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MINUTES OF THE 85TH ACNW MEETING
AUGUST 21-23, 1996

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Certified 12/10/96 by
Paul W. Pomeroy

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MINUTES OF THE EIGHTY-FIFTH MEETING OF THE
ADVISORY COMMITTEE ON NUCLEAR WASTE
AUGUST 21-23, 1996
ROCKVILLE, MARYLAND

The 85th meeting of the Advisory Committee on Nuclear Waste (ACNW) was held at Two White Flint North Building, 11545 Rockville Pike, Rockville, Maryland, on August 21-23, 1996. The purpose of this meeting was to discuss and take appropriate actions on the items listed in the attached agenda. The entire meeting was open to the public.

A transcript of selected portions of the meeting was kept and is available in the U. S. Nuclear Regulatory Commission (NRC) Public Document Room at the Gelman Building, 2120 L Street, N.W., Washington, D.C. [Copies of the transcript are available for purchase from Neal R. Gross and Co., Inc., Court Reporters and Transcribers, 1323 Rhode Island Avenue, N.W., Washington, D.C. 20005. Transcripts are also available on FedWorld from the "NRC MAIN MENU." The Direct Dial Access number for FedWorld is (800) 303-9672; the local Direct Dial Access number is (703) 321-3339.]

Dr. Paul W. Pomeroy, Committee Chairman, convened the meeting at 8:35 a.m. and briefly reviewed the schedule for the meeting. He stated that the meeting was being conducted in conformance with the Federal Advisory Committee Act. He also stated that the Committee had not received any requests from persons or organizations desiring to make an oral statement during the meeting. However, he invited members of the public who were present and had something to contribute to let the ACNW staff know so that time could be allocated for them to make oral statements. Subsequently, one member of the public asked for time to make a brief oral presentation and to submit a written statement.

ACNW members Drs. B. John Garrick and William J. Hinze were present. [For a list of other attendees, see Appendix III.]

I. CHAIRMAN'S REPORT (Open)

[Note: Mr. Richard K. Major was the Designated Federal Official for this part of the meeting.]

Dr. Pomeroy identified a number of items that he believed to be of interest to the Committee, including the following:

- On August 2, 1996, the U.S. Senate confirmed the appointment of Nils Diaz and Edward McGaffigan to the NRC.
- The U.S. Court of Appeals ruled that the Department of Energy (DOE) must begin to accept spent fuel from commercial reactors as of January 31, 1998.
- Steps are being taken to shut down the project to choose a Southeast Compact's low-level waste (LLW) disposal site in North Carolina.

II. COUPLED (Thermal-Hydrologic-Mechanical-Chemical) Processes (Open)

[Note: Mr. Richard K. Major was the Designated Federal Official for this part of the meeting.]

A working group session of the meeting of the ACNW was held August 21, 1996, to consider the topic of thermal-Hydrologic-mechanical-chemical (T-H-M-C) coupled processes. The topic was of interest to the Committee because of the need to understand how the coupling of the different processes will affect high-level waste (HLW) repository performance. The Committee had earlier expressed concern to the Commission about the nature of integration activities in the HLW program and the NRC's approach to understanding coupled processes. This working group session served as a forum for the Committee to review the staff's work on this topic, as well as to receive some input from other investigators studying coupled processes in other geologic settings.

Dr. Norman Eisenberg, Office of Nuclear Material Safety and Safeguards (NMSS), presented an overview of coupled processes, defining the term "coupled processes" in terms of the effects of one process on another. He outlined the fundamental relationships between various gradients and flux (Onsager processes) and how these define the primary couplings of thermal, hydrologic, mechanical, and chemical processes. Dr. Eisenberg summarized the various combinations and permutations of T-H-M-C coupling and showed where coupled processes are being treated in the NRC program: key technical issues (KTIs), iterative performance assessment (IPA), and integration activities. Dr. Eisenberg summarized the specific activities performed under each KTI and pointed out which T-H-M-C couple the activities address. Future NMSS activities include an evaluation of coupled processes resulting from disruptive events.

Dr. Randy Manteufel, Center for Nuclear Waste Regulatory Analyses (CNWRA), presented the results of a review of T-H-M-C coupled processes and their relative importance in repository performance. In its assignment of relative importance of processes, the review team did not consider large-scale geologic processes, such as seismic activity, or small-scale processes, such as biological or radiological effects. The importance of a particular process was assigned on the basis of the importance of the affected, rather than the affecting, process. The importance of couplings was considered on the basis of repository time (operations period, containment period, and isolation period). Thermal-mechanical (T-M) coupling was considered to be most important during the operations period. It is linked to the performance objective of having the drifts stable for possible retrieval during the first 100 years.

Thermal-hydrologic-chemical (T-H-C) coupling is considered to be most important during the containment period (<1000 years). The effects of hot water on degradation of the engineered barrier system (EBS) and the release of radionuclides are the performance objectives associated with this coupling. T-H-C coupling is also considered most important to the isolation period (1000 < time < 10,000 years). This coupling affects the transport of radionuclides to the geosphere. The chemical effects (e.g., sorption) on transport of radionuclides support the overall performance

objective of release/dose to the accessible environment. Dr. Manteufel discussed the effect of the proposed change from a release-based to a dose-based standard on the prioritization of the couplings. In general, there will be no effect; instead, the length of the compliance period will determine whether T-H-C in the near field vs. T-H-C in the far field needs to be considered.

Dr. Ronald Green, CNWRA, discussed the thermal effects on moisture movement (T-H) at Yucca Mountain. The results of numerical modeling of gas flow at different thermal loads indicate that at high thermal loads, there is gas movement both upward and downward from the repository. Modeling of temperatures in the drifts with fractures and backfill indicates that fractures will result in lower temperatures at the waste package surface, whereas backfill will result in higher temperatures. In general, the temperatures at the waste package surface and drift wall decrease with increasing fracture width near the drift. Backfill will delay the time of peak temperature in the drifts from less than 100 years to as long as 570 years at the drift wall.

There was discussion concerning the data needs to support the modeling work on T-H. Dr. Green also commented on the DOE in-drift heater tests.

Mr. Peter Lichtner, CNWRA, discussed thermal-hydrologic-chemical (T-H-C) coupled processes associated with the near field. Several effects on the EBS and the transport properties of the system are expected to result from T-H-C coupling. For example, substantial changes in the near-field chemistry will affect performance of the waste package, sorption, and hydrologic properties of the host rock. CNWRA has been developing a multiphase-multicomponent reactive transport code, MULTIFLO, which sequentially couples heat, liquid, and gas flow with solute and gaseous transport and mineral alteration. Similar to the DOE model V-TOUGH, MULTIFLO predicts a hot, dry zone at the repository horizon. The pH of waters in this zone may be as high as 10, whereas chloride concentrations may be 10 times greater than the ambient chloride concentrations.

At present, this model only addresses the unsaturated zone at Yucca Mountain. The uncertainties associated with the model include thermodynamic and kinetic data, and physical and chemical characteristics/heterogeneities of the host rock.

Dr. Mikko Ahola, CNWRA, presented an analysis of T-M coupling in the drifts. The analysis indicates that extensive yield zones may develop under a thermal loading of 100 MTU/acre. Collapse of the drift walls and roof may impact waste package performance. Shearing-induced dilation and separation along fractures and joints may impair flow and transport. Dr. Ahola presented the results of a sensitivity study of stress distribution around the drifts as a function of seismic activity. Little yielding was observed at the 100-MTU/acre thermal load.

Mr. Rex Wescott, NMSS, described a number of issues associated with integrating coupled process modeling into the overall system performance assessment (PA). These issues include evaluation of DOE's waste isolation strategy hypotheses to determine whether the assumptions account for the appropriate processes. Abstraction of subsystem models, evaluation of alternate treatments of couplings, and sensitivity analyses are activities used to determine the effect of various couplings on overall performance. Coupled processes are handled in three ways in evaluating performance: (1) couplings are included within a module; (2) calculations involving couplings are performed external to the total-system performance assessment (TPA), but results are fed to TPA; (3) coupling effects evaluated external to TPA and results used as bases for assumptions of simplifying internal calculations. The favored approach is to include important coupled processes as abstracted models. Mr. Wescott described how various T-H-M-C couplings have already been incorporated in the NRC and DOE PA calculations. The T-H-M-C couplings that have been significant or important to previous performance assessments include two-way, thermal-hydrologic (T-H), and one-way, thermal-hydrologic-chemical (T-H-C).

Dr. Chin-Fu Tsang, Lawrence Berkeley Laboratory, presented the results of the first phase of the international project, DEvelopment of COupled models and the VALidation against EXperiments in nuclear waste isolation (DECOVALEX), an effort to model T-H-M coupled processes in jointed rocks. The NRC and the CNWRA were participants in the first phase of this study. Objectives of DECOVALEX included investigating the ability of computer codes to describe laboratory or field measurements through various approaches to the conceptual models and the computations. Conclusions of the project include (1) thermal conductivity of the rock is negligibly affected by fractures and (2) water flux into the tunnel from fractures varied over two orders of magnitude. The largest and smallest fluxes were for computations involving homogenization of the system. Dr. Tsang described the next phase of DECOVALEX, which will involve predictive modeling of the effects in excavated rock. The Kamaishi mine in Japan has been selected as the site for the T-H-M tests.

Mr. Derek Elsworth, Pennsylvania State University, presented the results of the peer review of CNWRA's research program on T-H-M. The peer review, completed in 1995, evaluated the modeling and experimental activities conducted at CNWRA. The peer review panel made recommendations in three areas of research: T-M effects on drift stability, T-H-M effects on host rock surrounding the EBS, and long-term performance of repository seals. The panel ranked the topics it believed should be investigated in the following order:

1. Vaporization-condensation and mass transport around packages
2. T-H effects on change in fracture permeability
3. T-M effects on the change in permeability in partially fractured rock/fractures
4. Bounding spatial variability of rock mass parameters
5. Parameter scaling to field scale
6. Long-term performance of repository seals
7. Rock support under thermal loading

Dr. Steven Ingebritsen, U.S. Geological Survey, presented some impressions of the NRC/CNWRA efforts. He discussed their importance to modeling exercises such as those previously discussed. Modeling can be used as a means for scoping complex systems, for sensitivity analysis to determine important parameters, and for hypothesis testing. Models should not be considered as predictive tools. Dr. Ingebritsen expressed concerns about the T-H modeling of Yucca Mountain. The first concern was whether the heat pipe "predicted" by the equivalent continuum model approach will really form. There is almost no empirical data for steam-water systems in fractured rocks.

Dr. Ingebritsen suggested that thermoelastic effects on the permeability field should be considered. He also suggested that the effects of lateral flow in the top of the saturated zone should be considered in the context of heat-pipe development.

Mr. Walter Matyskiela, representing Nevada, presented some work on a "paleo-analog" in the Yucca Mountain region. He described alteration of previously non-welded vitric tuff that occurred upon emplacement of a basaltic sill. There is alteration of the fractures to zeolites, which have associated temperatures of approximately 100°C. Densities of the altered host rock decrease with increasing distance from the basalt contact. Hydrothermal minerals have been observed in the fractures as well as a variety of silicate minerals. Mr. Matyskiela noted that the permeability of altered fractures approaches zero.

In its summarizing remarks, the Committee observed that —

- a. The NRC and DOE appear to be in agreement about what the most important coupled processes are
- b. Disruptive processes may have an effect on T-H-M-C coupled processes
- c. Integration of the KTI teams is occurring, albeit it is difficult to implement

- d. Chemistry is going to have a profound impact on performance and should receive more attention
- e. The T-H-M-C effects on the saturated zone need to be investigated
- f. There is concern about the need to validate the modeling with research on geologic analogs

III. Technical Guidance on Expert Elicitation (Open)

[Note: Dr. Andrew C. Campbell was the Designated Federal Official for this part of the meeting.]

Dr. Pomeroy discussed ACNW's longstanding interest in the development of the "Branch Technical Position (BTP) on the Use of Expert Elicitation in the High-Level Radioactive Waste Program." He noted that Committee actions provided the impetus for the staff to develop guidance that could be used by NRC, DOE, and others involved in the licensing process. This guidance included a memorandum dated July 31, 1991, to Robert Bernero entitled, "The Role of Formal Elicitation of Expert Judgment in the Performance Assessment of a High-Level Waste Repository." He also commended the staff for developing the BTP and working to resolve a number of difficult issues.

Dr. John Austin, NMSS, discussed the history of the expert judgment process. He observed that the issue had been around for a long time. He also discussed how ACNW provided the primary impetus for development of the guidance BTP. He also discussed interoffice coordination in the review of the draft BTP. Of particular note was the interaction with the Office of the General Counsel (OGC). OGC's main concern was the use of the wording that the staff would "accept" the results of an elicitation conducted by the procedure. The legal issue was that "acceptance" implied automatic approval in the context of licensing. The issue was resolved by specifying that the staff would "accept for review" an elicitation conducted according to the process. Dr. Austin also noted that the public showed great interest in the BTP.

Dr. Hinze asked whether OGC's concern was with the methodology in the BTP or whether it was just the use of the word "acceptance." Dr. Austin indicated that concern primarily involved the wording. He said that in meetings with OGC, the staff also discussed what constitutes admissible evidence in a hearing and the benefits that the BTP elicitation process may have for licensing. Dr. Pomeroy asked about broader applications of the BTP process in other areas. Dr. Austin stated that NMSS asked the Office of Nuclear Reactor Regulation to evaluate the BTP and the extent to which it can be adopted for reactor probabilistic risk assessments (PRAs).

Mr. Michael Lee, NMSS, presented the overview and background for the development of the BTP in various drafts and revisions during the concurrence process. He discussed the scope of the BTP, including when formal expert elicitation is warranted and the protocol for using it. He noted that the BTP does not prescribe specific applications and is not intended to discourage informal expert judgment. If an applicant chooses, it is not necessary to follow the nine-step process precisely, but it is important to have a formal procedure that incorporates these attributes of an acceptable elicitation process. One important change in the BTP was that its scope was reduced from an agency staff technical position to a branch technical position that is more focused on HLW licensing. Earlier versions of the BTP included matters of expectation, policy, and protocol presented as specific staff positions. These were later incorporated into the text, but not included among the positions. The technical positions are now focused on the nine-step process recommended by the BTP.

Dr. Pomeroy asked about iterations of the process that allows the experts to obtain feedback. He also spoke about the possibility of public workshops. Mr. Lee discussed the various iterative components of the process that allow feedback to occur among the experts. In response to a question, he noted that the BTP does not address public workshops but is strongly focused on documenting the process and what the bases are for results, which would provide the same type of information.

Dr. Hinze asked about "data workshops" and the distinction between data and basic information." Dr. Austin noted that the starting point of an elicitation would be a lack of data. Dr. Hinze said that if there are no data then there is no information for answering the question. Dr. Garrick added that information descriptors used in the reactor field are more inclusive than just "data." He stated that these descriptors encompass a knowledge base, which is used as "evidence" to support a position. There was a discussion of data and information used to support positions in an elicitation. Dr. Eisenberg said that the intent of the BTP was to be inclusive of different types of data and information, not exclusive. Thus, too narrow an interpretation of "data" is not desirable in conducting and evaluating elicitations.

Mr. Michael P. Lee then discussed the public comments on the BTP. The NRC received 66 requests for the document but only received three sets of comments from the DOE, the State of Nevada, and the Nuclear Waste Technical Review Board (NWTRB). The State of Nevada was favorably responsive to the NRC's approach, but they disagreed with DOE's approach. They also suggested some additions and clarifications to the NRC BTP. Mr. Lee discussed Nevada's concerns with DOE's "Policy and Guidelines on Expert Elicitation." DOE's comments were favorable. DOE said that the NRC's approach was consistent with its own, that there was no substantive disagreement with the NRC's approach, and that no additional separate guidance on PA was necessary. Mr. Lee explained that at one point in developing the guidance, NMSS was considering specific guidance on expert elicitation for PA. Dr. Garrick said that PA is a key means of demonstrating compliance, and expert elicitation cannot be separated from it. Dr. Garrick described the relationship between PA and expert judgment in terms of developing ranges and probabilities for input into the models. Dr. Eisenberg said that the original idea was to provide specific guidance on where and when expert elicitation would be appropriate, but NMSS did not want to be too prescriptive regarding areas in which expert elicitation should or should not be used, rather, they wanted to leave the question up to DOE. The NMSS staff would then review what was done.

Mr. Lee discussed the comments from the NWTRB, which expressed approval of the document. Dr. Pomeroy reiterated a comment that the NWTRB raised, i.e., that the guidance in the BTP was very broad. He asked how the staff would deal with a situation in which an elicitation was conducted according to the general guidelines within the BTP but with a methodology that the staff considered inconsistent with its intent. Dr. Austin replied that they met with the NWTRB and discussed this issue along with other issues. He said that the BTP is one way to perform an elicitation; that there are other ways to do it, and it would be difficult to develop guidance that could deal with all conceivable situations. He added that an elicitation methodology, which the staff disagreed with, would not disqualify the results, but the staff would take them for what they are worth.

Mr. Lee discussed the staff's proposed resolution of Site Characterization Analysis (SCA) Comment 3, which was made in 1989. The two main points of SCA #3 were that DOE needed to provide clear guidance on when expert elicitation might be used and that DOE modify the site characterization plan (SCP) to indicate where expert judgment might be used in preference to empirical data. The first issue was resolved by DOE's publication of "Principles and Guidelines for Formal Use of Expert Judgment by the Yucca Mountain Site Characterization Project Office." Although the SCP has not been modified in accordance with the NRC staff's recommendation, the second issue is resolved because substantial program changes have occurred and the BTP will now be recognized as the benchmark in this area. Mr. Lee also noted that at the upcoming "Appendix 7" meeting on probabilistic volcanic hazard assessment (PVHA), the staff would make a comparison of the BTP approach and that used by DOE in the PVHA. He also discussed other upcoming applications of expert elicitation.

A question-and-answer session followed. Dr. Steindler asked about the conditions under which an elicitation would be rejected. Mr. Lee responded that the BTP lays out a protocol to follow, but an applicant is free to use some other protocol. The staff would evaluate the results and make a judgment on that basis, not on the basis that a different protocol had been used. Dr. Steindler also asked if the document was intended only to be a ruler for deciding when it would be useful to

review a document or if more was involved. A discussion ensued about the use of the document and the conditions under which the staff would review a DOE document derived from an expert elicitation. There was also a question about how to handle elicitations on the same subject by different groups that are submitted to the licensing board. Mr. Lee noted that 10 CFR Part 60 requires evaluation of different conceptual models and that the staff believes this evaluation will help in the licensing decision. Dr. Garrick asked about examples of the process or a pilot program to test it. He noted that as there are ongoing efforts for the PVHA and the probabilistic seismic hazard assessment (PSHA), could these or other examples serve as guides on to how to conduct the proposed process? There also was a question to the staff about how it will determine if the process is a good one? One answer was that the process would have to be tested in the legal system. Aaron DeWispelare, CNWRA, noted that the BTP process is accepted by the scientific community and is generally viewed as a good process. Dr. Garrick also raised a question about when elicitations have produced bad or useless results, e.g., one conducted for the Waste Isolation Pilot Project on human intrusions and future societies. He asked if the staff would provide such guidance. Dr. Austin noted that such guidance would have to be developed through reviews and interactions with DOE rather than in the BTP. The goal would be to identify areas in which unbounded speculation precludes the use of expert elicitation. Dr. Hinze asked about whether the staff had provided clear guidance on when expert elicitation was needed as discussed in SCA Comment #3. The staff believed that questions asked in 1989 would not necessarily be the same today, given programmatic and budgetary changes, and therefore, it is trying to determine what is and what is not important now. Two areas the staff hopes to see resolved without expert elicitation are human intrusion and infiltration. Dr. Eisenberg believed that there was no inconsistency between the resolution of SCA Comment #3 and the NWTRB's third question concerning when the NRC might reject an elicitation on the basis of an unacceptable methodology. He noted that they would accept it for review but would not necessarily accept the results of such an elicitation.

Dr. Abe Van Luik, DOE, noted that there are problems with the staff's being too prescriptive and too proscriptive. He discussed, as examples, elicitations being developed by DOE that might not be possible if the guidance were too proscriptive. He provided an overview of five elicitations that

the DOE hopes to conduct over the next 2 years. These elicitation will be conducted with the goal of establishing what the uncertainty bounds are in the process-level models and how they will be incorporated into PA. The goal is to reduce the uncertainty in the process-level models. These will be of limited scope but will follow the BTP guidance. The first will be an elicitation on the unsaturated zone flow model, which will have six subissue areas to address. All of the elicitation will provide support to total system performance assessment-viability assessment (TSPA-VA). The experts will be a mixed group from both inside and outside the DOE program. He noted that these elicitation will be somewhat different from those for PVHA and PSHA, and it was important to have the flexibility to conduct them because they will be an important part of the TSPA-VA. There was some final discussion about the acceptability of elicitation conducted in accord with the guidance and under what conditions the staff might reject an elicitation.

IV. Meeting with the Acting Director, NRC's Division of Waste Management, Office of Nuclear Material Safety and Safeguards (Open)

[Note: Mr. Howard J. Larson was the Designated Federal Official for this portion of the meeting].

After briefing the Committee on the status of the currently proposed congressional appropriation and authorization legislation, Ms. Margaret Federline, Acting Director, Division of Waste Management, then noted that the Environmental Protection Agency (EPA) had not yet submitted the proposed Yucca Mountain-specific HLW standard to the Office of Management and Budget. The reason for this delay was uncertain, as is the impact of this delay upon the eventual issuance of the standard. It was surmised that perhaps EPA was awaiting for Congress to resolve the current legislative proposals, all of which have provisions relevant to the standard.

Ms. Federline also described the current status of the DOE Yucca Mountain program, indicating that Phase 1 of the study, a comprehensive updated strategy, is scheduled for completion this calendar year. Phase 2, which is to describe in some detail the proposed tests and their

relationship to the hypotheses and to the elements of the strategy, is due to be completed during fiscal year 1997. She noted that the staff would not be ready to discuss its comments on DOE's waste isolation policy until the Phase 1 document has been issued and reviewed.

Insofar as DOE's progress at Yucca Mountain is concerned, although the tunnel-boring machine was some ~6200 meters into the tunnel, it was now in Category 3 ground, which was slowing forward progress. NRC is concentrating on the T-M experiment in alcove 5. The first experiment will be a single-element heater test, which is to begin on August 26, 1996 (with heating to continue for a 9-month period). She noted that this test will be more or less a prototype for the drift-scale heater test, which is scheduled to start in October 1997. This latter test is for 2 years and will be followed by a 2-year cooldown period. The first early progress report is due in February 1998. The staff has yet to see the detailed test design and analysis document and is concerned about the plan to use an accelerated heating process up to 400 degrees. According to its current long-range plan, DOE is planning on an east-west drift (similar to that proposed by the NWTRB). However, DOE's current long-range plan does not pursue further characterization of Calico Hills.

Ms. Federline indicated that the KTI annual report is due to be completed by October 30, 1996. A relevant Commission paper describing the staff's progress in the program will be prepared, and the staff is considering holding a public workshop. She noted the belief that while the KTI vertical integration is fairly good, horizontal integration is still not up to par. To correct this situation, a technical integration task force has been put in place. The staff intends to also describe this activity in the KTI annual report. In response to a question, she noted that the staff believes that DOE's hypotheses (as noted in Table 1 of the July 1996 draft Waste Containment and Isolation Strategy) are encompassed in the NRC's KTIs.

The Commission has approved publication of the draft BTP on PA. Public comment is being sought on several topics; questions are being prepared.

The Committee thanked Ms. Federline for her presentation, and also particularly noted the most excellent presentations made by the NMSS staff in the coupled processes workshop held the previous day.

V. Time of Compliance in Low-Level Waste Disposal (Open)

[Note: Dr. Andrew C. Campbell was the Designated Federal Official for this portion of the meeting.]

Dr. Pomeroy stated that the purpose of this session was to review and evaluate technical and policy issues in specifying a compliance period for 10 CFR Part 61. He noted that the time period for conducting PA calculations to demonstrate compliance with the regulations is a key issue in licensing an LLW disposal facility. The performance objectives for an LLW disposal facility are specified in 10 CFR Part 61. Section 61.41 limits the dose that may be received by members of the general public to 25/75/25 mrem. A PA is required in 10 CFR 61.13(a) to demonstrate compliance with the 10 CFR 61.41 performance objectives. LLW PAs are an essential component of the licensing process to provide reasonable assurance that the performance objectives are met and that the public health and safety and the environment are protected.

Dr. Paul Merges, Chief, Bureau of Pesticides and Radiation, New York State Department of Environmental Conservation (NY DEC), discussed some of the activities of the department.

Dr. Merges also heads the Conference of Radiation Control Program Director's Radioactive Waste Management Committee--the E5 Committee. He is also on EPA's Science Advisory Board, Radiation Advisory Committee.

Dr. Merges described the responsibilities of NY DEC in the area of radioactive waste, which includes licensing. In 1986, the New York State Low-Level Radioactive Waste Management Act was signed into law, and the NY DEC was tasked with promulgating regulations for LLW. It developed criteria to be followed by the NY State Low Level Radioactive Waste Siting Commission, which is now disbanded. It also developed regulations for design, construction, operations, site

safety, monitoring, permitting and manifesting transportation, and providing for financial assurance of LLW disposal facilities. In January 1993, New York State issued regulations for LLW disposal facilities--New York Code of Rules and Regulations (NYCRR), Part 383. The regulation provides specifically for PA analyses in Part 383-4. The regulation specifies that the time period of the analysis should be 10,000 years, unless a shorter period can be justified. The regulation also requires that the performance objectives be met with reasonable assurance and that the doses be as low as reasonably achievable (ALARA). The NRC approved NYCRR 383 in June 1992 as compatible with NRC regulations, with a caveat concerning disposal requirements for deep mine cavities. The NY regulations for deep mine disposal were the first regulations of this type in the country.

Dr. Merges said that the time of analyses for demonstrating compliance is set as 10,000 years in the NY regulations for several reasons. One, there are long half-life radionuclides in the inventory. Two, NY DEC wanted to ensure that radioactive progeny were adequately addressed. And three, the calculated peak doses in NY DEC rulemaking analyses typically occurred at 1,000 to 2,000 years after closure. Because the state of New York prohibits shallow land burial, concrete vaults were evaluated in the regulatory analysis. Dr. Merges described the different failure scenarios used for above-ground and below-ground vaults. NY DEC also evaluated performance in four different geologic regimes representative of the State's geology. The time of peak dose was primarily a function of roof failure scenarios. He noted that a peak dose can readily slip beyond 1,000 years with a longer performance of the vault roof. He also noted that the frequency of glacial cycling in New York State is about every 20,000 years and that the last period of glaciation in NY was about 10,000 years ago. He also noted that experience at the West Valley site indicated that NY DEC needs to address erosion rates at any future LLW site in NY. NY DEC chose not to go beyond 10,000 years because it believed that if this time period was adequate for the HLW regulations, it should also be good for LLW regulations. He described the model and computer code used in the regulatory analysis. The State used the COSMOS-3, SYVAC-3 PA model prepared for NY by Atomic Energy of Canada Limited (AECL). NY DEC used the GENII dose code for the intruder analyses. He showed Figure 4.1 from the Generic Environmental Impact

Statement, Section 4.5, and noted that some of the scenarios analyzed did not meet the dose standard. The figure shows a ^{129}I peak dose at around 1,500 years. He added that a cutoff at 1,000 years or less would miss the maximum dose to the public and would reduce the total ^{129}I dose by one-third.

Dr. Steindler asked about the source term and whether it contained much uranium. Dr. Merges said that NY DEC performed an analysis based upon disposal of waste at the Barnwell LLW site and that he was sure there was some uranium in it. Dr. Hinze asked about the choice of 10,000 years and inquired about its basis. Dr. Merges indicated that NY DEC had a significant philosophical discussion on it and that it was a policy issue as well as a technical issue. He noted that 10,000 years is longer than human history. He also said that NY DEC was surprised when it performed the analyses to find the peak doses out around 1,500 years and was then glad it had gone out that far. Dr. Hinze asked whether NY DEC was concerned with uncertainty at the long time frames. Dr. Merges noted that the whole area of PA is fraught with uncertainty. He added that PA is a useful tool for estimating the maximum dose to the critical receptor and that PA is a valuable tool for conducting sensitivity analyses. NY DEC analyses showed that container degradation over time could cause a buildup of readily mobile radionuclides in the vault such that when the roof fails, a pulse of radionuclides could be released. Because of this possibility, NY DEC considered vault designs that would preclude catastrophic roof failures. NY DEC also decided that the PA should be updated periodically during operations to allow for the better inventory numbers and to determine what the limits on inventory should be. Dr. Hinze asked what the basis was for the roof failure functions. Dr. Merges noted that in NY, freeze/thaw cycling is of major importance and that NY DEC attempted to account for that in their analyses of above-ground and below-ground vaults. He also noted that for the mobile, long-lived radionuclides, it does not matter whether the vault roof fails at 3,000 years or 500 years because whenever it does fail, the radionuclides will be released. He believed that the release times that were selected were conservative. Dr. Merges was asked about the role of PA in site selection, and the uncertainties in the peak dose value. He said that the state of New York used the performance objectives as specified in 10 CFR Part 61, rather than lower limits as was done in some other states. He also

said that the single, biggest uncertainty in the time of peak dose was the roof failure scenario. He noted that deep mine cavity disposal had much lower calculated doses and was clearly superior to near-surface disposal over long time frames. In response to a question, he said that NY DEC had not taken into account a drop in the erosion baseline if the sea level drops.

Dr. Garrick asked about the magnitude of the New York PA effort. Dr. Merges responded by describing the process for developing the PA, which was done by AECL for New York. He noted some problems were discovered with earlier versions of the COSMOS code in 1987, but these had been resolved by 1991, when the regulations were being developed. He also gave to the Committee the two-volume Generic Environmental Impact Statement that provided the technical basis for the regulation. Dr. Garrick asked about the degree of site specificity in the analyses. Dr. Merges provided a description of the models, scenarios, and regions of New York considered in the analyses. He noted that although the model sites were generic, NY DEC wanted to have enough realism built in that the regulations would not rule out the entire state of New York from siting consideration. He also noted that 10 CFR Part 61 and NYCRR Part 383 are performance-based regulations. This leaves the design and the means to achieve compliance up to the applicant, rather than prescribing every detail of the facility, such as is done for hazardous waste disposal.

Dr. Pomeroy asked whether the NRC provided any assistance. Dr. Merges described the process for letting the contract with AECL to do the work. Although NY DEC used NRC documents and guidance, it did not have any specific help in its efforts. Dr. Merges also described some of the problems that were encountered in trying to find a suitable site in New York State. In response to a question, Dr. Merges said that NY DEC never received an application for mined disposal. The applicant was considering shale rather than salt formations. In the State's analysis, NY DEC assumed that the mine flooded after closure. Dr. Merges said that he was glad NY DEC made that assumption, even though it was criticized for it by the siting commission, since the recent flooding of a salt mine in western New York confirmed this as a reasonable failure scenario.

Mr. Joseph Klinger, state of Illinois, who is in charge of licensing at the Illinois Department of Nuclear Safety (IDNS), was accompanied by Gordon Appel, Deputy Director of IDNS, and Tom Ortziger, Director of IDNS. Mr. Klinger described the IDNS experience in the licensing activities and the Illinois Siting Commission's review of the proposed LLW disposal facility in Martinsville, Illinois. He said that two specific issues for a timeframe involve the requirement for an intruder barrier for Class C waste that will last 500 years and the requirement that site characterization should be considered in terms of the indefinite future and evaluated for at least 500 years. He said that Illinois Code 32, Illinois Admin. Code 601, and NRC's equivalent rules, 10 CFR Part 61, do not explicitly express a regulatory compliance period for a low-level radioactive waste facility. He said that IDNS believes that there is no need to change this circumstance. He also said that the principal performance objective regarding protection of the general population from releases of radioactivity does not demand such an evaluation.

Mr. Klinger said that trying to credibly predict radiation doses to theoretical populations in light of the complex variables involved in projecting performance over a 500-year period was pushing the technical credibility envelope. He noted that the IDNS licensing effort ended in October 1992, when the siting commission found the Martinsville site unacceptable. He discussed the recent National Academy of Sciences (NAS) Report, "Technical Bases for Yucca Mountain Standards," and its statement that there was no justification for even the 10,000 years or any time period, but the site should be evaluated to peak risk, which for an HLW repository may be on the order of a million years. He said that given all the uncertainties involved, it does not believe the performance of the site can be accurately predicted over such long time periods as 50,000 to 1 million years.

Mr. Klinger noted that the sensitivity of a single parameter can change the result by large amounts. He said that IDNS believes that a 500-year timeframe is adequate for making and defending a credible PA for a low-level radioactive waste disposal facility. Mr. Klinger also stated that PAs could not have accurately predicted the performance of existing disposal facilities over the past 20 to 50 years and, therefore, he did not believe such predictions could be performed over thousands of years. He said that developing a time of compliance for LLW disposal will not help license such

facilities. Mr. Klinger said that specifying a time of compliance will add to public skepticism, which may extend to other portions of 10 CFR Part 61, and thus would challenge the entire effort to site new LLW disposal facilities.

Mr. Klinger also noted that LLW facility designs were developed that incorporated various EBSs to enhance public safety but that subsequently these designs were criticized because how the system components interact in terms of effectiveness, durability, and longevity was not understood. He said a similar problem might occur if a time of compliance were specified. Mr. Klinger also said that the PA analyses made over long timeframes are not believed by the public. Although disposal systems are not designed to fail, there will always be a limited understanding of the long-term performance of these systems. He discussed alternative concepts to disposal that are being proposed. Mr. Klinger also discussed the ACNW letter of July 26, 1996, on an adequate LLW program.

The Committee asked Mr. Klinger if the 500-year period was based on limited understanding of human behavior or of the natural setting. He replied that the 500-year period was based on both, and that IDNS believed that 500 years was all it could defend. Dr. Garrick noted that many earth scientists believe that the natural setting is sufficiently well understood to extend analyses past a few hundred years to a few thousand years and that there is merit in pushing beyond the 500-year type of timeframe. Mr. Klinger responded that IDNS had considered that and noted that the analyses for long-lived radionuclides could be made for longer periods but that decisions should not be based upon those analyses. Dr. Hinze asked if the analyses went to peak dose. Mr. Klinger responded that IDNS performed the calculation but based its licensing decision on the result at 500 years. There also was a question about the inventory. Gordon Appel discussed the development of the inventory from historical disposal records but added that there were a number of uncertainties because of future changes in generators, such as the status of the uranium enrichment facilities in Kentucky. There are also uncertainties with regard to the amount of ¹²⁹I in the waste, and Mr. Appel discussed some of the efforts to resolve this issue. In response to a question, Mr. Appel discussed what he considered to be the major sources of uncertainty beyond

500 years, including the sorption parameter and human behavior in the future. There was a question about whether the existing regulations were adequate to protect public safety. Mr. Appel said that the current regulations are more rigorous than those in place when older sites in Illinois were in operation, and both sites show only small releases of tritium and ^{14}C that are well below the current regulatory limits. Therefore, he believed that the current regulations are adequate. There was also a discussion of the relative uncertainty at different timeframes and the form of the increasing uncertainty function with increasing time.

Tom Ortziger presented a discussion of the revised siting process being developed in Illinois. He discussed some of the legislation that was passed, which resulted in the creation of a task group in 1993-94. He said that the new 28-point siting criteria will be issued in November 1996. There will be a 60-day volunteer period in which municipalities, governmental entities, or private citizens can volunteer a 640-acre or larger site. The Illinois geologic and water surveys will screen those sites and, additionally, will begin to select up to 10 larger sites. These sites will be evaluated, giving preference to the volunteer sites. Three discrete 640-acre sites will be presented to the task group. If there are no volunteer sites, the State will select three sites that can be defended as still meeting the criteria that have been established. He also described the nature of the site characterization activities to confirm that the sites meet the screening criteria. He discussed the specific role of IDNS once a site is selected.

Representatives of the National Academy of Public Administration (NAPA), Mr. Harold B. Finger, fellow at NAPA and panel chair, and Mr. Chris Wye, director of the program on improving Government performance at NAPA gave a presentation on a study they conducted: "Deciding for the Future: Balancing Risks, Costs, and Benefits Fairly Across Generations." Mr. Finger discussed the goals of the study, which was commissioned by DOE. DOE requested that NAPA help to define the elements of a decisionmaking process that considers the needs of present and future generations in allocating the required resources. Mr. Finger also described NAPA, its charter by Congress, how it functions through a group of appointed fellows, and the kinds of issues that NAPA addresses. He also pointed out the make up of the panel, which was provided to the Committee.

DOE's original request to NAPA was directed toward identifying some rigorous measure, such as economic discounting, that would help to allocate appropriate costs to achieve certain benefits in its cleanup activities.

The NAPA group conducted a comprehensive review of literature in the field, which revealed two main themes. One theme is that the literature supports the idea that we have an obligation to future generations and this involves a sense of justice. The second theme is that economic discounting, the tool frequently used by economists to make tradeoffs between the present and the future, is not valid for making tradeoffs with the very far future that is involved in the kind of issues DOE is addressing. Because the present value of future net benefits declines exponentially with time, the entire GNP of the earth could essentially be discounted in a hundred years. In addition, Mr. Finger said that there is no way to arrive at acceptable social discount rates when inter-generational comparisons are made involving the lives and health of distant future unborn children and their environments. He said that NAPA considered what values, guidelines, or principles were needed to provide overall guidance and decisionmaking in this area. This consideration led to Phase 2 of the project, which involved an intense 3-day workshop with more than 40 participants from many different backgrounds, interests, and areas of expertise. He described the process followed by the panelists to produce a set of draft principles. In Phase 3, the project reunited and combined the draft principles into the following four major principles:

- Trustee principle -- every generation has obligations as a trustee for the interests of future generations.
- Sustainability principle -- no generation should deprive future generations of the opportunity for a quality of life comparable to its own.
- Chain of obligation principle -- each generation's primary obligation is to provide for the needs of the living and next succeeding generations.

- Precautionary principle -- actions that pose a realistic threat of irreversible harm, or catastrophic consequences, simply should not be pursued unless there is some overwhelming requirement to do that.

He said that, in general, the group talked about three generations or four generations. He noted that this was very little time compared to the time previously discussed by New York, Illinois, and the ACNW. He said that the only place in which the panel sees the trusteeship principle incorporated into Federal law is in the 1969 National Environmental Policy Act. He further said that the panel concluded that each generation has a responsibility to examine earlier decisions to determine whether they are still valid or whether they have to be modified for the future. He referred to this as the "rolling presence" concept. This concept involves an ongoing, continual review for the life of the potential hazard. He explained that the sustainability principle was directed at issues such as providing alternatives for nonrenewable resources that are consumed by the present generation. The chain of obligation principle is key to understanding the "rolling presence" concept.

Mr. Wye added that, in terms of allocating limited resources, the panel believed these principles were very important. The panel concluded that the kinds of long timeframes being discussed in waste disposal were not conceivable from a public administration standpoint. He said that the panel was thinking in terms of only 100 years. He also discussed the dichotomy between scientific understanding, which may extend over long timeframes, and public administration goals of making decisions about allocating resources, which must be done on much more limited time scales. From this latter perspective, there is a need to periodically review decisions and modify them if necessary.

Dr. Hinze asked why there was such a large discrepancy between the "intergenerational equity concepts" espoused in waste disposal literature, which extend over long time periods, and the very limited timeframes that the NAPA panel was talking about. Mr. Finger discussed the difference

between rigorous knowledge of the future, such as radioactive decay, and the public decision-making process. He noted that the uncertainty lies in ensuring public confidence in the decisions that are made. He added that a fundamental part of the process is the need for public involvement throughout the process. He noted that a great deal of the problem faced by DOE is the past practice of making decisions internally and then going to the public with them. The only way to regain confidence is to obtain stakeholder and public involvement as an intrinsic part of the decisionmaking process.

Dr. Garrick discussed the distinction between waste management and waste disposal and expressed his preference to move toward management. Mr. Finger noted that it is important to be able to revisit a decision when new information becomes available or if the facility does not perform as expected. He also added that the literature review by NAPA found that the concept of intergenerational equity generally focused on the next few generations, not extremely long time frames. Dr. Steindler asked whether people would follow the principles and also whether different cultural groups might come up with a different set of principles. Mr. Finger replied that specific decisions will have to be made in each case and that this process requires public involvement. He added that the concept of continual evaluation is essential to being able to make decisions.

Mr. Wye addressed the cross-cultural issue and said that the panel included many philosophical extremes but was able to come to a consensus in the end. He thought that a similar process might occur in a cross-cultural setting. He added that the fundamental concept by which people resolve differences of opinion in the United States is the democratic process, which is a political process, not a scientific process, even though it includes science and other input. Dr. Garrick discussed the need to evaluate the whole perspective of risk and not just the risk of a single action out of the context of the alternatives to the action and the associated risks. Dr. Steindler commented that if a regulation were written in 1810, it might look the same as it does now, but if a set of principles was developed in 1810 in the way in which the NAPA panel worked, he thought that it would be quite different.

VI. Executive Session (Open)

[Note: Mr. Richard K. Major was the Designated Federal Official for this part of the meeting.]

A. Report

Comments on the Final Draft Branch Technical Position on the Use of Expert Elicitation in the High-Level Radioactive Waste Program (Report to Chairman Shirley Ann Jackson, NRC, from Paul W. Pomeroy, ACNW Chairman, dated August 30, 1996).

B. Future Meeting Agenda

Appendix IV summarizes the proposed items endorsed by the Committee for the 86th ACNW Meeting, Las Vegas, Nevada, September 24-27, 1996.

The meeting was adjourned at 4:00 p.m., Friday, August 23, 1996.

than 15 days prior to the date of the meeting.

Dated: July 2, 1996.

Alan M. Ludwig,

Acting Advisory Committee Management
Officer, National Aeronautics and Space
Administration.

[FR Doc. 96-17442 Filed 7-9-96; 9:45 am]

BILLING CODE 7510-01-M

NUCLEAR REGULATORY COMMISSION

Advisory Committee on Nuclear Waste; Notice of Meeting

The Advisory Committee on Nuclear Waste (ACNW) will hold its 85th meeting on August 21-23, 1996, Room T-2B3, at 11545 Rockville Pike, Rockville, Maryland. The date of this meeting was previously published in the Federal Register on Wednesday, December 6, 1995 (60 FR 62485).

The entire meeting will be open to public attendance.

The agenda for this meeting shall be as follows:

Wednesday, August 21, 1996—8:30 a.m. until 6:00 p.m.

Thursday, August 22, 1996—8:30 a.m. until 6:00 p.m.

*Friday, August 23, 1996—8:30 a.m. until 4:00 p.m.

During this meeting, the Committee plans to consider the following:

A. Thermal-Mechanical-Hydrological-Chemical Coupled Processes—The Committee will devote an entire day to a study of the Department of Energy and NRC staff plans to develop and use coupled process models in evaluating various aspects of repository performance. The Committee will investigate how thermal input to the host rock and ground water system will effect the hydrolic, mechanical, and chemical characteristics and processes of the geologic systems.

B. Meeting with the Director, NRC's Division of Waste Management, Office of Nuclear Materials Safety and Safeguards—The Director will discuss items of current interest related to the Division of Waste Management programs which may include: progress at the Yucca Mountain site, the status of EPA's Yucca Mountain standards and NRC's high-level waste regulations, and the status of a branch technical position on low-level waste performance assessment.

C. Preparation of ACNW Reports—The Committee will discuss proposed reports, including: specifying a critical group and reference biosphere to be used in a performance assessment of a nuclear waste disposal facility, the

consideration of coupled processes (Thermal-Mechanical-Hydrological-Chemical) in the design of a high-level waste repository, and comments on a Branch Technical Position on the use of Expert Elicitation.

D. Technical Guidance on Expert Elicitation—The Committee will review the NRC staff's draft technical position on the use of expert elicitation in the licensing of a nuclear waste disposal facility.

E. Time of Compliance in Low-Level Waste Disposal—The Committee will discuss options for setting a regulatory time of compliance for a low-level waste disposal facility. Participation by representatives of individual states is anticipated.

F. Committee Activities/Future Agenda—The Committee will consider topics proposed for future consideration by the full Committee and Working Groups. The Committee will discuss ACNW-related activities of individual members.

G. Miscellaneous—The Committee will discuss miscellaneous matters related to the conduct of Committee activities and organizational activities and complete discussion of matters and specific issues that were not completed during previous meetings, as time and availability of information permit.

Procedures for the conduct of and participation in ACNW meetings were published in the Federal Register on September 27, 1995 (60 FR 49924). In accordance with these procedures, oral or written statements may be presented by members of the public, electronic recordings will be permitted only during those portions of the meeting that are open to the public, and questions may be asked only by members of the Committee, its consultants, and staff. Persons desiring to make oral statements should notify the Chief, Nuclear Waste Branch, Mr. Richard K. Major, as far in advance as practicable so that appropriate arrangements can be made to allow the necessary time during the meeting for such statements. Use of still, motion picture, and television cameras during this meeting may be limited to selected portions of the meeting as determined by the ACNW Chairman. Information regarding the time to be set aside for this purpose may be obtained by contacting the Chief, Nuclear Waste Branch prior to the meeting. In view of the possibility that the schedule for ACNW meetings may be adjusted by the Chairman as necessary to facilitate the conduct of the meeting, persons planning to attend should check with Mr. Major if such rescheduling would result in major inconvenience.

Further information regarding topics to be discussed, whether the meeting has been cancelled or rescheduled, the Chairman's ruling on requests for the opportunity to present oral statements and the time allotted therefor can be obtained by contacting Mr. Richard K. Major, Chief, Nuclear Waste Branch (telephone 301/415-7366), between 8:00 a.m. and 5:00 p.m. EDT.

ACNW meeting notices, meeting transcripts, and letter reports are now available on FedWorld from the "NRC MAIN MENU." Direct Dial Access number to FedWorld is (800) 303-9672; the local direct dial number is 703-321-3339.

Dated: July 3, 1996.

Andrew L. Bates,

Advisory Committee Management Office.

[FR Doc. 96-17552 Filed 7-9-96; 8:45 am]

BILLING CODE 7500-01-P

RAILROAD RETIREMENT BOARD

Sunshine Act Meeting

Notice is hereby given that the Railroad Retirement Board will hold a meeting on July 17, 1996, 9:00 a.m., at the Board's meeting room on the 8th floor of its headquarters building, 844 North Rush Street, Chicago, Illinois, 60611. The agenda for this meeting follows:

(1) Draft Legislation to Enhance Debt Collection Efforts: Section 12(o) Lien Authority.

(2) Legislative Program for Fiscal Year 1996.

(3) Administrative Circular REF(IRM)-1. Custom Tailored Information Services.

(4) Coverage Determinations:

A. WCL Railcars, Inc.

B. Contract Rail Service Company.

(5) Regulations—Part 211, Pay for Time Lost.

(6) Medicare Part B Services (Contract No. 92RRB006) and Update on Status Of Medicare Transaction System (MTS) and Of Meetings with MetraHealth and Health Care Financing Administration (HCFA).

(7) Labor Member Truth in Budgeting Status Report.

The entire meeting will be open to the public. The person to contact for more information is Beatrice Ezerski, Secretary to the Board, Phone No. 312-751-4920.

Dated: July 5, 1996.

Beatrice Ezerski,

Secretary to the Board.

[FR Doc. 96-17642 Filed 7-6-96; 9:03 am]

BILLING CODE 7900-01-M



UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20555

Rev. 3 August 20, 1996

SCHEDULE AND OUTLINE FOR DISCUSSION
85TH ACNW MEETING
AUGUST 21-23, 1996

Wednesday, August 21, 1996, Two White Flint North, Room T-2B3,
11545 Rockville Pike, Rockville, Maryland

- | | |
|---|--|
| 1) 8:30 ⁵ - 8:36 ⁴⁰ A.M. | {
<u>Opening Remarks by the ACNW Chairman</u>
(Open)
1.1) Opening Statement (PWP/RKM)
1.2) Items of Current Interest (PWP/RKM) |
| 2) 8:36 ⁴⁰ - 5:00 P.M. | |
| 8:36 ⁴⁰ - 8:45 ⁵⁰ A.M. | {
<u>Coupled (Thermal Mechanical Hydrologic
Chemical) Processes</u> (Open) (WJH/VCB)
2.1) Introductory Remarks by W. J. Hinze
2.2) Coupled Processes and the NRC
Issues - N. Eisenberg (NRC) and B.
Sagar (CNWRA)
2.3) Results of the 1993 Literature
Review - R. Manteufel (CNWRA) |
| 8:45 ⁵⁰ - 9:30 ⁴⁵ A.M. | |
| 9:30 ⁴⁵ - 10:00 ¹⁰ A.M. | |
| 10:00 ¹⁰ - 10:15 ²⁵ A.M. | * * * BREAK * * * |
| 10:15 ²⁵ - 10:45 ^{11:10} A.M. | {
2.4) Thermal-Hydrologic Coupling - Ron
Green (CNWRA) and J. Pohle (NRC)
2.5) Thermal-Hydrologic-Chemical
Coupling - P. Lichtner (CNWRA) and
B. Leslie (NRC)
2.6) Summary of Morning Presentations -
ACNW |
| 10:45 ^{11:10} - 11:15 ⁵⁰ A.M. | |
| 11:15 - 11:45 A.M. | |
| 11:45 ⁵⁰ - 12:45 ⁵⁶ P.M. | * * * LUNCH * * * |
| 12:45 ⁵⁵ - 1:15 ³⁰ P.M. | {
2.7) Thermal-Mechanical Coupling - M.
Ahola (CNWRA) and M. Nataraja (NRC)
2.8) Coupled Processes in Performance
Assessment - R. Wescott (NRC)
2.9) Summary NRC/CNWRA presentations |
| 1:15 ³⁰ - 1:45 ^{2:30} P.M. | |
| 1:45 - 2:00 P.M. | |
| 2:00 ³⁰ - 2:15 ⁴⁰ P.M. | * * * BREAK * * * |
| 2:15 ⁴⁰ - 3:15 ⁴⁷ P.M. | {
2.10) DECOVALEX - C. F. Tsang (LBL)
2.11) Consultants -
S. Ingebritsen (USGS)
D. Elsworth (Penn. State Univ.)
2.12) Discussion and wrap-up |
| 3:15 ⁴⁷ - 4:00 ⁵⁰ P.M. | |
| 4:00 ⁵⁰ - 5:00 P.M. | |

[TRANSCRIBED PORTIONS OF THE MEETING]

5:00 P.M.

* * * RECESS * * *

Thursday, August 22, 1996, Two White Flint North, Room T-2B3,
11545 Rockville Pike, Rockville, Maryland

3) 8:30⁵ - 10:20^{10:20} A.M.

Technical Guidance on Expert Elicitation
 (PWP/ACC) (Open)

The Committee will review the NRC staff's draft technical position on the use of expert elicitation in the licensing process

- 3.1) Staff presentation including response to public comments
- 3.2) Roundtable discussion
- 3.3) Elements on an ACNW report

10:15²⁰ - 10:30⁵⁰ A.M.
 10:30²⁰ - 11:25⁵⁰ A.M.
 11:25²⁰ - 11:30⁵⁰ A.M.
 4) 11:30²⁷ - 12:30¹⁵ P.M.

* * * BREAK * * *
ACNW REPORTS - HIGH LEVEL WASTE
PRAIRIE ISLAND TRIBAL INDIAN COMMUNITY
Meeting with the Director, NRC's
Division of Waste Management, Office of
Nuclear Material Safety and Safeguards
 (Open) (PWP/HJL)

- 4.1) Progress at Yucca Mountain
- 4.2) Status of EPA High-Level Stds.
- 4.3) Status of the BTP on Low-Level Waste PA

12:30¹⁵ - 1:15 P.M.

Lunch on the Table (Open)
 - ACRS/ACNW Video Teleconferencing Capability
 - ACRS/ACNW Home Page
 - Use of Government Credit Cards

5) 1:15 - 3:25^{3:25} P.M.

Time of Compliance in Low-Level Waste Disposal (Open) (WJH/ACC)

Discuss options for setting a regulatory time of compliance for a low-level waste disposal facility. Meet with representatives from various states

3:25^{3:25} - 3:40^{3:40} P.M.

* * * BREAK * * *

6) 3:40^{3:40} - 5:00^{5:00} P.M.

Preparation of ACNW Reports (Open)

Discuss possible reports on the following topics:

- 6.1) Critical Group and Reference Biosphere (PWP/HJL)
- 6.2) Time of Compliance in Low-Level Waste Disposal (WJH/ACC)
- 6.3) Program Plan & Waste Isolation Strategy (BJG/HJL)

- 6.4) HLW Time of Compliance Road Map (NJH/ACC)
- 6.5) Franch Technical Position on Expert Elicitation (PWP/BJG/ACC)
- 6.6) TMHC Coupled Processes (WJH/VCB)

7) ⁰⁰5:30 - ⁰⁰6:45 P.M.

Committee Activities/Future Agenda

(Open) (PWP/RKM)

- 7.1) Set agenda for 85th ACNW, September 25-27, 1996
- 7.2) Review Items for the Out Months
- 7.3) Future Working Group Topics/Dates
- 7.4) Future Outside Meetings Members may attend
- 7.5) Reconcile EDO Responses to Committee Reports
- 7.6) Discussion of options for possible ACNW retreat

⁰⁰6:45 P.M.

* * * RECESS * * *

Friday, August 23, 1996, Two White Flint North, Room T-2B3, 11545 Rockville Pike, Rockville, Maryland

8) ⁵⁰8:30 - ⁵⁰10:30 A.M.

ACNW Task Action Plans (Open)
(ACNW Members/ACNW staff)

The Committee will discuss priority issues it will consider in the future and action plans for accomplishing these reviews initiated by the ACNW

- 8.1) Radionuclide Transport
- 8.2) Igneous Activity
- 8.3) Regulatory Framework
- 8.4) Risk-Based Regulation
- 8.5) Role of ACNW in Decommissioning
- 8.6) Negligible Incremental Risk Level
- 8.7) Use of Expert Judgment in the HLW Program

⁵⁰10:30 - ^{11:00}10:45 A.M.

* * * BREAK * * *

9) ^{11:00}10:45 - ⁴⁵12:15 P.M.

Continue Preparation of ACNW Reports
(Open)

⁴⁵12:15 - 1:00 P.M.

* * * LUNCH * * *

10) ~~1:00 - 2:00 P.M.~~ Report on Outside Meetings Attended by Members and Staff (Open)

- DOE/NRC Technical Exchange on TSPA 95, ESF/Amargosa Valley Visit
- NWTRB Meeting on Hydrology
- Others

11) ^{1:00}~~2:00~~ - 4:00 P.M. Continue Preparation of ACNW Reports
(Open)

4:00

ADJOURN

- Presentation time should not exceed 50 percent of the total time allocated for a specific item. The remaining 50 percent of the time is reserved for discussion.
- Number of slides/copies of the presentation materials to be provided to the ACNW - 35

APPENDIX III: MEETING ATTENDEES

85TH ACNW MEETING August 21-23, 1996

ACNW MEMBERS

	<u>1st Day</u>	<u>2nd Day</u>	<u>3rd Day</u>
Dr. Paul W. Pomeroy	<u>X</u>	<u>X</u>	<u>X</u>
Dr. William J. Hinze	<u>X</u>	<u>X</u>	<u>X</u>
Dr. B. John Garrick	<u>X</u>	<u>X</u>	<u>X</u>

ACNW Invited Experts:

M. Steindler, D. Elsworth (1st day only), S. Ingenbritsen (1st day only)

ACNW STAFF

	<u>1st Day</u>	<u>2nd Day</u>	<u>3rd Day</u>
Dr. Andrew Campbell	<u>X</u>	<u>X</u>	<u>X</u>
Ms. Virginia Colten-Bradley	<u>X</u>	<u>X</u>	<u>X</u>
Ms. Lynn Deering	<u>X</u>	<u> </u>	<u> </u>
Mr. Howard J. Larson	<u>X</u>	<u>X</u>	<u>X</u>
Mr. Richard K. Major	<u>X</u>	<u>X</u>	<u>X</u>
Dr. John T. Larkins	<u>X</u>	<u>X</u>	<u>X</u>
Dr. Richard P. Savio	<u>X</u>	<u>X</u>	<u>X</u>
Ms. Roxanne Summers	<u>X</u>	<u>X</u>	<u>X</u>

ATTENDEES FROM THE NUCLEAR REGULATORY COMMISSION

August 21, 1996

B. Leslie	NMSS
C. Lui	NMSS
K. Chang	NMSS
N. Eisenberg	NMSS
M. Nataraja	NMSS
B. Jagannath	NMSS
R. Wescott	NMSS
J. Austin	NMSS
S. Wastler	NMSS
P. Justus	NMSS
J. Thoma	NMSS
J. Firth	NMSS
R. Johnson	NMSS
R. Codell	NMSS
J. Pohle	NMSS

August 22, 1996

N. Eisenberg	NMSS
M. Lee	NMSS
B. Ibrahim	NMSS
J. Austin	NMSS
R. Johnson	NMSS
J. Thoma	NMSS
C. Lui	NMSS
S. Wastler	NMSS
M. Nataraja	NMSS
B. Leslie	NMSS
S. Salomon	OSP
e. O'Donnell	RES
J. Davis	NMSS
P. Reed	RES
J. Firth	NMSS

August 23, 1996

C. Lui	NMSS
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ATTENDEES FROM OTHER AGENCIES AND GENERAL PUBLIC (CONT'D)

August 21, 1996

R. Wallace, Jr.	USGS
J. Russell	CNWRA
S. Ingebritsen	USGS
W. Matyskia	Gamms Eng.
J. York	R. F. Weston, Inc.
D. Elsworth	Penn State Univ.
C. Tsang	LBNL
R. Green	CNWRA
R. Mantaufel	CNWRA
M. Ahola	CNWRA
A. Van Luik	DOE
P. Lichtner	CNWRA
P. Cummings	CLV
V. Palciauskas	NWTRB
G. Roseboom	USGS (Retired)
R. Lanza	ICF Kaiser

August 22, 1996

R. Wallace, Jr.	USGS
J. York	R. F. Weston
J. Russell	CNWRA
D. Fenster	DOE/OCRWM M&O/WCFS
A. DeWispalane	CNWRA
F. Galpin	Rogers Engineering
A. Huang	Golder Fed. Serv. Inc.
A. Van Luik	DOE
P. Petersen	GAO
J. Klinger	Illinois Dept. of Nucl. Safety
E. Pehle	Prairie Island Indian Community
A. Childs	Prairie Island Indian Community
A. Bennett	Prairie Island Indian Comm.
P. Merges	New York State, Dept of Envir. Cons.
R. Andersen	NEI
J. Weil	Radioactive Exchange
H. B. Finger	NAPA
C. Wye	NAPA

ATTENDEES FROM OTHER AGENCIES AND GENERAL PUBLIC (CONT'D)

August 22, 1996 (Cont'd)

T. W. Orteiger	IDNS
G. Appel	Illinois Dept. of Nucl. Safety
H. Rai	Self
D. D'Arrigo	NIRS

August 23, 1996

A. Huang	Golder Federal Serv. Inc.
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APPENDIX IV: FUTURE AGENDA

The Committee agreed to consider the following during the 86th ACNW Meeting, September 24-27, 1996:

- ACNW Planning Session - The Committee will conduct a planning session and will not formulate advice for the Commission during this session. The conduct of Committee activities, procedures and operations, as well as future priorities, will be discussed.
- Radionuclide Transport at Yucca Mountain - The Committee will investigate the status and results of studies and modeling of radionuclide transport in the saturated and unsaturated zone at Yucca Mountain. This topic will constitute the entire meeting on Thursday. Specific focus will be on the transport of radionuclides in fracture systems at Yucca Mountain. This will include the ingress of water to the repository horizon and geochemical processes that affect transport of radionuclides out of the repository via fracture systems.
- Site Characterization - The Committee will discuss site characterization integration through the use of performance assessment. A continuation of discussions with the Department of Energy on Total System Performance Assessment will be held with emphasis on the use of expert elicitation panels.
- Repository Design for Viability Assessment - The Committee will discuss the advanced conceptual design for the proposed repository at Yucca Mountain, Nevada, with representatives of the Department of Energy and other interested parties.
- Public Comments - The Committee will hear comments from members of the public on concerns related to nuclear waste disposal.
- Preparation of ACNW Reports - The Committee will discuss proposed reports, including: radionuclide transport at Yucca Mountain, specifying a critical group and reference biosphere to be used in a performance assessment of a nuclear waste disposal facility, the consideration of coupled processes (thermal-mechanical-hydrological-chemical) in the design of a high-level waste repository, time of compliance in high- and low-level waste disposal, and the DOE program plan and waste isolation strategy.
- Committee Activities/Future Agenda - The Committee will consider topics proposed for future consideration by the full Committee and Working Groups. The Committee will discuss ACNW-related activities of individual members.

Appendix IV
85th ACNW Meeting

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- Miscellaneous - The Committee will discuss miscellaneous matters related to the conduct of Committee activities and organizational activities and complete discussion of matters and specific issues that were not completed during previous meetings, as time and availability of information permit.

APPENDIX V
LIST OF DOCUMENTS PROVIDED TO THE COMMITTEE

[Note: Some documents listed below may have been provided or prepared for Committee use only. These documents must be reviewed prior to release to the public.]

MEETING HANDOUTS

AGENDA
ITEM NO.

DOCUMENTS

2 Coupled (Thermal Mechanical Hydrologic Chemical) Processes

1. Coupled Processes: Overview and Introduction, dated August 21, 1996, presented by Norman A. Eisenberg, Division of Waste Management (DWM), NMSS [Viewgraphs]
2. 1993 Literature Review and Assessment of Couples THMC Processes, dated August 21, 1996, presented by Randall D. Manteufel, Center for Nuclear Waste Regulatory Analyses (CNWRA) [Viewgraphs]
3. Thermal-Hydrologic (TH) Coupled Processes, dated August 21, 1996, presented by Ronald T. Green, CNWRA [Viewgraphs]
4. Thermal-Hydrologic-Chemical (THC) Coupled Processes, dated August 21, 1996, presented by Peter C. Lichtner, CNWRA [Viewgraphs]
5. Thermal-Mechanical (TM) Coupling, dated August 21, 1996, presented by Mikko P. Ahola, CNWRA [Viewgraphs]
6. Integration of Couples Processes in Performance Assessment, dated August 21, 1996, presented by Rex Wescott, NMSS
7. DECOVALEX, Development of Coupled Models and their Validation against Experiments, undated, presented by C. F. Tsang, LBL
8. Highlights: Review of CNWRA T-M-H Research, undated, presented by D. Elsworth, Penn State University

3 Technical Guidance on Expert Elicitation

9. Public Comments on the Branch Technical Position on the Use of Expert Elicitation in the High-Level Waste Program, dated August 22, 1996, presented by Michael P. Lee, DWM, and Aaron R. DeWispelare (CNWRA) [Viewgraphs]
10. Letter from Alan W. Childs, Sr., Treasurer, Prairie Island Indian Community, to Paul Pomeroy, Chairman, ACNW, dated August 2, 1996, regarding the storage of spent nuclear fuel. [Handout]

5 Time of Compliance in Low-Level Waste Disposal

11. Time of Compliance in Low-Level Waste Disposal, Memoranda exchanged among ACNW Members on this subject [Handout #5.1]
12. Statement of Paul J. Merges, New York State Department of Environment Conservation, dated August 22, 1996 [Handout].
13. Illinois Department of Nuclear Safety: Remarks to ACNW on Setting a Regulatory Compliance Period for LLRW Facility, dated August 22, 1996, presented by Joseph Klinger [Handout].
14. Deciding for the Future: Balancing Risks, Costs, and Benefits Fairly, presented by Harold Finger, National Academy of Public Administration. [Viewgraphs]

7 Committee Activities/Future Agenda

15. Committee Activities/Future Agenda - EDO Responses [Handout #1]

8 ACNW Reports

16. Preparation of ACNW Reports: Critical Group/Reference Biosphere [Handout # 1]

MEETING NOTEBOOK CONTENTS

TAB
NUMBER

DOCUMENTS

1 Opening Remarks by ACNW Chairman

1. Introductory Statement by the ACNW Chairman, dated August 21, 1996
2. Items of Current Interest, undated
3. Introductory Statement by the ACNW Chairman, dated August 22, 1996
4. Introductory Statement by the ACNW Chairman, dated August 23, 1996

2 Coupled (Thermal-Mechanical-Hydrologic-Chemical) (THMC) Processes

5. Contents
6. Status Report
7. Agenda
8. ACNW Draft Task Action Plan, Working Group Session on T-H-M-C Coupled Processes
9. Abstract of Paper entitled: Changes in Water Table Elevation At Yucca Mountain in Response to Seismic Events, presented by B. W. Arnold at the Seventh International Conference, High-Level Radioactive Waste Management, pp. 102-103.
10. Paper entitled: Testing Geochemical Modeling Codes using New Zealand Hydrothermal Systems, URCL-JC-114798, dated December 1993, presented by C.J. Bruton, W.E. Glassley, and W.L. Bourcier, at FOCUS 93, Las Vegas, NV, September 26-29, 1993.
11. Paper entitled: The Importance of Thermal Loading Conditions to Waste Package Performance at Yucca Mountain, UCRL-JC-116429, dated October 1994, presented by Buscheck, T.A. and J.J. Nitao.
12. CNWRA Trip Report: NRC/DOE Technical Exchange on Field Heater Experiments Associated with Coupled THMC Processes, date of trip: November 7-9, 1994, by A. Ghosh, R.D. Manteufel, A.H. Chowdury, S. Mohanty, and R.T. Green.
13. Yucca Mountain Site Characterization Office (YMSCO) Thermohydrologic Testing and Modeling Program Peer Review Recommendations and DOE Response to Recommendations, 1996.
14. Yucca Mountain Site Characterization Office (YMSCO) Thermohydrologic Testing and Modeling Program Peer Review Record Memorandum, 1996.
15. The Effect of Media Properties on Prediction of Moisture Redistribution at a High-Level Nuclear Waste Repository, by Ronald T. Green, CNWRA, 1996.
16. DECOVALEX--Mathematical Models of Coupled T-H-M Processes for Nuclear Waste Repositories; Executive Summary for Phases I, II, and III, SKI Report 96.58, by L. Jing, O. Stephansson, C.-F. Tsang, and F. Kautsky, dated June 1996.
17. A Sensitivity Study of Near-field Thermomechanical Conditions in Tuff, by K.I. Johnson, D.J. Sherwood, and C.F. Voss, published in Proceedings: Nuclear Waste Isolation in the Unsaturated Zone, FOCUS '89, American Nuclear Society, Inc., LaGrange Park, IL, pp. 10-19, 1989.

2 Coupled (Thermal-Mechanical-Hydrologic-Chemical) (THMC) Processes (Cont'd)

18. Ground-Water Models Cannot Be Validated, by L.F. Konikow and J.D. Bredehoeft, published in Advances in Water Resources, vol. 15, pp. 75-83, dated 1992.
19. Surface Complexation Models and Mass Transport, by P.C. Lichtner and D.R. Turner, published in NRC High-Level Radioactive Waste Research at CNWRA, January-June, 1995, CNWRA, pp. 9-16 to 9-23.
20. How Would Near-Field Geochemical Reactions Affect Flow and Transport at Yucca Mountain?, presented by William M. Murphy at the Evans Conference, University of Arizona, January 30-February 3, 1995.
21. Introduction to Coupled Processes, by C.-F. Tsang, published in Coupled Processes Associated with Nuclear Waste Repositories, Chin-Fu Tsang, ed., Academic Press, Orlando, FL, pp. 1-8, 1987.
22. A Sensitivity Study of Near-field Thermal and Hydrological Conditions in Tuff, by M.D. White and M.K. Altenhofen, published in Proceedings: Nuclear Waste Isolation in the Unsaturated Zone, FOCUS '89, American Nuclear Society, Inc., LaGrange Park, IL, pp. 20-29, 1989.
23. Letter to Susan B. Jones, YMSCO, from Paul A. Witherspoon, President, Witherspoon, Inc., dated July 30, 1996; Subject: Comments of Peer Review Team on Response to the Thermalhydrologic Modeling and Testing Program Peer Review Report.

3 Technical Guidance on Expert Elicitation

24. Status Report "Draft Branch Technical Position on the Use of Expert Elicitation in the High-Level Radioactive Waste Program," undated.
25. Draft Branch Technical Position on the Use of Expert Elicitation in the High-Level Radioactive Waste Program, August 1996, by J.P. Kotra, M.P. Lee, N.A. Eisenberg, and A.R. DeWispelare.
26. Draft presentation overheads for ACNW Meeting on August 22, 1996, "Public Comments on the Branch Technical Position on the Use of Expert Elicitation in the High-Level Radioactive Waste Program"
27. Presentation overheads by Janet Kotra, et al., for International HLW Conference, April 29-May 3, 1996, Las Vegas, NV on the "NRC Draft Branch Technical Position on the Use of Expert Elicitation in the High-Level Radioactive Waste Program"
28. Letter from Dade W. Moeller, Chairman, ACNW, to Robert M. Bernero, Director, NMSS, dated July 11, 1991: The Role of Formal Elicitation of Expert Judgment in the Performance Assessment of a Geological High-Level Waste Repository.
29. Memorandum from B. John Garrick to ACNW Members and Staff, dated May 7, 1996: Committee Actions Regarding Expert Elicitation.
30. Memorandum from Andy Campbell, ACNW Senior Staff Scientist, to John Garrick, dated May 7, 1996: Comments and Observations on Background information in the BTP on Expert Elicitation.

4 Meeting with the Director, NRC's Division of Waste Management, Office of Nuclear Material Safety and Safeguards

31. Status Report, August 22, 1996

5 Time of Compliance in Low-Level Waste Disposal

32. Status Report
33. Code of Federal Regulations, Title 10, Chapter 1, Part 61
34. Overheads presented by Tim McCartin, DWM/NMSS Staff, on March 27, 1996, Working Group Session on Regulatory Time of Compliance at 82nd ACNW Meeting
35. Draft Minutes from a session on Low-Level Waste Time of Compliance at the 84th ACNW Meeting
36. Memorandum from Andrew Campbell, ACNW Senior Staff Scientist, to ACNW Members, dated June 28, 1996: Compliance Period for Performance Assessment of LLRW Disposal Facilities, attaching a Letter from Carl Lischeske, Manager, Low-Level Radioactive Waste Program, California Department of Health Services, dated June 19, 1996, providing comments on compliance period to be used in LLW performance assessments
37. Memorandum from Paul Pomeroy to William Hinze, dated August 3, 1996: Low-Level Waste Time of Compliance--Some Preliminary Thoughts
38. Memorandum from Martin Steindler to William Hinze, dated July 10, 1996: Comments on Time of Compliance for Low-Level Waste Facility Licensees
39. Memorandum from Andy Campbell to William Hinze, dated August 7, 1996: Issues for Low-Level Time of Compliance
40. ACNW Report from Martin J. Steindler, Chairman, ACNW, to Ivan Selin, Chairman, NRC, dated July 28, 1995: Regulatory Issues in Low-Level Radioactive Waste Disposal
41. Memorandum from James M. Taylor, Executive Director for Operations, NRC, to Paul Pomeroy, Chairman, ACNW, dated May 17, 1996: Regulatory Issues in Low-Level Radioactive Waste Disposal Performance Assessment

6 Preparation of ACNW Reports

42. Status Reports and Attachments for Letter Reports on:
 - The Critical Group and Biosphere
 - The Program Plan and Waste Isolation Strategy

7 Committee Activities/Future Agenda

43. Set Agenda for 86th ACNW Meeting, September 25-27, 1996, in Las Vegas, NV
44. Review Items for the Out Months
45. Future Working Group Topics
46. Future Outside Meetings Members and Staff May Attend
47. Reconcile EDO Responses to ACNW Reports
48. Agenda Items for ACNW Review Proposed by the Staff
49. CRWMS/M&O Meeting Status
50. One Year Calendar of Events

8 ACNW Task Action Plans

51. Status Report on Task Action Plans, August 23, 1996
52. Report from Paul W. Pomeroy, Chairman, ACNW, to NRC Chairman Jackson, dated December 28, 1995: Revision of ACNW Priority Issues
53. Draft Task Action Plans for the Following Topics:
 - Flow and Radionuclide Transport
 - Site Characterization Activities Related to Waste Isolation Strategy (Part II: KTI - Predicting the Consequences and Probability of Igneous Activity...
 - Regulatory Framework
 - Risk-Based Regulation in the Radioactive waste Program
 - Role of ACNW in Decommissioning
 - Negligible Incremental Risk Level
 - Use of Expert Judgment in the High-Level Radioactive Waste Program