

MEMORANDUM FOR: B. Joe Youngblood, Chief
Operations Branch
Division of High-Level Waste Management

FROM: Daniel A. Galson
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Division of High-Level Waste Management

SUBJECT: TRIP REPORT: MEETING AT UKDOE (LONDON, MAY 8, 1987);
ATTENDANCE AT IAEA/NEA SYMPOSIUM ON BACK-END OF THE NUCLEAR
FUEL CYCLE (VIENNA, MAY 11-15, 1987)

On June 8, 1987, I met with management of the Radioactive Waste Division of the United Kingdom Department of the Environment (UKDOE) in London primarily to discuss their ideas on and possible sponsorship of the proposed international meeting of regulators responsible for deep geologic disposal programs. Our discussions also encompassed the development of a possible exchange agreement between the UKDOE and the NRC, and the recent policy change of the UKDOE concerning the disposal of low-level radioactive wastes (LLW). On May 11-15, 1987, I attended a joint IAEA/NEA Symposium on the Back-End of the Nuclear Fuel Cycle - Strategies and Options, and delivered a paper summarizing key elements of interest to the international technical and regulatory community on the NRC's Advanced Notice of Proposed Rulemaking (ANPR) to define high-level radioactive waste (HLW).

UKDOE MEETING

At the UKDOE, I met with Dr. Frank Feates, Head of the Radioactive Waste Division, and with Dr. Peter Johnston, Head of the Research and Assessment section of this Division. In terms of responsibility, these individuals would be approximately at the Office Director and Branch Chief levels, respectively. I was also introduced to Mr. Martin Jones, who is a newly hired staff person responsible for following international programs and parliamentary actions. The primary purpose of the meeting was to exchange ideas on a proposed international meeting of regulators, and to agree on tentative scheduling and organization of this meeting. These objectives were fully realized, and support was gained for all of HLWM's positions on this meeting.

Meeting of Regulators

Both Dr. Feates and Dr. Johnston supported this meeting and agreed that organization by a national regulatory agency would be preferable to organization by the Radioactive Waste Management Committee (RWMC) of the Nuclear Energy Agency (NEA). Dr. Feates supported the idea of cosponsorship by the NRC and the UKDOE, and stated that the meeting could be organized in London, although a

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U.S. location would be equally acceptable. He added, however, that before he could make a firm commitment to assuming responsibility for London meeting arrangements, he would need to pursue the matter with his management within Her Majesty's Inspectorate of Pollution (HMIP) of the UKDOE.

Scope of the meeting was discussed and it was agreed to limit this to deep geologic disposal of radioactive wastes; that is, discussion of issues associated with licensing of monitored retrievable storage and transportation systems would be excluded.

Potential outcomes of the meeting were discussed. It was considered that publication of informal proceedings, among other possible outcomes, would be of benefit. Dr. Feates indicated that the UKDOE could bear any publication costs although the UKDOE would not have sufficient staff resources to assume actual responsibility for compilation and editing of the proceedings. It was also agreed that establishment of a small Steering Group that would meet periodically (annually, for example) would be of benefit.

With regard to participation, it was agreed that this initial meeting of regulators should be considered a "management-level" meeting with restricted attendance. Possible UKDOE participation would consist of Dr. Feates and Dr. Johnston. Possible NRC participation would consist of Hugh L. Thompson, Jr., Robert E. Browning, B. Joe Youngblood, and, as staff organizer of and Scientific Secretary for the meeting, Daniel A. Galson.

It was further agreed that participants should be invited from OECD countries with well-established regulatory programs for disposal of radioactive wastes in geologic repositories: Canada, the Federal Republic of Germany, France, Japan, Sweden, Switzerland, and the United Kingdom. Spanish participation should also be considered. Representatives from the OECD, the IAEA, and, possibly, the CEC, could also be invited. To ensure a productive meeting, however, it was considered important to reduce total numbers.

There was agreement that the meeting should be organized as soon as feasible, and it was considered that this could not occur before December 1987. With this in mind, a detailed timetable for organization of the meeting was discussed, with the planning assumption that the meeting would occur in London on December 8-10, 1987.¹

Possible UKDOE/NRC Exchange Agreement

Dr. Johnston and I exchanged general information on our respective organizational structure, size and programs. It was agreed that there were many programmatic areas in common and shared concerns (in performance assessment in particular) that could serve as a basis for some kind of formal exchange agreement. Insofar as the NRC's Office of Research is also interested

¹It has since been decided within NMSS that a Spring-Summer 1988 date would be more practical.

in establishing an exchange agreement with the UKDOE, it was considered that any negotiations between the UKDOE and the Office of Research should also take into consideration the potential participation of the Office of Nuclear Material Safety and Safeguards in the agreement.

Three documents were obtained that may be of interest to HLWM staff:

- (1) Department of the Environment et al., 1984. Disposal Facilities on Land for Low- and Intermediate-Level Radioactive Wastes: Principles for the Protection of the Human Environment.

This document sets out the UK's basic regulatory criteria for the disposal of radioactive wastes.

- (2) Department of the Environment, 1987. Radioactive Waste Management and Radioactivity in the Environment. A Report of Research Commissioned by the Department of the Environment 1984-1986.

This document lists all research projects sponsored by the UKDOE in the period 1984-1986, and references all reports produced in this period.

- (3) Radioactive Waste (Professional) Division of the Department of the Environment, 1986. Assessment of Best Practicable Environmental Options (BPEOs) for Management of Low- and Intermediate-Level Solid Radioactive Wastes.

This report provides the basis behind policy decisions of the UKDOE on the management of low- and intermediate-level radioactive wastes.

New UK LLW Disposal Policy

A few days prior to my arrival in the UK, a new policy for the land disposal of LLW was announced by the Secretary of State for the Environment. Prior to this announcement, government policy had been to dispose of LLW by near-surface burial, and four potential LLW disposal sites were under investigation. The new policy is to dispose of LLW in the deep geologic repository that was being sited for intermediate-level waste (ILW) disposal. Cost comparisons by NIREX, the Nuclear Industry Radioactive Waste Executive, indicate that the marginal cost of disposing of LLW in a multipurpose deep geologic repository for LLW and ILW is of the same order as disposing of the same quantity of LLW in an engineered shallow repository. The current LLW disposal site at Drigg (disposal in shallow trenches in a clay formation) will continue to be operated until a combined ILW/LLW deep repository is ready, currently scheduled for about 2003. I have enclosed the official UK government correspondence on this matter, as well as several newspaper articles that appeared in the London Times the day after the government announcement.

IAEA/NEA SYMPOSIUM ON BACK-END OF THE NUCLEAR FUEL CYCLE

This five-day Symposium was attended by several hundred government and industry representatives from more than 30 different countries. Most of the participants, however, were from the Federal Republic of Germany (FRG), France, Japan and the United Kingdom (UK), reflecting the strong orientation of the Symposium towards papers on nuclear fuel reprocessing and recycling. U.S. participation included myself and approximately seven others from the U.S. Department of Energy (DOE) or contractors to the DOE, most notably, S. Kale from the DOE's Office of Geologic Repositories. There were apparently few regulators from other countries in attendance.

The Symposium was divided into eight sequential sessions and four poster sessions that covered seven broad topics:

- (1) national approaches to the back-end of the nuclear fuel cycle,
- (2) options and strategies for the back-end of the nuclear fuel cycle,
- (3) transportation of spent fuel and radioactive wastes,
- (4) handling, conditioning and storage of spent fuel and high-level wastes,
- (5) development programs for reprocessing facilities,
- (6) utilization of materials recovered by reprocessing, and
- (7) disposal of spent fuel and high-level wastes (referred to collectively here as "HLW").

Sessions (1) and (7) were the most valuable from my point of view. My paper, entitled Development of a Risk-Based Definition of "High-Level Radioactive Waste" by the U.S. Nuclear Regulatory Commission (copy enclosed), was the last-scheduled presentation in Session (7) and, of the Symposium, as a whole. This was unfortunate as there was no time after the session officially ended to discuss the paper informally with other Symposium participants. The Session chairman was kind enough, however, to reiterate my call for comments from the international technical and regulatory community as the NRC proceeds with the development of this definition.

I have enclosed a copy of the agenda for the Symposium; this contains titles of all papers presented. I have copies of many of these papers, as well as the abstract volume. Symposium Proceedings will be published by the IAEA in due course, but not before the end of 1987. I would be pleased to provide further information on any of the papers listed on the agenda. For the purpose of this trip report, I would like to make some general remarks on the Symposium.

Back-End Strategies

Current HLW management strategies broke down along two lines: (1) immediate reprocessing of spent fuel, and (2) temporary storage of spent fuel. These strategies could be further subdivided into (1a) storage of reprocessed Pu for future use in fast-breeder reactors (FBRs) and (1b) immediate recycling of Pu into mixed-oxide (MOX) fuel, and (2a) eventual reprocessing of stored spent fuel (with Pu recycled into FBR or MOX fuel) and (2b) eventual disposal of stored spent fuel. The immediate choice between reprocessing or storage of spent fuel can be related to two important factors: national FBR development programs and abundance of national uranium supplies.

France and the UK currently have industrial-scale reprocessing programs. These countries recognize that long-term pool storage of reprocessed U and Pu is difficult and that economic operation of FBRs is still many years off; national investment situations have, nonetheless, led to government policies to continue with reprocessing. In addition, China, the FRG, Japan, and the USSR intend to have operational industrial-scale reprocessing plants by the 1990's. With the exception of the UK, representatives of these countries went so far as to say that reprocessing was seen as a necessary step in the management of HLW. The French in particular argued further that it would be "wasteful" not to recover U and Pu. The Chinese appear to have developed a technology to extract precious metals (in addition to U and Pu) during reprocessing, thereby increasing the attractiveness of the reprocessing option.

Of the remaining nations with vocal representation at the Symposium, Canada, Finland, Italy, Spain, Sweden and the U.S. have a policy to store spent fuel for the time being. Of these, only Spain and Sweden have decided definitely to dispose directly of spent fuel after a period of long-term storage (i.e., reprocessing of spent fuel is no longer considered as a viable option). Regardless of national policy on reprocessing, however, most countries (the UK being a notable exception) plan to have a waste disposal capability in place by 2020.

Several conflicting studies on the economics of reprocessing were presented. On the balance, considering the current price of U, economic considerations appear to favor only slightly long-term storage of spent fuel over reprocessing. Because the overall financial differences are small, especially with respect to the overall costs for generation of nuclear power, decisions on whether to reprocess are apparently being made on other bases (e.g., political). However, economic considerations do appear to favor recycling of surplus reprocessed U through light-water reactors (LWRs).

Transportation

Transport by rail using dedicated trains was the preferred mode for HLW by most countries. One exception was the FRG, which is considering a system of transport by truck (100 tonnes per transport, truck speed of about 60 km/hr).

Reprocessing/Recycling

Both France (at La Hague) and the UK (THORP - for Thermal Oxide Reprocessing Plant) will have further reprocessing capability on line in the early 1990's. The FRG and Japan intend to have their first industrial-scale plants on line in 1997 and 1995 at Wackersdorf and Tokai, respectively. It was evident that there is already a great deal of experience in Europe on recycling of U (in the UK) and Pu (in Belgium, the FRG and France) into MOX fuel at the enrichment stage.

HLW Storage and Disposal

There are a multitude of proven options for the storage of HLW, including (1) ponds, (2) dry vaults, and (3) dry casks. Option (1) in particular has been proven trouble-free for LWR spent fuel. Options (2) and (3) have the advantage of being modular. U.S. and Canadian representatives cited option (3) as having the additional advantages of high earthquake tolerance, and suitability for transport and direct disposal of the casks. Notable advances in development of away-from-plant centralized interim storage have occurred in the FRG (Goleben dry store completed c. 1986), France (CASCAD natural convection air-cooled store nearly completed), and Sweden (CLAB pool store operational since 1985).

Descriptions of ongoing work at the FRG's Asse (experimental in situ studies) and Gorleben (shaft construction) salt-dome sites show that the FRG has the most advanced program for disposal of HLW. Repository programs in other countries are still in the early planning, site selection, and surface-based testing phase.

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Enclosures:
As stated

cc w/encls.:
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