

The workshop covered disposal of the broad range of wastes termed “intermediate level wastes”. ILW waste arisings come from NPP operations and decommissioning, the operation and decommissioning of spent fuel reprocessing facilities and waste arisings of diverse origin that do not fit either of these broad categories (e.g., radium wastes, disused sealed radioactive sources). The countries that participated in the workshop have one or more of these types of waste arisings.

Disposal of radioactive wastes that occupy the ends of the “spectrum” of waste types have received the most attention (LLW and HLW) – disposal options for the broad range of materials in the middle of this spectrum (ILW) have been developed at the national level but have not so far been the subject of as much attention from the perspective of international activities. Hence, the need for an international workshop on this topic.

A few of the countries with nuclear power programmes have operating facilities for ILW disposal. Of the remaining countries with nuclear power programmes, many have included an ILW disposal facility as one element of their national policy and strategy for radioactive waste management. It would appear that ILW disposal facilities will one day be prevalent in countries with nuclear power programmes.

Commensurate with the diverse range of wastes, a diverse range of disposal solutions have been implemented and proposed for the broad range of ILW, examples of such being: relatively shallow cavities, former mines, disposal in bedded salt formations, borehole disposal solutions and near surface disposal facilities adapted to particular waste streams. In all cases it is important to recognize the unique hazards of the specific sub-categories of ILW, for example ILW containing predominantly short-lived radionuclides may not require the same disposal methods as ILW containing predominantly long-lived radionuclides.

¹ Only a few changes were made to the provisional programme: Mr. Liu (China) and Mr. Neretin (Russia) were not able to attend, and in Session 2 Mr. Motonori Nakagami (Chubu Electric Power Co.) delivered the talk from Japan instead of Mr. Kato.

Safety is the fundamental objective of radioactive waste disposal. The notion of an “optimal” disposal solution is elusive. Deciding what would be an optimal solution is complicated by many factors that cloud the decision process (e.g., policy constraints and public acceptance, siting constraints, the specific waste streams, resources available). The legal framework can often prescribe the range of disposal solutions that can be examined. In the end, the disposal system is either safe or not safe, as determined by regulatory review.

Safety assessment methods for ILW disposal are generally similar to the methods employed for HLW disposal. The differences have to do with specific issues such as assessment time frame, range of assessment scenarios considered, less need for heat dissipation, greater diversity of waste forms and waste packages, simpler operations for waste handling, a smaller inventory of radionuclides, and in many cases fewer provisions for nuclear safeguards.

On the other hand, a safety assessment for a near surface disposal facility could include provision for specific ILW waste streams (e.g., ILW streams with short-lived radionuclides). Operational experience with near surface facilities has shown that the waste streams suitable for disposal can be enlarged as experience with the safety case evolves (i.e., waste acceptance criteria are modified as experience is gained). In other words, specific ILW waste streams could be considered for near surface disposal.

Existing IAEA safety requirements for near surface disposal and geologic disposal provide the needed foundation for addressing ILW disposal. The safety case for ILW disposal facilities would reflect a graded application of existing IAEA safety requirements to address issues such as the wastes included for disposal, the specificities of the natural and engineered barriers, and operational considerations. Additional guidance in existing IAEA draft safety guides may be needed to address ILW disposal.

Depth of disposal is just one of the factors that must be considered for the safety of ILW disposal: the properties of the geological environment, the waste characteristics and engineered features of the facility, regulatory constraints, national policy, are other factors of equal or greater importance. Intermediate depth disposal is not a separate disposal concept. Therefore, it is recommended that IAEA not use the phrase “intermediate depth disposal”.

Some form of borehole disposal may be appropriate for ILW disposal – for countries with small waste volumes but in other countries as well. It should be noted that the IAEA concept for borehole disposal is limited to disposal of disused sealed radioactive sources in small diameter boreholes and subject to a generic safety assessment. Other borehole type disposal could be used for ILW disposal but would require a facility-specific safety case.