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MINUTES OF THE 63RD ACNW MEETING
APRIL 20-21, 1994

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MINUTES OF THE 63RD MEETING OF THE
ADVISORY COMMITTEE ON NUCLEAR WASTE
APRIL 20-21, 1994
BETHESDA, MARYLAND

The 63rd meeting of the Advisory Committee on Nuclear Waste was held at Room P-110, 7920 Norfolk Avenue, Bethesda, Maryland, on Wednesday and Thursday, April 20-21, 1994. The purpose of this meeting was to discuss and take appropriate actions on the items listed in the attached agenda. The meeting was open to public attendance, except a portion that dealt with matters of a personal nature.

A transcript of selected portions of the meeting was kept and is available in the 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 Ann Riley & Associates, Ltd., 1612 K Street, N.W., Washington, D.C. 20006.]

Dr. Martin J. Steindler, Committee Chairman, convened the meeting at 8:30 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 stated that the Committee had not received any requests from persons or organizations desiring to make an oral statements 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.

ACNW members, Drs. William J. Hinze, Paul W. Pomeroy and B. John Garrick were present. Drs. Paul Shewmon and Kenneth Foland, ACNW Consultants, were also present. [For a list of attendees, see Appendix III.]

I. CHAIRMAN'S REPORT (Open)

[Note: Ms. Lynn Deering was the Designated Federal Official for this part of the meeting.]

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

- Dr. Steindler announced that Secretary of the Interior, Bruce Babbitt, requested the Board of Radioactive Waste Management, National Academy of Sciences, to review two reports prepared by three U.S. Geological Survey (USGS) scientists identifying concerns with the proposed Ward Valley, California, low-level radioactive waste (LLW) disposal site. Secretary Babbitt stated that the

resolution of the concerns is relevant to his decision on whether to transfer the Federal land for the site to the State of California. In addition, the Governor of South Carolina has sent a letter to President Clinton and Secretary Babbitt requesting reconsideration of the decision to delay the transfer of land to the State of California for the proposed Ward Valley LLW disposal site.

- The U.S. Department of Energy (DOE) is receiving parts of the tunnel boring machine. When assembled the machine will weigh 720 tons and have a cutting diameter of 25 feet.
- The Center for Nuclear Waste Regulatory Analyses (CNWRA) is planning a workshop in September 1994 on rock mechanic issues in repository design and performance assessment.
- The NRC has issued an advance notice of proposed rulemaking, inviting public comment on whether the NRC should amend its regulations governing the release of radio-nuclides from licensed nuclear facilities into sanitary sewer systems.

II. VOLCANISM STUDIES UNDERWAY IN THE CHARACTERIZATION OF THE YUCCA MOUNTAIN SITE (Open)

[Note: Ms. Lynn Deering was the Designated Federal Official for this part of the meeting.]

Dr. William Hinze, Chairman of this portion of the meeting, introduced the topic of volcanism and the speakers from DOE and NRC, beginning with Ms. Jeanne Nesbit, DOE, Yucca Mountain Project Office (YMPO).

Overview

Dr. Jeanne Nesbit announced that she would provide an overview of the volcanism program, followed by briefings from Dr. Frank Perry, Los Alamos National Laboratory (LANL), on characterization of volcanic features, Dr. Bruce Crowe, LANL, on probabilistic volcanic risk assessment, and Dr. Greg Valentine, LANL, on volcanic effects on the potential repository.

Dr. Nesbit discussed the objectives of the Yucca Mountain volcanism program, the DOE strategy to resolve remaining issues, current schedule and major milestones, and critical studies that need to be completed. Highlights from her presentation include:

- Two major objectives of this work are to assess the probability of magmatic disruption of the potential repository and or waste isolation system, and constrain the effects of magmatic events at or near the repository. The primary focus to date has been to collect sufficient information to answer the question, "Is the probability of magmatic disruption of the potential repository large enough to disqualify the Yucca Mountain site?"
- Regulatory requirements that pertain to the objectives include both the qualifying conditions set forth in 10 CFR Part 960, as well as the total system performance requirements set forth in both regulations. DOE is focused not only on determining whether the Yucca Mountain site should be disqualified due to volcanic activity, but also on the magmatic effects on potential repository or on total system performance.
- The volcanism program at Yucca Mountain is part of the postclosure tectonics investigations by the DOE. The five main investigations that comprise the postclosure tectonics program include (1) characterization of igneous intrusive features, (2) probability of magmatic disruption into the repository, (3) characterization of volcanic features, (4) physical processes of magmatism and effects on the potential repository, and (5) tectonic effects: evaluations of changes in the natural and engineered barriers resulting from tectonic processes and events. These studies are interactive and feed into determining site suitability and total system performance assessment (TSPA).
- Based on the information compiled by LANL that summarizes the last 10 years or so of research, the DOE does not consider the probability of volcanism to be high enough to disqualify the Yucca Mountain site. Dr. Nesbit observed that there is agreement on this point from NRC staff and other oversight groups.
- The DOE strategy focuses on answering the question, when is "enough is enough?" She noted that there are different perspectives on this. The principal investigators will answer when is "enough is enough" when they think they have finished their study plans and have adequate confidence in the results. DOE managers address the question using cost benefit of additional data and performance assessment, considering how strong the case is for compliance. The tools used to address this question include interim site suitability evaluations, issue resolution, TSPA, formal peer review and expert judgment, and feedback from oversight groups and NRC. Dr. Nesbit provided an example. The Early Site Suitability Evaluation (ESSE) in 1992 indicated that the tectonics qualifying condition was likely to be met. This was a low-level finding,

and the recommendation for volcanism was to continue the studies as planned. The ESSE also highlighted the geochronology issue as something that really needed to be resolved.

Another example of using the tools includes the TSPA. In total system performance assessment, 1991, the first iteration, Dr. Nesbit looked at the eruptive effects of dike intrusion into the proposed repository and concluded that the consequences did not exceed regulatory release limits in 40 CFR Part 191. However, this was based on very limited effects data, so the recommendations were to look at estimating the probability of occurrence of subsurface events and to determine the quantity of debris that could be ejected from repository depths during a volcanic eruption. Most of DOE's volcanism resources have been moved into evaluating effects because DOE staff believes that it has completed the other two parts of the volcanism studies.

- DOE experts have always been used to determine the adequacy of the data set and analysis, however, the DOE is considering using alternative mechanisms, such as peer reviews and expert elicitation to ensure the diversity of interpretations and completeness. Expert judgment will be used in the volcanism program to help refine the volcanism probabilities, which is just getting underway. Dr. Kevin Coppersmith at Geomatrix is conducting this work.
- Dr. Nesbit showed the current schedule and major milestones for volcanism, but stated that due to the ongoing redirecting of the project, there may be some changes to the actual schedule. Dr. Hinze asked whether the work would be slowed or accelerated. Dr. Nesbit indicated that she did not know, but perhaps the work could be accelerated by a year. Dr. Nesbit noted that, in FY 1996, the DOE will have the final reports on probability, and the chronology of the volcanism in the Yucca Mountain region. At that point, the DOE expects to have completed 90 percent of the probability work, and 60-70 percent of the characterization of volcanic features study. In FY 1998, much of the magmatic effects work should be completed, as well as the work on tectonic effects.
- Critical studies still needed to complete the volcanism work include the subsurface effects studies, the sensitivity studies, and the subsurface information to be obtained from geophysics. This gets at trying to detect any intrusions that we have not identified yet in the Crater Flat and Yucca Mountain area. Other crucial studies include the probability of polycyclic volcanism and development of a magmatic evolution model for the Crater Flat volcanic zone.

Dr. Garrick asked how the probability of a volcanic event relates to the subject of site disqualification, noting that the regulations are much clearer with respect to consequences rather than to probability. Dr. Nesbit stated that the regulations do not give any specific criteria for when the probability is low or high enough to disqualify the site. The DOE has made the judgement that the numbers that its been getting over the last 10 years, about 1×10^{-8} , are low enough that the site should not be disqualified on this basis. She noted that this is important because it has been an area of some disagreement in the past, but now most sides agree with this.

Dr. Hinze asked Dr. Nesbit to provide any insights why so many open items remain unresolved in the volcanism program, especially given that DOE has completed 90 percent of the probability work, and 60 percent of the characterization work. Dr. Nesbit reminded the members that there are technical issues where the NRC and DOE genuinely disagree, which she believes can be worked out. However, she believes that there is a communication problem between the DOE and NRC, either the DOE staff is not communicating well or the NRC staff is not getting its point across. They have had opportunity in the last year and a half to get together for discussion, including two technical exchanges. She noted that the DOE is trying to be responsive, and its strategy is to get on with the effects work, which addresses 10 CFR Part 60 directly, and should help to resolve NRC issues.

Dr. Hinze asked whether the DOE is conducting any applied research in volcanism, such as developing methodologies or techniques, and how close does DOE track the NRC research program? Dr. Nesbit indicated that the DOE does not have a research program separate from characterization activities. DOE tries to keep abreast of NRC research and other groups doing research. She commented that none of the research that the NRC has been doing that they are aware of has had a significant impact on DOE's volcanism program, and it has not changed DOE's strategy.

Dr. Hinze asked about the status of the status report. Dr. Nesbit indicated the report will be published as a Los Alamos technical report, reviewed by DOE, and is expected sometime in June 1994. DOE is not expecting NRC to review the document.

Update on Characterization of Volcanic Features

Highlights from Dr. Frank Perry's talk include:

- Volcanism is an issue at Yucca Mountain because, in the last five million years, there has been about six centers of volcanic activity near Yucca Mountain, ranging in age from 4.8

million years at Thirsty Mesa to the youngest eruptions, which were within the last hundred thousand years at Lathrop Wells. Lathrop Wells is about 20 kilometers south of Yucca Mountain, and some of these eruptions may range into the Holocene. Eruptions in between include Buckboard Mesa at 2.9 million years ago, Crater Flat eruptions at 3.7 million years ago, another set of Crater Flat eruptions at about 1 million years ago, Sleeping Butte at about 300,000 years ago, and Lathrop Wells less than a 100,000 years ago.

- The Crater Flat Volcanic Zone includes some buried aeromagnetic anomalies suspected to be buried basalts. One of the characterization activities is to drill into these anomalies to determine their age and nature. One anomaly has been drilled commercially and is a basalt that is 3.8 million years old.
- It appears that most of the Quaternary centers that have erupted in the last 5 million years are polycyclic. This has been a major surprise of the volcanic characterization studies that these are not the typical small volume volcanos that erupt only once. Several of these volcanos appear to have had a long eruptive history, which has been the emphasis of the characterization studies.

Dr. Hinze asked whether sensitivity studies have been conducted to determine the minimum size and the minimum depth of detection of the aeromagnetic anomalies. Dr. Perry stated that they are conducting studies on magmatic susceptibility of dikes to determine whether one meter wide dikes can be detected at depth.

- Recent progress in geochronology includes dating 50 percent of the post-Miocene centers and one aeromagnetic anomaly. They are trying to improve the precision because this data is important for determining recurrence rates. Other progress includes sampling for geochemistry for the centers older than Lathrop Wells. The work at Lathrop Wells is complete. A map will be published next month. DOE has determined that Lathrop Wells is polycyclic, having a four episode eruptive history, ranging from about a hundred thousand years at the first episode to Holocene in the youngest episode. From geochemistry data, they have determined that this involves a minimum of about six to eight independent magma batches. DOE is using tuff sanidine separates from xenoliths that are enclosed in the lava flows to revise the chronology of the Lathrop Wells center, where they are not completely done interpreting that geochronology. The episodes are geochemically distinct.
- DOE has used more than one technique in addition to potassium argon to improve on the precision of the dates for the old

cones, but the work has not changed the results. DOE expects to conclude this dating of all the centers within the next 12 months.

- The Lathrop Wells center, located about 20 kilometers south of Yucca Mountain, is the youngest center in the region. He noted that small volume centers have traditionally been interpreted as being monogenetic, which means that their eruption involved the ascent of a single magma batch. Monogenetic volcanos erupt over a period of weeks to possibly years, and then they become extinct. They never erupt again. Any future eruption in that area will move to a new location and form a new center cone. However, Lathrop Wells is polycyclic, meaning it has had a very long and complex eruptive history, where each eruption involves a completely independent episode of new dike intrusion. When one of these centers is active, there is a tendency for subsequent eruptions to come up in the same place instead of moving to a new center. Thus the most likely volcanic event in the Yucca Mountain region during the next 10,000 years is another eruption at the Lathrop Wells Center.

Dr. Foland asked how do they know that Lathrop Wells involves multiple feeders, instead of a single feeder system, which occurs at a different time? Dr. Perry observed that the field evidence indicates breaks in these sequences where soils have developed. Further, they get different ages for different episodes. Each episode is geochemically distinct and cannot be related to a single magma by fractionation or any more complex process. Dr. Perry clarified that they know they were independent events in time, with different chemistries, and that they erupted along spatially separate fissure systems because the fissure systems at Lathrop Wells span at least a half kilometer lateral distance. They know that there have been independent events, so the easiest interpretation is that there are multiple feeders and multiple dike events at depth.

Dr. Steindler asked what is the difference between the two models and why does it matter. Dr. Perry responded that the implications for volcanic risk assessment include that the effects studies must consider a very complex geometry, including multiple penetrations over a long period, not just a single diking event or set of diking events, and two, because there is clustering of diking at a single location, it provides a constraint on the location of future volcanism. For example, at Lathrop Wells the last seven or eight diking events in the last hundred thousand years, appear to have been at Lathrop Wells. He noted that they believe this pattern to be structurally controlled.

Dr. Perry commented that they tried to model how the different chemistries of each flow related, and found no way to relate them by the evolution of a single magma batch. He stated that in faults around Yucca Mountain there were periods when these faults were open as fissures, where volcanic basaltic ash went into the fissures. LANL is working with the USGS to chemically correlate those ashes to each eruption from Lathrop Wells and then use the information to constrain the ages of the faults.

Dr. Hinze asked whether they have been able to tag the ash in the Solitario Canyon fault? Dr. Perry indicated that they believe from looking at the ash that it is likely from the second eruptive episode, or 60 to 80,000 years old, but they have not done the dating yet. Further, the USGS staff believes that there is a possibility of as many as three separate ashes in their fault trenches, so we want to be able to distinguish all three of those and see if we can relate them back to Lathrop Wells.

Lathrop Wells has been mapped as four episodes. Dr. Perry reviewed the episodes from oldest to youngest, and the dating methods used to date each flow.

Dr. Perry discussed the chemical evidence for their model of Lathrop Wells having different magma batches. He discussed evidence of different trace element ratios for different flows. Mg can be used as a marker for how much the magma has evolved. They saw a wide variation in thorium/potassium ratios, with little variation in Mg, which correlates with eruptive events. The constant Mg number supports the lack of evolution of a single magma event.

Dr. Perry indicated that they believe that the northwest alignment of the cones and polycyclic centers within this alignment, is structurally controlled. He noted they have been corroborating with Dr. Chris Frederick, USGS, who has been doing structural mapping in this area. He has concluded that largely from rotation of Miocene tuffs as you come south from Yucca Mountain, that there is a right lateral shear zone that is oriented northwest that goes through Crater Flat and up toward Thirsty Mesa and Sleeping Butte. Superimposed on this zone there are areas that have extended. The Crater Flat zone apparently opened up to the south along the shear zone from a pivot point up near the Timber Mountain Caldera, and as this opened up, it formed a half graben, which is down to the west. The maximum extension within that half graben is coincident with the eruption of the million-year-old Crater Flat centers. They think there is a structural control as a secondary effect, but that this whole northwest alignment is due to this deep, penetrating northwest, right lateral shear zone. This may be the mechanism for why the centers are polycyclic, that at any point in time, there are these deeply penetrating structures that magmas are following,

and wherever there is a weakness at any point along the evolution of this zone, repeated pulses of separate magmas come up very near the same place.

Dr. Perry showed a 3D portrayal of the Crater Flat volcanic zone showing where dikes are inferred to have intruded in the last 100,000 years. A strong clustering at Lathrop Wells is evident, where at least six or eight independent dikes have intruded. He observed that there is possibly a Holocene eruption at Sleeping Butte, but it has not been completely characterized, but will be worked on in the next six months. The strong clustering reduces the probability of any diking occurring near Yucca Mountain. He noted that Dr. Crowe assumes a random distribution within a certain event zone, when calculating probability, despite the evidence of clustering.

Dr. Perry mentioned that he will be putting together an evolution model for the entire Crater Flat zone over the last five million years. He stated that the centers within this zone have decreased in volume over time. All the quaternary centers are fairly small volume, 0.2 cubic kilometers or less, thus their interpretation is that overall activity within the zone is waning. DOE will use the evolution model to observe patterns in melting behavior through time, changes in volatile through time, and changes in fractionation through time, to determine whether magmatism is waxing, steady state or waning through time.

Dr. Pomeroy asked for clarification on those areas where the DOE and NRC/USGS have disagreed with conclusion about polycyclic volcanism and associated increased likelihood that the next eruption will occur at Crater Flat. Dr. Perry responded that the polycyclic model has been controversial in the last four or five years, however, this model is becoming accepted.

Dr. Foland asked where else polycyclic volcanism has occurred. Dr. Perry responded that in the Zuni Bandera Field in New Mexico, there is one center that is on a very major structure cutting across the Zuni uplift, which is believed to be polycyclic.

Dr. Foland noted that assuming a waning system is steady-state is not conservative; rather, it should be assumed that high-volume volcanism is ready to begin again, i.e., in a waxing mode. Dr. Perry stated that a pattern of waxing after waning is not seen in the Great Basin Fields, but that Dr. Crowe could address the question.

Future work includes (1) characterize the evolution of the Crater Flat zone to answer the question of whether magnetism is waxing or waning, and address whether there are important changes involved with content, fractionation, or depth through time, which could

affect the set mechanics and eruption styles. The evolution model will be used to provide a physical framework for all the probability calculations, (2) continue to refine the mechanism and duration of polycyclic volcanism, which is now believed to have a maximum period of about a hundred thousand years, (3) wrap up the geochronology of the older centers, (4) correlate the ashes in the fault trenches with the USGS to correlate them with data of eruptive episodes at Lathrop Wells, and (5) drill the volcanism drill holes for the rest of the aeromagnetic anomalies to determine whether there are older faults, or could possibly be young intrusions, and if they are basalt or not.

Physical Processes of Magmatism and Effects on the Potential Repository

Dr. Gregory Valentine, LANL, discussed activities and some initial results of the work being done under study plan, "Physical Processes of Magmatism and Effects on the Potential Repository," which was funded this year.

Highlights of his presentation include:

- The effects work addresses the E3 part of the equation, which is the probability that the releases, either eruptive material, or subsurface effects, produced by magmatic activity will exceed regulatory limits.
- The goals of the study are to: (1) determine the range of the quantity of waste that can be ejected if a new, small volume (0.1-1 km³) basaltic volcano erupted through the repository, (2) determine the effects on the waste isolation system resulting from magmatic intrusions at or near the repository, and (3) provide a physical framework for Quaternary magmatism in the Yucca Mountain region as needed to constrain event probabilities and effects (magma system dynamics). This involves looking at the physics and physical processes to constrain some processes observed in the geologic record. These three activities then are integrated with performance assessment.

Goal 1 - Eruptive Effects determine the quantify of waste that can be ejected from small volume volcano. - The two approaches that can be used to assess eruptive effects include a theoretical approach, and natural analog approach. The theoretical approach involves modeling the ascent and eruption of magma and its interaction with the wall rock to determine how much material could be entrained and erupted in the magma. However, the natural analog approach is preferred because the phenomenology of basaltic magma ascent and interaction with wall rock is poorly known. Natural

analogs are advantageous because real geometric complexities of feeder systems can be captured. Selection criteria for natural analogs include (1) similar size, composition, and eruptive facies to Crater Flat Volcanos, (2) good exposure of lavas and pyroclastics, and (3) well-constrained subvolcanic stratigraphy with easily identifiable units. Examples of natural analogs include Alkali Buttes, NM, Uinkaret Field, Arizona, and Rio Puerco Necks, NM.

Dr. Hinze asked about how the theoretical work and natural analog work are integrated. Dr. Valentine responded that the results of the natural analog studies will determine whether they perform the detailed theoretical studies. For example, if the amount of material available for dispersal is small, dispersal mechanisms may not need to be looked at.

Goal 2 - Subsurface Effects - The bulk of the work over the next few years will address this. It involves defining scenarios and constraining subsurface effects that igneous activities might have on the system, including short term effects that occur during the thermal perturbation accompanying an intrusion, and long term effects after the intrusion, such as changes in groundwater flow. This involves use of modeling and natural analogs. The selection criteria for natural analogs for this purpose include (1) similar composition to Crater Flats volcano, (2) small volume intrusive complexes, (3) shallow intrusive depths, (4) similar structural setting to Yucca Mountain, and (5) intrusions that are hosted by silicic pyroclastic rocks.

Additional activities in support of determining subsurface effects include looking at the (1) mechanical effects on wall rock, such as fracturing that is induced by intrusions, and contact welding of the tuff host, (2) Hydrothermal processes, such as intrusion induced air flow, in thick, unsaturated zones. It is thought that most of the heat transport away from a dike is dominated by diffusion, thus this is what the focus is with the modeling, (3) Long term hydrologic effects, such as new groundwater pathways or barriers caused by intrusions, and perching, and (4) mineralogical and geochemical effects, such as altered radionuclide properties of host rocks. Zones of alteration can be used to constrain spatial extent of hydrothermal processes.

The current highest priorities are for the eruptive effects is to complete the analog studies, and determine whether the detailed eruption modeling is needed. For subsurface effects, the highest priority is to complete the studies in the maximum spatial scale of subsurface processes, which is vapor flow. The approach is interdisciplinary, using advanced computer modeling and study of analog sites. The study is tailored to provide the maximum

information that is relevant to repository performance in the most efficient manner.

Probabilistic Volcanic Risk Assessment

Dr. Bruce Crowe emphasized DOE's probabilistic approach for assessing the probability of the recurrence rate for volcanism, and the likelihood of disruption.

Highlights from his talk include:

- DOE's definition of cluster refers to cones that align, and are of similar age, as opposed to the CNWRA's definition, which is statistical in nature, based on cluster analysis.
- DOE's conditional probability model has three attributes: E-1: recurrence rate of volcanic events, E-2, the probability of a future event intersecting a specified area, and E-3, release of radionuclides to the accessible environment.
- To address the risks of future volcanism, DOE first addresses the range of possible future volcanic events, with the major focus on the probability of a new volcanic event, which has spatial uncertainty and thus is the more conservative case than consideration of the probability of polycyclic event.

Next, the nature of the eruption, i.e., Hawaiian, Strombolian, hydrovolcanic, or mixed. The most likely event at Yucca Mountain will be mixed, because hydrovolcanism usually occurs where there is a shallow groundwater table. Next, the type of intrusive event will get magma to the surface, eruption with dikes, eruption with dikes and sills, or shallow intrusion without a surface eruption, if this is possible. Next, where can a future volcanic event occur, which is constrained by where past events have occurred in the Pliocene and Quaternary events, and a preferential pattern within the Crater Flat Zone.

- DCE has two models to look at the spatial distribution of events: A simple Poisson model for these three zones, and nonhomogeneous models. Dr. Crowe agrees that the nonhomogeneous spatial distributions are probably the most applicable. However, he may disagree with NRC that sophisticated nonhomogeneous models to deal with the probability of small data sets, and whether using either makes a difference.
- The preliminary conclusion in the Volcanism Status report is that the probability of an intrusion is approximately equal to the probability of a volcanic event, because it is hard to get an intrusion without an eruption, and the recurrence rate is

estimated at 10^{-8} events per year. 1×10^{-8} is used as a screening criteria, that the studies can be terminated if the probability is below this value. Current results in the controlled area of the repository indicate greater than 1×10^{-8} .

- There is a data paradox that surrounds volcanism because few (seven) events have occurred in the last 2-5 million years, so the risk is low, but because of the lack of data, there is high uncertainty. If there were more events, the risk would be greater but the uncertainty in defining the risks would be less. DOE states up front that the statistical record is insufficient to do any robust calculations by standard statistical methods. The alternate approach to assessing risk is to use forward projections, assuming the past is the key to the future, use a mid-point estimate, use analog volcanic fields to bound rates, and use multiple alternative models for every part of the probability calculations. Assume, due to small amounts of data, models cannot be provided or disproved, but look at how models affect probability distributions. Try to have a comprehensive spectrum of models for consideration. The status report uses the best estimates of probability through April 1994, but DOE reserves the right to change these as new data is available.

Dr. Hinze asked whether the DOE plans to investigate beyond Yucca Mountain to other centers in the Great Basin. Dr. Crowe indicated that they plan to look at the evolution of Crater Flat volcanic zone. There may be much data from other fields to compile. Dr. Foland asked if the database extends beyond Yucca Mountain to Cima or Lunar Crater. Dr. Crowe responded that they have extensive data on Cima and Lunar, but he questions how analogous these are for Yucca Mountain. There is a planned activity to augment the database.

- DOE is looking at multiple models due to a limited number of data sets, using a Monte Carlo Risk Simulation to estimate recurrence rates (E1). All models considered must be physically possible. Rather than look at the bounds of the distribution, as was done before, they are concentrating on the midpoint estimate.

Dr. Crowe ran five different simulations, and the mid point estimates all tend to be around the 50 percentile values or around 5×10^{-6} .

- Results show that the recurrence models are well constrained, and are insensitive to the midpoint estimates, but sensitive to boundary conditions. New information that could alter current estimates include undetected intrusions and undetected

centers. Performance assessment calculations indicate as many as 14 to 21 undetected centers, which is a factor of 2-3 times current value assumed, would be needed to affect the results significantly.

- For the E2 parameter, DOE used various spatial and structural models that combine differing groups or clusters and assume a uniformity of event rates. Dr. Crowe concluded that it is difficult to use this type of model to predict where the next event is going to be. Dr. Crowe ran simulations to estimate the probability by adjusting the recurrence rate for spatial and structural models of the site. The midpoint estimate is approximately 1 to 3 x 10⁻⁸, with the high and low ranges at 6.0 x 10⁻⁹, and 1.1 x 10⁻⁸. Dr. Crow suggested to DOE that geophysics studies should be conducted to test the two end point models as to their viability.

Conclusions:

- Recurrence models are well constrained. The DOE has initiated geophysics studies to look at the deductibility studies using aeromagnetic data.
- Only a few structural models are significant. The DOE plans to run a seismic line across the key areas to test these significant models, as well as an upgrade seismic network to allow for more rigorous teleseismic tomography work in the future. DOE believes that these two geophysics upgrades will be adequate to address concerns of undetectability of intrusions and centers, and presence of magma bodies.

NRC Staff Presentation

Dr. Linda Kovach, RES, reviewed the regulatory drivers for the volcanism program, 10 CFR 60.112, overall system performance objective for geologic repository, and 60.122 (C)(15), the potentially adverse condition: evidence of igneous activity since the start of the Quaternary period. Ms. Kovach described the RES fitting into either calculations of probability or consequences.

Highlights include:

- She reviewed the uncertainties related to predicting small volume mafic volcanism. Uncertainties include small volume igneous activity represents large spatial scales, difficult or impossible to sample, difficult to determine frequency of eruptions due to long periods of time over which volcanos are active, lack of understanding of processes and mechanisms governing small-volume mafic volcanism, difficulty in bounding

probability, without some knowledge of the mechanisms of volcanic and tectonic processes involved, range of eruptive styles needs to be bounded, the feeder geometry must be known, and the cinder cone cooling history may impact future hydrologic conditions, geochemical transport, engineered barrier system, and stability of repository host rock.

- Dr. Kovach reviewed the history and evolution of user needs and the key technical uncertainties (KTU) for volcanism. User needs identified by NMSS in 1991 include: Structural control on volcanism, Temporal and Spatial Distribution of Volcanic Events, Coupled Processes, Volcanic Vent Characteristics, and Age Determination Methods.
- The KTUs for volcanism identified by staff in 1993 as part of the systematic regulatory analyses process and license application review program (LARP) development include:
 1. Prediction of future system states (disruptive scenarios)
 2. Prediction of future changes in the hydrologic system (due to tectonism)
 3. Development and use of tectonic models related to igneous activity
 4. Low resolution of exploration techniques to locate and evaluate igneous features
 5. Inability to sample igneous features.
- Dr. Kovach discussed RES's approach to reduce uncertainties in volcanism, and identified the current projects at the CNWRA, below:
 1. Volcanism in the Basin and Range - CNWRA (FY 1991 to 1994) - this project involves the identification of the spatial and temporal controls on mafic volcanism and geologic uncertainties in probability models. It is designed to address specific aspects of the impact of small volume basaltic volcanism on repository performance.
 2. Field Volcanism - CNWRA (FY 1993 to 1996) - This project involves investigation of geologic processes and mechanisms controlling volcanic processes, such as energetics of eruptions, and area disrupted, and data from active and inactive sites to test model assumptions. It is designed to address specific aspects of small volume basaltic volcanism on repository performance. (This

project is the equivalent to DOE's project on eruption dynamics).

3. Future Project - Modeling of the Source Region, involving investigation of the coupling between thermal and structural controls on magma production and ascent.

Grants in volcanism include:

1. Dynamics of Magma within the Crust, John Hopkins University (FY 1991-93)
 2. Dynamics of Volcanic Vent Alignment Evolution: San Francisco Volcanic Field, Arizona - Florida International University (FY 1992-94).
- Interfaces between Volcanism, Tectonics, and the Natural Analog Program include (1) The Volcanism of the Basin and Range project and the Tectonic Processes in the Basin and Range project utilize the same GIS database and will use the same coupled volcano/tectonic models(s) of the Basin and Range, (2) The Volcanic Field Studies and Volcanism in the Basin and Range projects both utilize an analogue approach to investigations and model development, and these projects closely interface with performance assessment and hydrology, and (3) The modeling study on Mantle/Crustal Dynamic Processes will be tested against information obtained within the volcanism of the Basin and Range, Tectonic Processes of the Basin and Range, and the Field Volcanism Studies, and interfaces with performance assessment.
 - NRC's Objectives in the two ongoing and single planned volcanism research projects are to (1) Develop licensing tools and scientific data and information, (2) Achieve independent knowledge of volcanic processes, and (3) Maintain independent confirmatory research capability in the areas of the KTUs. For Objective 1, the specific objectives for the volcanism Basin and Range project include development of probability models, a GIS database, and modeling capability. For the Volcanic Field project, collect geologic and geophysical data on eruptive dynamics, and diffuse degassing of active analogous cinder cones. For the modeling of Mantle/Crustal Dynamics, development of modeling tools for source region and tectonic control on magma descent. Dr. Kovach noted that if there is a source region, then the past cannot be used as an indication of the probability of future volcanism. For the second objective, specific objectives for the Volcanism Basin and Range project include tectonic processes in the basin and range and coupling between magmatic and tectonic processes, and for the Volcanic Field Studies, understanding eruptive

dynamics, and the changes in hydrologic conditions and geochemical transport due to thermal effects of volcanic intrusion/eruption. For the third objective, the research results will be used to improve the understanding of KTUs and develop methodologies to determine compliance with performance assessment objectives.

- Dr. Kovach described the objectives of each research project, the individual project tasks, and the specific KTUs being addressed by each task. She also reviewed results and progress to date for each project task. General results include:

Volcanism Systems Basin and Range

Literature review conducted and expert panel convened. Findings include Western Great Basin volcanic fields are most analogous to those of Yucca Mountain; probabilistic approaches should involve hypothesis testing, spatio-temporal models, and incorporation of geologic and geophysics models; Volcanism GIS includes CIMA, Lunar, Pancake, San Francisco ranges, with digitized geologic maps, geochemistry, petrology and geochemical data; current uncertainties in the age of Lathrop Wells do not significantly impact most probability models, vents cluster in time and space; probability of eruptions has been highest near Crater Flat since at least at the beginning of the Quaternary; Probability of new volcano forming within the candidate repository site, based on near-neighbor nonhomogeneous model, is on the order of 1×10^{-4} to 3×10^{-4} in 10,000 years; Markov models support the idea that volcanism is most likely to occur in the Crater Flat region; and probability of volcanism occurring in an 8 km² area varies by more than two orders of magnitude within 20 km of the site, therefore spatial variation appears to be important; geologic processes may impact probability estimates substantially, including structural and tectonic control, indirect effects, and explosivity.

The results of the Volcanic Basin and Range Project will be used in performance assessment. For example, assessment of the probability of volcanic disruption of the repository based on spatio-temporal models can be used to develop a probability density function (PDF) for the probability of volcanism, and application of the probability models to other volcanic fields will provide understanding of the limitations and uncertainties related to the use of probability models, among other examples. Dr. Foland noted that there is a high concentration of data in the GIS, but regional tectonics data is missing.

Field Volcanism Project

The three analogs selected for study are Cerro Negro, Nicaragua; Paricutin, Mexico; and northern and southern cinder cones of Tolbachic, Kamchatka. Field work is underway at Cerro Negro and Pericutin. Dr. Foland pointed out that the CNWRA needs to show that hydrous minerals affect lava. Examples of how study results may be used to support performance assessment include observations and models of ash dispersion resulting from small volume basaltic volcanism to develop a PDF for ash dispersion, and the modification of the ditty code. In addition, observation of cinder cone eruptions can be used to develop a PDF of the repository area disrupted by igneous activity.

Questions for Dr. Kovach include:

- How are the results of probability calculations bounded, or how do you know when you are done? Ms. Kovach responded they are trying to reduce uncertainties by identifying scenarios to reduce the range of eruptive styles that must be considered. RES is constrained by resources as well as literature and data available on small volume cinder cones.
- How are priorities set? Dr. Kovach responded that user needs, expert panel and results of peer review were used to set priorities in volcanism research. IPA also continues to help focus RES priorities. All projects are to end by 1996.
- Conclusions include (1) volcanism research programs are designed to gain insight into key technical uncertainties and to develop methodologies to determine Compliance Determination Strategies, (2) spatio-temporal probability models improve the understanding of the probability of volcanic disruption of the site, (3) probability of volcanism varies substantially within 20 km of the site, on the scale of many geologic structures, (4) geophysical data can be useful in modeling subsurface igneous structure, and (5) uncertainties are large in conceptual models of small basaltic volcanism.

Dr. Hinze observed that one conclusion of the Volcanism Basin and Range project should be that indirect effects are also important. Dr. Trapp noted that a deficiency in DOE's program includes alternative models and their effect on probability. If more money were available, staff would fund more work in geophysics.

Conclusions/Action Items

The Committee agreed that many of its questions about the NRC volcanology research program were clarified by the presentation.

Some Committee questions remained unanswered. These questions are expected to be the subject of future communications between the Committee and the Office of Nuclear Regulatory Research (RES) and Office of Nuclear Materials Safety and Safeguards (NMSS) staffs.

In response to the request from Chairman Selin that the Committee assess the NRC HLW research programs, the Committee plans to prepare a report on its review of several technical topics in the HLW research and NMSS technical assistance programs, including this topic.

III. MULTI-PURPOSE CANISTER CONCEPT (Open)

[Note: Mr. Giorgio N. Gnugnoli was the Designated Federal Official for this part of the meeting.]

Dr. Steindler announced that the representatives of the DOE would make a presentation first followed by the NRC staff. He introduced Mr. Jeff Williams, Office of Storage and Transportation, DOE.

DOE Staff Presentation

Mr. Williams provided an overview of the multi-purpose canister (MPC) concept and what has been accomplished during the last year.

For each phase of this MPC's utility, there is an additional outer package system for each of the three phases (e.g., dry storage/concrete outer package at the reactor site, a specific truck or rail-designed outer cask, and a final disposal outer container). As the MPC is shifted from the storage pool to the dry storage area, or from the storage area to a transportation mode, or from rail/truck transportation casks to the disposal canister, each phase of the handling is expected to be compatible for the vast majority of spent nuclear fuel.

Mr. Williams indicated that the DOE had decided to proceed with the deployment of the MPC as a waste package option. The questioning from the Committee focused on the criticality concerns, especially from the perspective of thermal loading perspectives. The DOE presenters indicated that a borated aluminum criticality control strategy was being pursued. Of note was DOE's intent to proceed with a horizontal emplacement strategy, which is expected to keep the poisons and fuel elements intermixed. Dr. Steindler raised the concern that a criticality event could alter the presently held dispersion mechanisms and could impact the accessible environment. The DOE presenters acknowledged the possibility of a criticality event leading to enhanced transport through the geosphere. Dr. Steindler also suggested additional investigation into technetium,

iodine and actinide as the real actors resulting from criticality-induced failure, release and transport.

NRC Staff Presentation

The NRC staff presented the storage and transport licensing perspective; no formal presentation was provided by the NRC staff associated with licensing waste packages for disposal. Various designs have been submitted to the NRC Division of Industrial and Medical Nuclear Safety (IMNS) for single or dual purpose (storage and transportation) licensing. Mr. Charles Haughney, IMNS, presented slides showing storage and internal transport questions at actual nuclear power plant sites. The IMNS staff is actively reviewing license requests to extend certain storage canister systems for dual purpose. The driving force is the need on the part of utilities to close down the SNF pools. He observed that the greater stringency of transportation as driven by the need to avoid accidents in transportation, where the ability to deal with accident impacts is greatly reduced as compared to the facilities and services at nuclear power plant facilities. Mr. Haughney concluded his presentation by pointing out the increased level of interest, the dwindling storage space at nuclear power plants, the need to terminate SNF pool storage operations (primarily due to cost) all in light of dwindling NRC licensing and technical resources.

Conclusions/Action Items

The Committee decided that, following the decision by DOE with regard to the RFPA, the Commissioners' technical assistants should be contacted by ACNW staff to determine the urgency and level of importance with which the Committee should investigate and consider the subject.

IV. MEETING WITH THE DIRECTOR OF THE WASTE MANAGEMENT DIVISION, NMSS (Open)

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

Dr. Malcolm R. Knapp, Director of the Waste Management Division, NMSS, introduced Dr. M. Bell, Branch Chief, and Mr. Richard Weller as additional contributors to his presentation. In addition to briefing the Committee on the relevant aspects of the "important to safety" (ITS) issue included in the proposed 10 CFR Part 60 Design Basis Event (DBE) Rulemaking, he intended to provide some general

comments on his new Division and a few program areas, as well as present his thoughts on future interactions with the Committee.

Dr. Knapp explained that the staff position has not yet been firmed and the Committee, therefore, was going to be presented with the current "work-in-progress" status.

After presenting the chronology of the proposed DBE rule, he discussed the relevant DOE petition, indicating that DOE noted a lack of numerical dose criteria to identify the need for, and adequacy of, engineered safety features. In response to the DOE recommendations, the staff is attempting to define what it considers the truly "ITS" issues. He noted the ACNW letter to James M. Taylor, Executive Director for Operations, dated June 2, 1992, on this subject and the recent Commission SRM redirection, which stated that the staff should:

- Reconsider the proposed functional definition of "ITS,"
- consider other methods for determining structures, systems and components are important to safety (SSCITS),
- consider public/worker dose levels in other rules in developing the "ITS" definition,
- retain the definition of "controlled-use area" and other proposals in SECY-92-408, and
- seek the views of the ACNW on subsequent DBE Commission papers.

The major issue he believed was the lack of a clear definition for determining which are "SSCITS." The definition of "ITS" features is important to the design/quality assurance requirements. Although the staff would consider various alternatives for defining "SSCITS," Dr. Knapp believed that the staff preference was for a hybrid definition that would be partly functional and partly dose-based. Such a definition would focus strongly on the functional requirements of the "ITS" features as well as the dose basis for their identification. He presented the current staff proposed "straw man" definition, which resulted in a discussion on some of the wording. Dr. Knapp stated the rationale behind the current staff wording and his assessment of the efficacy of the proposed "ITS" definition, summing up with his perception that it was responsive to the Commission's SRM.

After presenting the ANSI/ANS 57.9 classification of DBEs and partial listings of anticipated "Q" list items "ITS" and those not selected as "ITS," a discussion ensued as to how items were placed on the "Q" list. Dr. Bell noted that the DOE had three basic

criteria, deciding that an item was important for radiological safety reasons, was within the class of items that it considered important to waste isolation, or else was a class of activities that should be included because DOE wants the repository to be considered a safe facility. (A possible example of an item in the latter category could be the men-and-materials shaft, which would contribute to the rapid egress of personnel from the underground facility should there be an "event." This is a DOE category known as "direct inclusion.") Several members expressed their views on the items indicated on the "Q" and "non-Q" listings.

Among the other Committee queries/comments:

- What is the proper extent for the staff to address worker protection? (How would it compare with the protection provided to nuclear power plant facility workers, i.e., assembling in the control room should there be an unlikely event?)
- "Q" lists must be both site and facility specific (Dr. Garrick noted that his experience involved two adjacent facilities).
- Are there guidelines at the Waste Isolation Pilot Plant that might apply in the definition of "ITS?"
- It was suggested that "ITS" should be more closely tied to current thoughts regarding PRA, et al. (Additional discussions were related to the similarities and dissimilarities of reactors and the repository insofar as episodic and routine events, nature of releases, etc.)

Mr. James Wolf, Office of the General Counsel, interjected that a distinction must be made between "ITS" vs. important to waste isolation. This must be addressed from a preclosure perspective; postclosure considerations are not applicable.

Dr. Moeller commented that, from a radiation protection consistency perspective, SI units should be inserted. He also noted that the proposed onsite worker dose limit is that specified in the revised "Planned Special Exposures" section in 10 CFR 20.1206. The implications of that proposal should be recognized. Considerable relevant discussion followed.

Shifting to some general observations related to the functioning of his new Division, Dr. Knapp noted that for the next six months or so he would concentrate on the HLW-related issues while his Deputy, Dr. J. Greeves, would focus on the LLW issues. His two major management concerns were, how to utilize the Divisions' available resources effectively, including resource allocation among projects, and how to best employ his current matrix organization.

Dr. Knapp noted that he would like to reach closure on several issues, including Substantially Complete Containment (SCC), "ITS," uncertainties related to groundwater travel time (GWTT), the most constructive closure of the volcanism issue (what must be done and where to go), the continuing emphasis on the Yucca Mountain Project Office on-site QA program, the need to increase interactions with the State of Nevada and other interested parties, and the need to be responsive to the DOE Yucca Mountain schedule. He stated that, although Rev. 0 of the LARP would be out shortly, it should be recognized that due to resource limitations it may not be possible to provide guidance documents either as quickly or as complete as desired.

Current objectives are to schedule a briefing on the SCC issue with the Committee in July, followed later by the GWTT issue. Insofar as the ITS issue, he intends to come back to the Committee at its June meeting, as the Commission has directed the staff to provide its recommended resolution by the end of July.

In response to a question from Dr. Pomeroy as to what guidance documents would be shifted, Dr. Knapp noted that, of the 97 review plans in the LARP, only two are complete. The Division of Waste Management intends to complete the others in response to DOE's requirements. Also, instead of being "gold-plated," documents may only be "brass-plated"-sufficient for meaningful guidance, but not 100 percent complete.

Dr. Knapp concluded by stating that he liked the timing of this review and intended to continue such a practice in the future, if possible. He indicated his pleasure with the interactions at this meeting and stated that at this stage in the development of a staff position the effort was not too labor intensive.

In closing, Dr. Steindler stated that the Committee was looking forward to further interactions and would provide coherent comments on the ITS issue in the next few weeks.

Conclusions/Action Items

Dr. Steindler requested that the other members transmit their comments on the "important to safety" issue to him within four working days regarding Dr. Knapp's briefing.

Dr. Knapp agreed to return during the 65th ACNW meeting to continue discussion on issues of mutual concern, including the status of the "important to safety" issue. The Committee expects to develop a report on this issue during the June meeting as directed by the Commission.

V. REPORT ON THE NUCLEAR WASTE TECHNICAL REVIEW BOARD MEETING HELD ON APRIL 11-13, 1994 (Open)

[Note: Ms. Lynn Deering was the Designated Federal Official for this part of the meeting.]

Oral reports were given by Dr. Pomeroy and Ms. Deering on the Nuclear Waste Technical Review Board (NWTRB) meeting on the lessons learned in site assessment for critical facilities and saturated zone hydrology, held in Reno, Nevada. Dr. Pomeroy discussed several presentations on lessons learned held April 11, 1994, and Ms. Deering discussed several presentations on saturated zone hydrology held on April 12, 1994.

Dr. Pomeroy noted that the NWTRB meeting came about because of the rejection of the proposed Martinsville, Illinois, LLW Repository Site. He discussed highlights from talks given by Mr. Bill Hall, a member of the Martinsville Siting Commission, and Mr. Fred Snyder, Raytheon Engineering, who reviewed the report on behalf of DOE to provide feedback to the States. Highlights of Dr. Pomeroy's talk include:

- Mr. Fred Snyder raised several concerns in reviewing the report. First, there is a need to have standards in place before a siting process. There were no specific criteria in place within the management act of the state. Without standards in place, any degree of stringency can be applied, and if absolute proof becomes required, it is not achievable. Second, there was uncertainty in the source term that apparently convinced the Board that uncertainty robs the analysis of credibility. Thirdly, the applicant could not prove "leak-tight" operation of the durability of the concrete for a period of 500 years."

Other important points from Mr. Snyder include the importance of QA procedures, the magnitude for potential errors was large in using groundwater models, the site was not adequately characterized and modeled, and the Siting Board equated uncertainty to mean error.

- Dr. Wendell Wert, Waste Isolation Pilot Plant (WIPP), stated that (1) PA is a powerful tool for resource allocations and site characterization but it is only as good as the data it is based on; (2) you should have a good site to make it through the process, and (3) do not oversell or over-simplify the attributes of the site, and (4) involve the stakeholders early and meaningfully -- the WIPP staff did not do a good job of this.

- Mr. Jim Divine, USGS, discussed the Teton Dam that failed shortly after it was built by the Bureau of Reclamation. He noted that two USGS geologists, who were not involved in building the Dam, noticed some weak structures on the rock on the abutment, which they reported. However, the emotion and sense of urgency was stripped from their report, and they were ignored. He concluded that there was a failure to communicate.
- Mr. Russ Dyer summed up in the roundtable at the meeting that early and iterative performance assessment is very important, procedural issues are as important as technical issues, and public involvement and external experts is important.
- Miscellaneous ideas conveyed include (1) do not establish regulations unless they can be met, (2) need clear regulations, and (3) need a well defined process.
- Dr. Linda Lehman, L. Lehman and Associates, talked about the possibility that some faults could be channeling water from the north, while others may serve as barriers. She attempted to correlate changes in water table elevation with earthquake events. Water levels did different things in different wells in response to a series of earthquakes last June, which she tried to relate to faulting.
- Mr. Rick Spengler, USGS, reported on the Sundance Fault. He described a new possible interpretation by Mr. Chris Freidrich, USGS. Dr. Pomeroy noted a difference between two maps provided by Mr. Spengler. Dr. Pomeroy noted that Mr. Spengler was asked about the significance of the Sundance Fault, but he did not provide a clear answer. Mr. Jeromy Boak later responded that the fault could affect the available area of waste, and could serve as a pathway, and this is what DOE is evaluating in performance assessment in a more global way, i.e., not specific to the Sundance Fault, but faults in general.

Ms. Deering focused on a talk given by Ms. Jean Yonker, M&O, on the strategy of DOE to approach GWTT. Highlights from her talk include:

- Ms. Deering reminded the Committee that the NWTRB briefed the Commission in March 1994, and noted during this briefing that GWTT is not a good measure of site performance. The NWTRB recommended that the NRC change 10 CFR Part 60 to require percolation flux or some other measure other than GWTT. The NWTRB is preparing a letter to the NRC to clarify what it meant by this recommendation. Ms. Deering observed that percolation flux would be problematic in that it is specific

to the unsaturated zone, whereas 10 CFR Part 60 is to be generic for any site. Ms. Deering noted that the NWTRB's concern is that GWTT may not be a good measure of site performance because it addresses pre-waste emplacement. She also mentioned that the NRC staff has completed generic calculations that indicate if a 1,000 year GWTT can be met, that the performance objectives can also be met. The Commission sent a Staff Requirements Memorandum (SRM) requesting information on what the staff is doing on the GWTT issue.

- The DOE is concerned about GWTT because it also appears in the DOE Siting Guidelines, 10 CFR Part 960. The DOE is anxious to know how the NRC is going to apply and interpret this requirement in 10 CFR Part 60, so that DOE can interpret its own requirement in Part 960. Ms. Deering noted that DOE probably cannot make a finding on site suitability until it clarifies how to interpret and apply the GWTT requirement.
- Ms. Deering stated that the DOE presented its current thinking on GWTT. The DOE is interpreting the requirement to mean particle transport, thus would predict a distribution of radionuclide particles in space and time. This adds transport on top of the velocity field. This is a very different interpretation than the NRC's interpretation. Ms. Deering pointed out that 10 CFR Part 960 includes language, "... likely and significant radionuclide travel," which suggests some pathways are more important than others. Ms. Deering speculated that the DOE is going with a radionuclide particle distribution approach, rather than water velocity, to be able to account for the fact that some pathways, such as rapid flow through fractures, do not meet the 1,000 year GWTT requirement, but they are perhaps not significant with respect to radionuclide transport. This would allow the DOE greater flexibility in meeting the GWTT requirement.
- Ms. Deering informed the Committee that the NWTRB plans to have another meeting in the fall on GWTT. The NRC and DOE may also meet in the future to discuss DOE's strategy.
- Ms. Deering disclosed that Mr. Steve Frischman, State of Nevada, responded to the DOE at the NWTRB meeting that DOE is changing its philosophy of GWTT in the Nuclear Waste Policy Act, from GWTT serving as a measure of the goodness of the site, to a measure of waste and repository performance, hence DOE would need to go through the formal process of changing a rule or regulation to adopt this interpretation.

Conclusions/Action Items

Dr. Pomeroy recommended that Mr. William Hall, Member of Siting Commission, and Mr. Fred Snider, Raytheon/Ebasco, be invited to brief the Committee on the lessons learned from the activities of the Illinois LLW Disposal Facility Siting Commission (proposed site at Martinsville, Illinois).

The Committee will maintain an awareness of the NRC staff capability and the scope of the NRC and DOE activities in this area. Also, the Committee will continue to maintain an awareness of the NWTRB activities. No Committee action was taken at this time.

VI. ASSESSMENT OF LOW-LEVEL WASTE PERFORMANCE ASSESSMENT PROGRAM
(Open)

The Committee continued its discussions on the results of the Working Group meeting that reviewed the NRC's low-level radioactive waste (LLW) performance assessment program.

Conclusions/Action Items

The Committee discussed a draft report to the Commission on this subject. The Committee agreed to continue its deliberation on this report during the 64th ACNW meeting.

VII. EXECUTIVE SESSION (Open/Closed)

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

A. New Members (Closed)

The Committee discussed potential candidates for nomination to be an ACNW member. A slate of candidates is expected to be completed during the May ACNW meeting for submission to the Commission.

B. Future Committee Activities

The Committee discussed anticipated and proposed Committee activities, future meeting dates and agenda.

- The Working Group on NRC Staff Capabilities in Performance Assessment and Computer Modeling of High-Level Waste Disposal Facilities will meet on May 16, 1994

- The 64th ACNW meeting dates have been changed from May 18-19, 1994, to May 17-18, 1994. The 65th ACNW meeting dates have been changed from June 22-23, 1994, to June 29-30, 1994.
- Dr. Hinze reminded the members that Mr. Harold Lefevre, NMSS, plans to brief the Committee on the lessons learned from the review of the DOE Topical Report on Extreme Erosion.

D. Future Meeting Agenda

Appendix IV summarizes the proposed items endorsed by the Committee for the 64th ACNW Meeting, May 17-18, 1994, and future Working Group meetings.

The meeting was adjourned at 4:00 p.m., Thursday, April 21, 1994.

Arlington, VA 22230. Telephone: (703) 306-1760.

Purpose of Meeting: To provide advice and recommendations concerning proposals submitted to NSF for financial support.

Agenda: To review and evaluate the Methodology, Measurement, and Statistic proposals as part of the selection process for awards.

Reason for Closing: The proposals being reviewed included information of a proprietary or confidential nature, including technical information; financial data, such as salaries; and personal information concerning individuals associated with the proposals. These matters are exempt under 5 U.S.C. 552b(c), (4) and (6) of the Government in the Sunshine Act.

Dated: April 8, 1994.

M. Rebecca Winkler,
Committee Management Officer.

[FR Doc. 94-8948 Filed 4-13-94; 8:45 am]
BILLING CODE 7550-01-M

NUCLEAR REGULATORY COMMISSION

Abnormal Occurrence Report Section, 208 Report Submitted to the Congress

Notice is hereby given that pursuant to the requirements of section 208 of the Energy Reorganization Act of 1974, as amended, the Nuclear Regulatory Commission (NRC) has published and issued another periodic report to Congress on abnormal occurrences (NUREG-0090, Vol. 16, No. 3).

Under the Energy Reorganization Act of 1974, which created NRC, an abnormal occurrence is defined as "an unscheduled incident or event that the Commission (NRC) determines is significant from the standpoint of public health or safety." NRC has made a determination that events involving an actual loss or significant reduction in the degree of protection against radioactive properties of source, special nuclear, and by-product material are abnormal occurrences.

The report to Congress is for the third calendar quarter of 1993. The report identifies the occurrences or events that the Commission determined to be significant and reportable; the remedial actions that were undertaken are also described.

This report discusses two abnormal occurrences at NRC-licensed facilities. One involved a medical sodium iodide misadministration and one involved a 1981 fatal radiation exposure of a radiographer. One industrial radiographer overexposure event and four medical misadministrations that were reported by the Agreement States are also discussed, based on information provided by the Agreement States as of

November 1, 1993. The report also contains information updating four previously reported abnormal occurrences at NRC-licensed facilities and three reported by the Agreement States, and includes information on two other events of interest.

Appendix D has been added to this report which includes events submitted by Agreement States that are likely to be categorized as abnormal occurrences. For these events, insufficient information was available as of November 1, 1993, to positively identify them as abnormal occurrences.

A copy of the report is available for inspection or copying for a fee at the NRC Public Document Room, 2120 L Street NW. (Lower Level), Washington, DC 20555, or at any of the nuclear power plant Local Public Document Rooms throughout the country.

Copies of NUREG-0090, Vol. 16, No. 3 (or any of the previous reports in this series), may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Post Office Box 37082, Washington, DC 20013-7082. A year's subscription to the NUREG-0090 series publication, which consists of four issues, is also available.

Copies of the report may also be purchased from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161.

Dated at Rockville, MD this 8th day of April, 1994.

For the Nuclear Regulatory Commission,
John C. Hoyle,
Assistant Secretary of the Commission.
[FR Doc. 94-9007 Filed 4-13-94; 8:45 am]
BILLING CODE 7550-01-M

Advisory Committee on Nuclear Waste Meeting

The Advisory Committee on Nuclear Waste (ACNW) will hold its 63rd meeting on Wednesday and Thursday, April 20 and 21, 1994, in room P-110, 7920 Norfolk Avenue, Bethesda, Maryland.

The entire meeting will be open to public attendance, with the exception of a portion that may be closed to discuss information the release of which would represent a clearly unwarranted invasion of personal privacy pursuant to 5 U.S.C. 552b(c)(6).

The agenda for the subject meeting shall be as follows: Wednesday, April 20, 1994—8:30 a.m. until 6 p.m.; Thursday, April 21, 1994—8:30 a.m. until 6 p.m.

During this meeting the Committee plans to consider the following:

A. Volcanism Studies Underway in the Characterization of the Yucca Mountain Site—Discuss site characterization studies related to volcanism with the DOE staff and gain additional insights into the NRC staff's volcanology research program.

B. Nuclear Waste Technical Review Board Meeting on Saturated Zone Hydrology—Hear a report from ACNW members and staff that attended this meeting.

C. Multi-Purpose Canister (MPC) Concept—Discuss with the DOE and NRC staffs the MPC concept which utilizes a single canister for spent fuel storage, transportation and disposal.

D. Meet with the Director of the Waste Management Divisions, NMSS—Discuss the status of staff progress in resolving the "important to safety" issue as related to the DOE petition to revise the design basis accident for a high-level waste repository and other items of possible interest.

E. Future Activities—Discuss topics proposed for consideration by the full Committee and working groups.

F. New Members—Discuss matters related to the appointment of new members, and organizational and personnel matters related to the ACNW members and ACNW staff. Portions of this session may be closed to public attendance to discuss information the release of which would represent a clearly unwarranted invasion of personal privacy pursuant to 5 U.S.C. 552b(c)(6).

G. Miscellaneous—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 June 6, 1988 (53 FR 20699). 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. The ACRS Office is providing staff support for the ACNW. Persons desiring to make oral statements should notify the Executive Director of the ACRS Office as far in advance as practical 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 Executive Director of the office of the ACRS, Dr. John T. Larkins (telephone 301/492-4516), 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 the ACNW Executive Director or call the recording (301/492-4600) for the current schedule if such rescheduling would result in major inconvenience.

Dated: April 8, 1994.

John C. Hoyle,

Advisory Committee Management Officer.

[FR Doc. 94-8913 Filed 4-13-94; 8:45 am]

BILLING CODE 7590-01-M

[Docket No. 50-440]

The Cleveland Electric Illuminating Co., et al.; Notice of Consideration of Issuance of Amendment to Facility Operating License and Opportunity for a Hearing

The U.S. Nuclear Regulatory Commission (the Commission) is considering issuance of an amendment to Facility Operating License No. NPF-58, issued to The Cleveland Electric Illuminating Company, Centenor Service Company, Duquesne Light Company, Ohio Edison Company, Pennsylvania Power Company, and Toledo Edison Company (the licensee), for operation of the Perry Nuclear Power Plant, Unit No.1, located in Lake County, Ohio.

The proposed amendment, requested by the licensee by letter of December 16, 1993, would represent a full conversion from the current Technical Specifications (TS) to a set of TS based on NUREG-1434, "Improved BWR/6 Technical Specifications," Revision O, September 1992. NUREG-1434 has been developed through working groups composed of both NRC staff members and the BWR/6 owners and has been endorsed by the staff as part of an industry-wide initiative to standardize and improve TS. As part of this submittal, the licensee has applied the criteria contained in the Final NRC Policy Statement on Technical Specification Improvements to the current Perry Nuclear Power Plant Technical Specifications utilizing BWR Owners' Group (BWROG) report NEDO-31466, "Technical Specification Screening Criteria Application and Risk

Assessment," (and Supplement 1) as incorporated in NUREG-1434.

The licensee has categorized the proposed changes into four general groupings. These groupings are characterized as administrative changes, relocated changes, more restrictive changes, and less restrictive changes.

Administrative changes are those that involve reformatting, renumbering and rewording of the existing TS. The reformatting, renumbering and rewording process reflects the attributes of NUREG-1434 and do not involve technical changes to the existing TS. Such changes are administrative in nature and do not impact initiators of analyzed events or assumed mitigation of accident or transient events.

Relocated changes are those involving relocation of requirements and surveillances for structures, systems, components or variables that do not meet the criteria of inclusion in TS as identified in the Application of Selection Criteria to the Perry TS. The affected structures, systems, components or variables are not assumed to be initiators of analyzed events and are not assumed to mitigate accident or transient events. The requirements and surveillances for these affected structures, systems, components or variables will be relocated from the TS to administratively controlled documents. Changes made to these documents will be made pursuant to 10 CFR 50.59. In addition, the affected structures, systems, components or variables are addressed in existing surveillance procedures which are also subject to 10 CFR 50.59 and subject to the change control provision in the Administrative Controls Section of the TS. These proposed changes will not impose or eliminate any requirements.

More restrictive changes are those involving more stringent requirements for operation of the facility. These more stringent requirements do not result in operation that will alter assumptions relative to mitigation of an accident or transient event. The more restrictive requirements continue to ensure process variables, structures, systems and components are maintained consistent with the safety analyses and licensing basis.

Changes characterized as less restrictive have been subdivided into four additional subcategories. They include:

(A) *Relocating details to TS Bases, the Updated Safety Analysis Report (USAR), or procedures.* The requirements to be transposed from the TS to the Bases, USAR or procedures are the same as those currently included in

the existing TS. The TS Bases, USAR and procedures containing the relocated information are subject to 10 CFR 50.59 and are subject to the change control provisions in the Administrative Controls section of the TS.

(B) *Extension of instrumentation surveillance test intervals (STIs) and allowed outage times (AOTs).* The proposed changes affect only the STIs and AOTs and will not impact the function of monitoring system variables over the anticipated ranges for normal operation, anticipated operational occurrences, or accident conditions. However, the changes are expected to reduce the test related plant scrams and test induced wear on the equipment. General Electric topical reports GENE-770-06-1 and GENE-770-06-2 showed that the effects of these extensions of STIs and AOTs, which produced negligible impact, are bounded by previous analyses. Further, the NRC has reviewed these reports and approved the conclusions on a generic basis.

(C) *Relocation of instrumentation only requirements (which provide no post-accident function).* These requirements are part of routine operational monitoring and are not considered in the safety analysis. Changes made to the Bases, USAR and procedures containing the relocated information will be made in accordance with 10 CFR 50.59 and are subject to the change control provisions in the Administrative Controls section of the TS. These proposed changes will not impose or eliminate any requirements.

(D) *Other less restrictive changes.* Additional changes that result in less restrictions in the TS are discussed individually in the licensee's submittal.

Before issuance of the proposed license amendment, the Commission will have made findings required by the Atomic Energy Act of 1954, as amended (the Act) and the Commission's regulations.

By May 18, 1994, the licensee may file a request for a hearing with respect to issuance of the amendment to the subject facility operating license and any person whose interest may be affected by this proceeding and who wishes to participate as a party in the proceeding must file a written request for a hearing and a petition for leave to intervene. Requests for a hearing and petitions for leave to intervene shall be filed in accordance with the Commission's "Rules of Practice for Domestic Licensing Proceedings" in 10 CFR Part 2. Interested persons should consult a current copy of 10 CFR 2.714, which is available at the Commission's Public Document Room, the Gelman Building, 2120 L Street NW.,



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

April 1, 1994

SCHEDULE AND OUTLINE FOR DISCUSSION
63RD ACNW MEETING
APRIL 20-21, 1994
BETHESDA, MARYLAND

Wednesday, April 20, 1994, Room P-110, 7920 Norfolk Avenue,
 Bethesda, Maryland

- | | |
|---|--|
| <p>1) 8:30-8:45 a.m.</p> | <p>⁴⁰</p> <p><u>Opening Remarks by ACNW Chairman (Open)</u>
 1.1) Opening Remarks (MJS/RKM)
 1.2) Items of Current Interest (MJS/RKM)</p> |
| <p>2) 8:45-1:00 p.m.</p> | <p><u>Volcanism Studies Underway in the
 Characterization of the Yucca Mountain Site
 (Open) (WJH/LGD)</u>
 2.1) Introduction by W. Hinze (WJH/LGD)
 2.2) Additional Insights into NRC's
 Volcanology Research Program -
 Relationship to other pertinent
 research and resolution of key
 technical uncertainties</p> |
| <p>8:45-8:50 a.m.
 8:50-10:15 a.m.
 1:15</p> | <p>* * * BREAK * * *</p> |
| <p>9:55 ¹⁰
 10:15-10:30 a.m.
 8:45 ^{12:15}
 10:30-1:00 p.m.</p> | <p>2.3) DOE site characterization studies
 related to volcanism at the Yucca
 Mountain Site</p> |
| <p>12:15 ^{1:15}
 1:00-2:00 p.m.</p> | <p>* * * LUNCH * * *</p> |
| <p>3) 10:35-noon
 2:00-3:00 p.m.
 Thursday</p> | <p><u>Report on Nuclear Waste Technical Review
 Board Meeting on Saturated Zone Hydrology
 (Open) (WJH/PWP/LGD)</u>
 3.1) Report by ACNW Members and staff of
 recent (4/11-13/94) NWTRB meeting in
 Reno, NV</p> |
| <p>4) 3:10
 3:00-6:00 p.m.</p> | <p><u>Review of Current Issues Associated with
 the Multi-Purpose Canister (MPC) Concept
 (Open) (MJS/GNG)</u>
 4.1) NRC efforts to establish a review plan
 for the MPC concept (1/2 hr.)
 4.2) NRC coordination of storage/
 transportation licensing with disposal
 specifications (1/2 hr.)</p> |
| <p>5:15
 3:00-3:30 p.m.
 ^{5:40}
 3:30-4:00 p.m.</p> | <p>* * * BREAK * * *</p> |
| <p>2:55 ^{3:10}
 4:00-4:15 p.m.</p> | <p>* * * BREAK * * *</p> |

[= Transcribed portion of Meeting

Wednesday, April 20, 1994 (Continued)

3:10 5:15
~~4:15-6:00~~ p.m.

- 4.3) DOE progress on the MPC concept -
 Current status, technical
 considerations, etc. (2 hrs.)

30
~~6:00~~ p.m.

RECESS

Thursday, April 21, 1994, Room P-110, 7920 Norfolk Avenue, Bethesda, Maryland

5) 8:30-10:00¹⁵ a.m.

- Discussion with the Director of Waste Management Division, NMSS (Open) (MJS/HJL)
 5.1) Status report on staff progress in resolving "important to safety" issue as related to DOE petition to revise the design basis accident for a high-level waste repository.
 5.2) Other areas of mutual Waste Management Division Staff/ACNW interfaces

10:00-10:15¹⁵ a.m.
 3:30 4:00³⁵ p.m.
 6) ~~10:15-12:00~~ Noon

* * * BREAK * * *
 (See Item 3)

Committee Activities/Future Agenda
 (Open/Closed) (MJS/RKM)

- 6.1) Set May Agenda; confirm meeting dates for May/June
 6.2) Review Items for the Out Months
 6.3) Pending Products to the Commission
 6.4) Calendar of upcoming events
 6.5) Appointment of Members (Closed)
 6.6) Others

12:30 - 1:45 p.m. —

12:00-1:00 p.m.

* * * LUNCH * * *

7) 1:00-4:00⁴⁵ p.m.

- Preparation of ACNW Reports (Open)
 Discuss potential ACNW reports regarding:
 7.1) LLW PA
 7.2) Volcanology RES/TA
 7.3) Use of Natural Analogs
 7.4) MPC deployment
 7.5) Others

4:00 p.m.

ADJOURN

APPENDIX III: MEETING ATTENDEES

63RD ACNW MEETING
APRIL 20-21, 1994

<u>ACNW MEMBERS</u>	<u>1st Day</u>	<u>2nd Day</u>
Dr. Martin J. Steindler	<u> X </u>	<u> X </u>
Dr. William J. Hinze	<u> X </u>	<u> X </u>
Dr. B. John Garrick	<u> X </u>	<u> X </u>
Dr. Paul W. Pomeroy	<u> X </u>	<u> X </u>

<u>ACNW CONSULTANTS</u>	<u>1st Day</u>	<u>2nd Day</u>
Dr. Kenneth Foland	<u> X </u>	<u> X </u>
Dr. Dade W. Moeller	<u> X </u>	<u> X </u>
Dr. Paul G. Shewmon	<u> X </u>	<u> </u>

<u>ACNW STAFF</u>	<u>1st Day</u>	<u>2nd Day</u>
Ms. Lynn F. Deering	<u> X </u>	<u> X </u>
Mr. Giorgio N. Gnugnoli	<u> X </u>	<u> X </u>
Dr. John T. Larkins	<u> X </u>	<u> X </u>
Mr. Howard J. Larson	<u> X </u>	<u> X </u>
Mr. Richard K. Major	<u> X </u>	<u> X </u>
Dr. Richard P. Savio	<u> X </u>	<u> </u>
Mr. H. Stanley Schofer	<u> X </u>	<u> X </u>
Mr. John L. Minns	<u> X </u>	<u> X </u>

- [Viewgraphs]
13. Perspectives No. 18: Computer Modeling, Part 1; Accept its Use and Value with Reasoned Skepticism, by Allen W. Hatheway, AEG News, 37/1, Winter 1994
- 3 Report on Nuclear Waste Technical Review Board Meeting on Saturated Zone Hydrology
14. The Sundance Fault: A Newly Recognized Shear Zone at Yucca Mountain, Nevada, U.S. Geological Survey Open-File Report 94-49
15. Administration Funding Proposal: Description, dated April 11-12, 1994, Presented by Stephan J. Brocoum at the Nuclear Waste Technical Review Board Meeting [Viewgraphs]
- 7 Preparation of ACNW Reports
16. Comments from the Review of the NRC's BTP on PA for LLW Disposal Sites, dated April 21, 1994 [Handout #2]
- 6 Committee Activities/Future Agenda

MEETING NOTEBOOK CONTENTS

TAB
NUMBER

DOCUMENTS

1. Introductory Statement by ACNW Chairman
2. Items of Interest, undated
- 2 Volcanism Studies Underway in the Characterization of the Yucca Mountain Site
3. Table of Contents
4. Status Report
5. Note to Abraham Eiss from Lynn Deering, dated March 29, 1994, regarding Request for Staff Participation in 63rd ACNW Meeting, with enclosure
6. Memorandum to ACNW Members from Lynn Deering, dated March 21, 1994, regarding Summary of NWTRB Meeting on Probabilistic Seismic and Volcanic Hazard Estimation, San Francisco, CA, March 8-9, 1994, with enclosure
7. Update on Volcanism Investigations, Presented by Frank Perry, Los Alamos National Laboratory, at the NWTRB Meeting, March 8-9, 1994

APPENDIX IV: FUTURE AGENDA

64th ACNW Committee Meeting on May 17-18, 1994 (Tentative Agenda)

Tectonics of the Proposed Yucca Mountain Site - Discuss research and technical assistance being performed by the NRC staff and the Center for Nuclear Waste Regulatory Analyses related to the tectonics of the Yucca Mountain site.

National Academy of Science's Panel on the Technical Bases for Yucca Mountain Standard - Hear a report from a member of ACNW who attended an April 28-29, 1994 meeting of the Academy's Panel to update the Committee on current progress.

Preparation of ACNW Reports - Prepare ACNW reports on issues considered during this and previous meetings.

Future Activities - Discuss topics proposed for consideration by the full Committee and working groups.

New Members - Discuss matters related to the appointment of new members, and organizational and personnel matters related to the ACNW members and ACNW staff. Portions of this session may be closed to public attendance to discuss information the release of which would represent a clearly unwarranted invasion of personal privacy pursuant to 5 U.S.C. 552b(c)(6).

Miscellaneous - 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.

Working Group Meetings

NRC Staff Capabilities in Performance Assessment and Computer Modeling of High-Level Waste Disposal Facilities, May 16, 1994, Bethesda, Maryland (Giorgio Gnugnoli) - The Working Group will discuss progress in the NRC's Iterative Performance Assessment (PA) Program, the NRC staff's completion of an expert elicitation exercise, and progress in the execution of the NRC's modular computer model. These discussions will be performed periodically, along with the review of NRC reports, to remain apprised of the degree of in-house and contractor-supported PA capability, the coordination and integration between data analysts and computer modelers, revisions to the High-Level Radioactive Waste Management PA Strategy Plan, and future plans for PA development.

Groundwater Age Dating, Date to be determined, Bethesda, Maryland (Lynn Deering) - The Working Group will discuss the results of groundwater age dating at the proposed Yucca Mountain site and implications of the results on groundwater travel time and flow paths.

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

DOCUMENTS

ITEM NO.

- 2 Volcanism Studies Underway in the Characterization of the Yucca Mountain Site
 1. Overview of the Yucca Mountain Project Volcanism Program, dated April 20, 1994, Presented by Jeanne C. Nesbit, Yucca Mountain Site Characterization Project [Viewgraphs]
 2. Update on Characterization of Volcanic Features, dated April 20, 1994, Presented by Frank Perry, Los Alamos National Laboratory [Viewgraphs]
 3. Probabilistic Volcanic Risk Assessment, dated April 20, 1994, Presented by Bruce Crowe, Los Alamos National Laboratory [Viewgraphs]
 4. Physical Processes of Magmatism and Effects on the Potential Repository, undated [Viewgraphs]
 5. NRC HLW Research on Volcanism, dated April 20, 1994, Presented by Linda A. Kovach, RES [Viewgraphs]

- 4 Review of Current Issues Associated with the Multipurpose Canister (MPC) Concept
 6. List of Participants for MPC Discussion, undated
 7. Status of Multi-Purpose Canister System Development, dated April 20, 1994, Presented by Jeff Williams, OCRWM [Viewgraphs]
 8. MPC/Waste Package Technical Considerations, dated April 20, 1994, Presented by Hugh A. Benton, Manager, OCRWM [Viewgraphs]
 9. Focused MGDS - Advanced Conceptual Design Status, dated April 20, 1994, Presented by Alan Berusch, OCRWM [Viewgraphs]
 10. MPC-Related Documents, including Proposed FRN: Exemption for Canisters for Vitrified HLW wrt Double Containmentment and DOE-Generated Report on November 17-18, 1994 MPC Workshop [Handout #1]

- 5 Meeting with the Director of Waste Management Division, NMSS
 11. Memorandum to Martin Steindler, ACNW Chairman, from Giorgio Gnugnoli, dated January 10, 1994, regarding Definition of "Important to Safety," with enclosure [Handout #3]
 12. "Important to Safety" Briefing to Advisory Committee on Nuclear Waste: Design Basis Events (DBE) for the Geological Repository Operations Area, dated April 21, 1994

ATTENDEES FROM THE NUCLEAR REGULATORY COMMISSION

D. Dancer	DWM	E. O'Donnell	RES
N. Eisenberg	NMSS	W. Ott	RES
A. Eiss	NMSS	K. Stablien	OEDO
F. Goldberg	NMSS	J. Wolf	OGC
C. Haughney	NRC/STSB		

ATTENDEES FROM OTHER AGENCIES AND GENERAL PUBLIC

A. Becusch	DOE/RW-HQ
C. Bella	USNWTRB
H. Benton	CRWMS M&O Las Vegas
W. Chu	USNWTRB
A. Cleary	Weston
C. Connor	CNWRA
J. Cowles	TRW/M&O
B. Crowe	Los Alamos/Las Vegas
L. Desell	DOE-HQ
P. Dunn	TRW M&O
S. Frishman	State of Nevada
A. Gil	USDOE/YMP
B. Hill	CNWRA
L. Hoffman	M&O Las Vegas
W. Hollaway	CRWMS M&O/TRW
D. Jerez/MacPherson	M&O (WCGS)
P. Krishna	M&O/TRW
R. Lanza	ICFKAISEN Engineering
W. Matyskiels	M&O (TRW)
L. McKague	CNWRA
H. Minwalla	Weston/Jacobs Engr.
G. Mirewalt	CNWRA
R. Morgan	M&O/Duke Engineering
R. Murthy	DOE/OOA
J. Nesbit	DOE/YMPO Las Vegas
J. Packer	M&O (TRB)
F. Perry	Los Alamos
L. Rater	NWTRB
G. Roseboom	USGS Dir. Office
J. Rosenthal	Weston
S. Skuchko	DOE-RW-331
S. Spector	CNWRA
N. Stellavato	Nye County, Nevada
G. Valentine	LANL
R. Wallace	USGS/HQ
J. Wells	BWFC/M&O
J. Williams	DOE/RW-421
K. Yourish	Radioactive Exchange
J. York	Weston

8. Use of Probabilistic Volcanic Hazard Assessment in the Yucca Mountain Program, Presented by Jeanne Nesbit, DOE, at the NWTRB Meeting, March 8-9, 1994
9. Probabilistic Volcanic Risk Assessment, Presented by Bruce Crow at the NWTRB Meeting, March 8-9, 1994
10. Note to Marty Steindler from Bill Hinze, dated February 12, 1994, regarding the February '94 Meeting
11. Memorandum to ACNW Members from Lynn Deering, Senior Staff Scientist, dated March 28, 1994, regarding Draft Volcanism Letter and Natural Analog Bullets, with enclosures
12. Analyses for Igneous Activity, Presented by Keith McConnell and John Trapp, NRC, at NWTRB Meeting, undated
13. Predecisional Draft Section VII from Volcanism Status Report entitled, Volcanic Risk Assessment for the Potential Yucca Mountain Site, dated April 6, 1994, Los Alamos National Laboratory

3 Report on Nuclear Waste Technical Review Board Meeting on Saturated Zone Hydrology

14. Agenda for the Nuclear Waste Technical Review Board Spring Meeting on Lessons Learned in Site Assessment for Critical Facilities, Saturated Zone Hydrology, and Site Characterization Update, dated April 11-12, 1994
15. Memorandum to James M. Taylor, EDO, from Samuel J. Chilk, Secretary, dated March 21, 1994, regarding Staff Requirements - Briefing by NWTRB, 2:00 P.M., Monday, March 14, 1994, Commissioners' Conference Room, One White Flint North, Rockville, Maryland
16. Memorandum to James L. Blaha, Assistant for Operations, from Robert M. Berner, Director, NMSS, dated March 11, 1994, regarding Transmittal of Information Relating to the Nuclear Waste Technical Review Board Briefing on March 14, 1994, to the Commission, with enclosures

4 Review of Current Issues Associated with the Multipurpose Canister (MPC) Concept

17. Table of Contents
18. Status Report
19. Memorandum to Martin J. Steindler from Giorgio Gnugnoli, dated November 7, 1994, regarding SRM - Requirements for Storage and Transportation Casks, with enclosure
20. Memorandum to Joseph J. Holonich, Ronald L. Ballard, and Margaret V. Federline, from B.J. Youngblood, Director, Division of High-Level Waste Management, dated March 11, 1994, regarding Multipurpose Canister Development Plan for Fiscal Year 1994, with enclosure
21. Memorandum to Giorgio N. Gnugnoli, ACNW Support Staff, from Amanda F. Blandford, ACRS/ACNW Intern, dated October 1, 1993, regarding September 30, 1993 Commission Briefing

- Regarding Requirements for Storage and Transportation Casks, with enclosures
22. Memorandum to Martin J. Steindler, Vice Chairman, ACNW, from Giorgio Gnugnoli, ACNW Support Staff, dated July 8, 1994, regarding CNWRA Reports on Nuclear Waste Containers, with enclosures
 23. Memorandum to M.J. Steindler from Giorgio Gnugnoli, dated December 10, 1993, regarding DOE Request to Exempt HLW Container from Special Requirements for Plutonium Shipments, with enclosure
 24. Memorandum to ACNW Members from H.J. Larson, Staff Engineer, dated January 29, 1991, regarding ACRS Review of Standard Review Plan (SRP) for Spent Fuel Storage, January 29, 1991, with enclosure
 25. Multi-Purpose Canister (MPC) Implementation Program Conceptual Design Phase Report. Volume I: MPC Conceptual Design Summary Report, Final Draft, dated September 30, 1993, OCRWM, DOE

5 Meeting with the Director of Waste Management Division, NMSS

26. Table of Contents
27. Status Report, undated
28. SECY-92-408, Proposed Amendments to 10 CFR Part 60, on Disposal of High-Level Radioactive Wastes in Geologic Repositories -- Design Basis Events for the Geologic Repository Operations Area [For Internal ACNW Use Only]
29. Letter to the Honorable Peter H. Kostmayer, United States House of Representatives, from Dennis K. Rathbun, Director, Office of Congressional Affairs, undated draft, with enclosures
30. Briefing to ACNW on Proposed Rulemaking 10 CFR Part 60 - Design Basis Events for the Geologic Repository Operations Area, dated May 28, 1992
31. Extract from Minutes of the 43rd ACNW Meeting, May 28-29, 1992, pages 5-7
32. ACNW Letter to James M. Taylor, EDO, dated June 2, 1992, regarding Rulemaking on Design Basis Events for Geologic Repository Operations Area
33. Memorandum to Dade W. Moeller, ACNW Chairman, from James M. Taylor, EDO, dated August 24, 1992, regarding Rulemaking on Design Basis Events for Geologic Repository Operations Area
34. Definitions of "Important to Safety"
35. Memorandum to Dade W. Moeller, ACNW Chairman, from Giorgio Gnugnoli, dated December 8, 1993, regarding Summary from December 7, 1993 Meeting with the Commissioners' Technical Assistants on 10 CFR Part 60 Design Basis Events, with enclosure [For Internal Committee Use Only]
36. Memorandum to James M. Taylor, EDO, from Samuel J. Chilk,

Secretary, dated February 3, 1994, regarding SECY-92-408

6 Committee Activities/Future Agenda

37. 64th ACNW Meeting, May 17-18, 1994
38. Memorandum to John T. Larkins, ACNW Executive Director, from James L. Blaha, EDO Assistant for Operations, dated April 1, 1994, regarding Proposed Agenda Items for the ACRS and the ACNW, with enclosure
39. Calendar of Upcoming Events
40. Strawman for ACNW Working Group on HLW Performance Assessment, dated April 12, 1994
41. Appointment of Members (Closed) [For Internal Committee Use Only]