

GUY.RFT/

- 1 -

SEP 10 1990

NOTE TO: Guy Arlotto, Deputy Director
Office of Nuclear Material Safety
and Safeguards

FROM: Robert E. Browning, Director
Division of High-Level Waste Management

SUBJECT: QUESTIONS AND TOPICS FOR YOUR JAPAN VISIT

In response to your request, the Division of High-Level Waste Management has prepared several questions and topics that may be worth discussing on your upcoming visit to Japan. They are provided in the Enclosure 1 and organized by technical area. Enclosure 2 contains some background information on the NRC/ Japanese Atomic Energy Research Institute now expired agreement.

151

Robert E. Browning, Director
Division of High-Level Waste Management

Enclosures: As stated
cc: H. Schechter, GPA/IP

DISTRIBUTION

B.J. Youngblood	R.E. Browning	J. Bunting	J. Linehan
R. Ballard	CNwRA	NMSS R/F	HLPD R/F
J. Holonich			

OFC :HLPD	:HLPD	:HLPD	:HLWM	:	:	:
NAME: JHolonich	:JLinehan	:BYoungblood	:RBrowning	:	:	:
DATE: 09/10/90	:09/10/90	:09/10/90	:09/10/90	:	:	:

OFFICIAL RECORD COPY

9009120136 900910
NMSS SUBJ
412 CDC
000000

*412
NHXT*

ENCLOSURE 1

SHAFT EXCAVATION

Presently, the Japanese are using conventional (drill and blast) shaft sinking techniques for their excavation effects study at the Tono Mine. The staff has been encouraging the U.S. Department of Energy to explore other means of excavation such as mechanical techniques. There are several questions that would be appropriate to ask the Japanese in this area.

Question 1

Have the Japanese decided what techniques will be used for their repository? (For instance, are or will they consider using mechanical excavation techniques?)

Question 2

Are they worried about creating preferential path ways in the repository as a result of drilling and blasting?

Question 3

What kind of analyses were performed before choosing the shaft sinking method?

Question 4

What kind of mapping techniques are being proposed? (For instance, are they considering photogrammetric mapping?)

Question 5

Are they looking into how a certain excavation technique would impact their ability to gather the required data?

WASTE PACKAGE AND REFORM

Question 1

What is the present Japanese waste package design or design concept for high-level waste?

Question 2

The Tokai vitrification facility uses a liquid-fed, Joule-heated ceramic melter in which concentrated liquid waste is fed into the melter. This will generate more gas than a similar facility using powdered waste. How does the Tokai facility design handle this large off-gas?

Question 3

What are the performance requirements for waste package life and radionuclide release from the waste package? Is a multi-barrier concept used in the overall design?

Talking Point 1

Treatment of uncertainties in predicting waste package life and subsequent radionuclide release from failed waste packages.

Talking Point 2

Use of short-time span data for long term performance projection.

HYDROLOGY AND GEOCHEMICAL AREAS

Question 1

Have studies been made in Japan on the thermomechanical or hydrologic properties of volcanic tuff? If so, have such studies included combined matrix and fracture flow?

Question 2

Have the coupled effects of heat and water movement been considered in modeling for fractured tuff or other geologic media?

Question 3

In regard to the natural analog studies near the Tono Mine near the Chubu Works:

- a) How old is the ore body?
- b) How old is the fault that intersects the ore body?
- c) Is the sampling drift above or below the present-day water table?
- d) Is the drift presently located downstream from the ore body?

Question 4

Will the results of the natural analog or other geochemical studies be adaptable to conventional radionuclide transport models?

Talking Point 1

Are the Japanese finding it feasible to place a high-level nuclear waste repository in a tectonically and volcanically active geologic setting?

Talking Point 2

Treatment of scenarios such as earthquakes and volcanoes in a tectonically active area like Japan. Need to determine changes to hydrologic regime from these events.

Talking Point 3

Japanese methods of hydrologic analysis and computer codes - differences relative to American methods and codes. (TAGSAC, Saitama University)

Talking Point 4

Japanese developments in hydrologic data collection as a result of Shaft Excavation Effect Project.

GEOLOGY/GEOPHYSICS AREA

Question 1

What approaches and criteria are in use for the investigation and identification of earthquakes, faults, and volcanic hazards?

Question 2

What are the criteria used for establishing acceptable levels of hazard?

Question 3

What methods of analysis are used for establishing the seismic design for the surface and subsurface facilities for the pre- and post-closure periods?

Question 4

Are the seismic design for facilities based mainly on deterministic, or probabilistic methods, or a combination of both?

Question 5

How is volcanic activity taken into consideration when establishing the design basis?

Question 6

What consideration is given to avoid or establish setback distance from Quaternary faults or Quaternary volcanoes for the construction of the various nuclear facilities?

Question 7

What are the criteria and surfaced-based testing used for choosing the location of the excavation shaft near the Chubu Works?

Question 8

Can tapes of digitized data of strong motion on the surface and subsurface be acquired by NRC or DOE for analysis?

PERFORMANCE ASSESSMENT

Question 1

What are the Japanese safety standards for disposal of high-level waste? Are standards limited to performance of the overall system, or will additional requirements be placed on individual barriers of the repository? Will Japan follow the recommendations of the International Committee on Radiation Protection (ICRP) Publication 46 and the International Atomic Energy Agency (IAEA) Safety Series 99? Has Japan identified potential difficulties in evaluating compliance with probabilistic standards such as those recommended by ICRP and IAEA?

Question 2

Has Japan carried out a preliminary performance assessment for a repository? If not, when is one planned?

Question 3

Will Japan use a scenario analysis approach for performance assessment? Has a methodology been developed for constructing scenarios?

Question 4

What is the Japanese approach for validation of the models and computer codes used for long-term projections or repository performance?

QUALITY ASSURANCE

Question 1

What type of quality assurance requirements do the Japanese have for their high-level waste program? Can you offer a comparison of the Japanese QA requirements to the U.S. requirements?

Question 2

Have there been difficulties in implementing these requirements in the program, especially in the earth science area?

ENCLOSURE 2

NRC/JAERI INFORMATION EXCHANGE AGREEMENT ON
RADIOACTIVE WASTE MANAGEMENT RESEARCH

BACKGROUND

- o The NRC-JAERI agreement in waste management research expired on 11/7/89. Actions to renew are in progress.
- o The JAERI senior management person for waste management is Dr. Hirano (Director).
- o One of his Lab managers (Branch Chief) is Dr. S. Muraoka who recently visited WMB.
- o Shao will probably meet with both people.
- 1. Current Status: Agreement is up for renewal since it expires in November 1989. Dr. Susumu Muraoka of JAERI met with Mel Silberberg and the WMB Technical Staff at the Fifth JAERI/NRC Technical Group Meeting held here at Nicholson Lane on October 30-31, 1989.

Dr. Muraoka said that JAERI would like to extend the Agreement, in it's current form and within the existing scope, for an additional five years. Mel Silberberg and Dr. Muraoka reached a mutual agreement of specific topics that JAERI and NRC are interested in pursuing within the existing scope.

2. TOPICS OF RESEARCH EMPHASIS (Over the next five years)

High Level Waste

JAERI will do -

- o Long term material corrosion tests
- o Radiation effects on corrosion
- o Leaching data for HLW waste glass

NRC will do -

- o Performance assessment methodology
- o Waste package corrosion
- o Geochemical equilibrium and kinetics

Low Level Waste

JAERI will do -

- o Effects of Gamma irradiation on concrete barriers (provide data from recently completed work)
- o Chemical retardation by concrete barriers and soils
- o Long term leaching of cement, bitumen and plastics

NRC will do -

- o Concrete durability
- o C_{14} release and transport
- o Performance assessment

3. NEXT STEPS

JAERI plans to send a letter from the President of JAERI to the EDO requesting that the Agreement be extended (Note: J. Cortez, NRC suggested this to Dr. Muraoka as the most expeditious means of extending the Agreement.) If NRC agrees, we can then respond in the affirmative to JAERI. Details of the exchange would be by letters between Dr. Hirano and Mr. Beckjord with day-to-day contact delegated thru Mr. Silberberg.