

MINUTES OF THE 84TH ACNW MEETING
JUNE 25-27, 1996

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CERTIFIED BY
P.W. POMEROY
9/27/96

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**MINUTES OF THE 84TH MEETING OF THE
ADVISORY COMMITTEE ON NUCLEAR WASTE
JUNE 25-27, 1996
ROCKVILLE, MARYLAND**

The 84th meeting of the Advisory Committee on Nuclear Waste was held at the two White Flint North Building, 11545 Rockville Pike, Rockville, Maryland, on June 25-27, 1996. The purpose of this meeting was to discuss and take appropriate actions on the items listed in the attached agenda. The entire meeting was open to public attendance.

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 Neal R. Gross and Co. Inc., Court Reporters and Transcribers, 1323 Rhode Island Avenue, N.W., Washington, D.C. 20005. Transcripts are also available on FedWorld from the "NRC MAIN MENU." Direct Dial Access number for FedWorld is (800) 303-9672; the local Direct Dial Access number is (703) 321-3339]

Dr. Paul W. Pomeroy, Committee Chairman, convened the meeting at 8:30 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 also stated that the Committee had not received any requests from persons or organizations desiring to make an oral statement during the meeting. However, he did invite members of the public, who were present and had something to contribute, to inform the ACNW staff so that time could be allocated for them to make oral statements.

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

I. CHAIRMAN'S REPORT (Open)

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

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

- Lynn Deering, ACNW staff, is serving a 3-month rotational assignment in Commissioner Rogers' office until September 1, 1996.
- The Commission has selected Dr. George M. Hornberger to the ACNW. He is to become a member of the ACNW upon completion of the clearance process. His term is scheduled to expire June 30, 2000.
- The Department of Energy (DOE) issued Revision 1 to the Civilian Radioactive Waste Management Program Plan in May 1996.
- The 18th Annual Low-Level Radioactive Waste Management Conference scheduled for October 1-3, 1996, has been postponed until 1997.

II. Specification of Critical Group and Reference Biosphere (Open)

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

Dr. Pomeroy introduced the session, indicating that its purpose was to provide background to the Committee on the issues related to the designation of the critical group and the reference biosphere for the proposed high-level waste repository at Yucca Mountain, Nevada. The National Research Council/National Academy of Science, in its report "Technical Bases for Yucca Mountain Standards (TBYMS)" discussed these issues and the majority of those preparing the report (all but Dr. Thomas H. Pigford, Professor Emeritus, University of California, Berkeley) proposed a recommended position.

After providing a brief history of recommendations for geologic disposal of HLW waste, Dr. Fred M. Phillips, New Mexico Institute of Technology and a member of the group responsible for the TBYMS report, was the first presenter. He indicated that there were three questions that must be addressed by any standard, viz.: Who is to be protected?; What is the level of protection the standard is intended to offer them?; and, For what period of time?

Dr. Phillips then discussed the possible types of standards, noting that collective dose, which he considers an indirect basis for the current form of the standard, does not necessarily protect the individuals that are most exposed. It may, in fact, afford a large degree of protection to those who receive very small doses, and not very much protection to those most exposed.

He also stated that the current form of the 40 CFR Part 191 standard, a cumulative release standard, is written in such a way making it very easy to evaluate compliance. However,

with such a derived standard, it may be very difficult to demonstrate that such a standard actually provides any degree of protection.

Instead, Dr. Phillips suggested a standard based on individual radiation risk. The goal of such a standard would be to limit the risk to a group of people that are determined to be the most at risk. The assumption that then follows is that if the risk to that group of people is limited, then presumably it also is limiting the risk for people who are less at risk. He pointed out that other advantages of such an approach are that it is unaffected by changes in the dose risk coefficient and that it allows direct comparison with other societal risks.

He noted that the risk standard makes no assurance of protection to the individual, rather it limits the average risk to the group most at risk. Such an approach, he indicated, is consistent with his own personal viewpoint that nuclear waste problems should be regulated commensurately with other societal issues; i.e., there should be some type of balancing of the costs and benefits to society from protecting the vast majority of people from the harmful effects of waste radiation. There should also be a recognition of the wide variety of unknowns..."it is neither possible nor is it necessarily desirable to try and protect every single person all of the time."

Dr. Phillips stated that the TBYMS report defines the critical group as being "representative of those individuals in the population who, based on cautious, but reasonable assumptions, have the highest risk resulting from repository releases." It should also be small enough to be relatively homogenous with respect to diet and other aspects of behavior that affect risk; include individuals at maximum risk; and, be homogenous with respect to risk (he noted that risk can be homogenous even when outcomes are quite diverse). The difference between the highest and lowest risk faced by individuals in a group should be relatively small.

The difference between the probabilistic critical group - preferred by all (but one) of the TBYS committee - and the subsistence farmer scenario preferred by Dr. Pigford, was next discussed in some detail.

Committee members questioned Dr. Phillips about the technical underlying methodology in some detail (including spatial distributions, relevance of finite element type analysis, scenario bounding -- such as movement into a pluvial period, etc.), and the philosophical acceptance of risk by society.

Dr. Norman Eisenberg, NMSS, indicated that since the staff had not completed its analysis as to a proposed regulatory approach, his presentation would be an articulation of general principles.

He stated the current NRC general criteria for limiting speculation on these topics were:

- 1) impacts due to societal changes would not be considered,
- 2) the reference biosphere and critical group should be based on reasonable assumptions (those with a reasonable chance of occurring in the region over the compliance period based on reasonable use of current knowledge), and
- 3) the critical group is to include the maximally exposed individual considering reasonable assumptions (not prejudiced by a small number of individuals with unusual habits or sensitivities).

He then discussed some of the site-specific data that would be used for the reference biosphere and the definition of the critical group, closing with a discussion of sources of information for Yucca Mountain. Dr. Steindler queried whether the promulgation of a Yucca

Mountain standards would be a deviation from the Commission's practice of issuing generic -- not site-specific regulations. Dr. Eisenberg replied that in this case, EPA was directed by Congress to prepare a site-specific standard and the NRC's regulations to implement it must correspond. A question was also raised as to whether EPA or the NRC should provide definitions of the reference biosphere and the critical group. Dr. Eisenberg's response indicated that there were elements of both definitions that fell within the cognizance of both agencies, and that a clear-cut delineation could not be readily made.

Dr. Pigford, a member of the TBYSMS committee, presented the elements of his personal supplementary differing opinion.

Dr. Pigford's discussed the following issues:

- 1) the calculation of doses to subsistence farmers -- the reasonable maximally exposed individual,
- 2) calculated doses for a conceptual geologic repository at Yucca Mountain,
- 3) proposals to limit the dose rate to the average individual in the vicinity,
- 4) proposals to project probabilistic distributions of habits of future people,
- 5) mathematical errors in the TBYSMS report,
- 6) how long in the future doses should be calculated and a discussion of the origin of EPA's 10,000 year cut-off,
- 7) uncertainty analysis and risk,
- 8) underground criticality, and
- 9) groundwater protection.

Dr. Pigford addressed each of these issues, in varying degrees of detail, also providing his perspective as to the pros and cons of various approaches to each of these issues. Among his observations were:

- 1) Calculated average dose can be thousands of times less than the reasonable maximum dose.
- 2) Terminating dose calculations at 10,000 years gives a false illusion of the safety of geologic disposal.
- 3) EPA's selection of 10,000 years in 40 CFR Part 191 was due to a technical error. The report used as a basis was updated in 1979 to show that the cross-over time should have been over a million years.
- 4) The current international consensus is that one should assume the critical group is a single hypothetical individual that can be reasonably represented by a subsistence farmer of reasonable diet and normal response to radiation.
- 5) A repository with an unacceptably high individual dose could be perceived to be safe if compliance focuses on protection of the average individual.
- 6) Probabilistic future populations can result in lower calculated doses and higher allowed concentrations in ground water.

He also discussed several of the mathematical errors in the report and postulated how it was possible, from his perspective, to manipulate the TBYS report's probabilistic critical group exposure scenario.

His summary position was that the subsistence-farmer scenario should be used and that the Yucca Mountain project needs a standard that is stringent enough to build confidence in the

face of legal and political challenges. At present, he believes, there are no scientific bases in existence to support a policy less stringent than the subsistence-farmer approach.

Following the conclusion of Dr. Pigford's presentation, Dr. Phillips attempted to clarify several aspects of the majority's perspectives in the TBYMS report discussed by Dr. Pigford; notably: "predicting future activities" (not considered feasible), use of the subsistence-farmer (perhaps too specialized to be considered a representative basis for the standard), and mathematical errors in the TBYMS report appendix (TBYMS committee provided an outline that was meant to be illustrative, not prescriptive).

Mr. Ray A. Clark, 40 CFR Part 197 Project Manager, EPA, noted that since EPA has not yet published a proposed 40 CFR Part 197, he would be unable to address its potential contents. However, he could present to the ACNW, EPA's prior history regarding the use (if any) of assumptions regarding the critical group and the reference biosphere.

Insofar as the critical group, he noted that EPA did not use the concept in Part 191, the Waste Isolation Pilot Program (WIPP) Compliance Criteria, nor anywhere else in the agency. The "reasonably maximally exposed individual" has been used in the Superfund program but "worst case" values are not used although doses are well above the average (but still within a realistic range).

Insofar as defining a biosphere, EPA does not explicitly address future biospheres nor did 40 CFR Part 191. The WIPP Compliance Criteria state "...characteristics...remain what they are at the time of compliance application" but that does not apply to hydrology, geology, or climate.

In response to several questions from Dr. Steindler regarding generic vs. site-specific standards and the acceptability by EPA of ICRP standards, to the first question Mr. Clark opined that 40 CFR Part 197 would be site-specific because of Congressional direction and, insofar as the second question, EPA had never used the ICRP critical group approach before. Dr. Hinze asked if in Part 191, EPA meant the future - or the present - when addressing the accessible environment. Mr. Clark stated that implicitly one could say it was the present day environment.

Dr. John H. Kessler, EPRI, presented his two main points; i.e., the individual numerical limit should be based on the local population average and that the critical group, insofar as a repository at Yucca Mountain is concerned, should be Amargosa Valley as it is today.

He proceeded to provide background for those points, noting that dose assessments do not predict the future. After discussing some "tolerated" involuntary risk limits, both natural (e.g., tornadoes, lightning, floods) and man-made (e.g., poisonings, electrocutions, motor vehicle pedestrian collisions), he stated his perspective that the TBYMS approach mixed the "cautious" and the "equitable" philosophies, resulting in a very conservative approach.

In response to a series of questions from Dr. Hinze regarding land usage in the Amargosa Valley and Yucca Mountain environs, Dr. Kessler pointed out that one of the largest uncertainties is the current governmental land use restrictions in the area. He stated that the current restrictions may very well not exist in the future and consideration of such artificial limitations should be considered. Dr. Richard Codell, NRC staff, in the

audience, stated that water mining had already started in the region. He proceeded to then discuss several relevant potential implications.

Dr. Pomeroy questioned the "locking together" of the critical group and the reference biosphere, to which Dr. Kessler stated that due to the intermediate safety philosophy that he proposes, there are levels of health risks in terms of numerics and the underlying heterogeneity that are accepted today by U.S. society.

The last speaker, Mr. Steve Frishman, State of Nevada, presented a short video showing the agricultural pursuits currently underway in the Amargosa Valley. He noted that alfalfa and dairy cattle are currently the main industries in the valley but that recently the cultivation of pistachio nuts and monster garlic, as well as ostrich farming, had begun.

His position was that the subsistence-farmer should be protected rather than "fooling around" with a critical group definition. He also stated that Yucca Mountain was not the only relevant source of radioactive contamination in the area and that releases from the National Testing Station and the Beatty, NV, LLW facility should also be included in evaluating Yucca Mountain and its potential impacts.

In responding to questions, Mr. Frishman noted that the only incentive to agricultural development in the area was the low price of land. He also stated that while he did not know if there was a "pure" subsistence farmer in the area, he supposed there very well could be a retired person who could be essentially considered one. He suggested that the ACNW might find it worthwhile during their next visit to the Yucca Mountain site to spend some time in the Amargosa Valley area to ascertain for themselves the extent and nature of activities.

Dr. Pomeroy requested the Committee to consider what they had heard and attempt to coalesce their thoughts as to the proper next step for the Committee -- either the drafting of a letter report or whether further presentations by others with a technical or stakeholder interest in the topic should be scheduled.

III. Meeting with the Director, Division of Waste Management, NMSS (Open)

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

Ms. Federline, Acting Director, Division of Waste Management, NMSS, gave her current events briefing to the Committee. She discussed a number of issues in which the Division of Waste Management is involved. Ms. Federline also discussed the current status of the Branch Technical Position (BTP) on Expert Elicitation. This document will be reviewed by the Committee in August of 1996. The BTP was published for public comments. The staff received comments from the State of Nevada, the Department of Energy (DOE), and the Nuclear Waste Technical Review Board (Board). The general tenor of the comments was that the BTP provides useful information and the guidance should be used to document the elicitation process. The Board asked the staff to consider areas where expert elicitation cannot be used, or where if the guidance was followed, the results would not be acceptable.

Ms. Federline discussed her recent visit to the Yucca Mountain site. Two areas were highlighted: (1) the thermal test facility in alcove 5, and (2) a second experiment in alcove 5 that will focus on thermal hydrologic interactions.

Dr. Phillip Justus, NMSS, discussed independent NRC staff analyses of geophysical data that the DOE generated. In order to test the validity of the models, the NRC staff is studying DOE's tectonic models and the seismic reflection data, and magnetic and gravity surveys. Based on data gathered, the staff is eliminating or discriminating between various tectonic models and the characterization of various faults. The staff will be reviewing a geophysics white paper prepared by the U. S. Geological Survey entitled, "Major Results of Geophysical Investigations at Yucca Mountain and Vicinity in Southern Nevada." Dr. Justus noted that the Center for Nuclear Waste Regulatory Analyses (CNWRA) staff believes it had discovered some volcanic centers in southern Crater Flat and in Amargosa Desert.

Ms. Federline gave the ACNW an update on bomb pulse Chlorine 36 which has been found in the exploratory studies facility (ESF) in five locations. It could indicate a fast water path from the surface to the repository horizon. Additional samples are being taken, and additional nuclides are being sought, including technetium 99, cesium, tritium and iodine 129. Technetium 99 has been found in water samples taken from the Bow Ridge Fault area.

The current status of EPA's high-level waste standard was discussed. Some changes have been made to the standard, but it has not yet been sent to the Office of Management and Budget. NRC is in close contact with the EPA and will adapt NRC regulations to be consistent with the EPA standard.

The licensing support system (LSS) was the final topic discussed. DOE plans to begin purchasing equipment for the LSS in January 1997 and installing the equipment by the end of that calendar year. The LSS will be fully acquired by 1999. The LSS will use a

shared data base and be available to all through Internet access. A pilot program will be running by the end of this year.

IV. Discussion with Dr. Dade Moeller, Moeller and Associates, Inc. (Open)

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

Dr. Pomeroy introduced Dr. Moeller, former ACNW Chairman, whose qualifications were well known to all of the members. He also indicated his own personal pleasure at Dr. Moeller returning to address the Committee.

Dr. Moeller commenced his presentation by discussing the so-called "open-market trading rule" which has been used by EPA to reduce facility releases through the sharing (by mutual consent trading) of release limits. Such a practice has resulted in concurrent reductions at several proximate facilities and has been made possible through the acceptance by the regulators and the public that the implementation of the concept is mutually beneficial and in the public health and safety interest. He noted that the technique had been used in a wide variety of applications and had received endorsements from various officials in the EPA, DOE, General Accounting Office, Council on Environmental Quality, and the Electric Power Research Institute.

He suggested that for nuclear facilities one might assess all the sources, rank them according to dose and ease of reduction, proceed to clean up the facility to the minimum requirements and then apply trade-offs to reach the desired lower facility release levels. He indicated that indoor radon and medical radiation might provide "banks" which could be drawn upon to facilitate trade-offs. Statistics from various Pennsylvania radiation

programs were provided, e.g., \$2220/cancer prevented from X-rays, \$103,000/life saved by radon mitigation, and $> \$8.18E+06$ /life saved from low-level radioactive waste programs.

He then discussed many of the anticipated benefits of implementing an "open-market trading program" but also noted several possible problem areas, such as the cleanup standard level, the relevant time scales of concern, and the equity of exposures. In this latter regard, the issue is one of population exposed vs. population remediated. These may very well be different and this could present a problem of acceptability of the concept. There are also public perceptions of the various types of exposures and the susceptibility differences between men and women, adult vs. child, and residential or environmental exposure vs. medical.

Dr. Moeller's closing comment on this topic was his belief that such a proposal might be innovative enough to work and he would be most pleased to assist the Committee in any way should they desire to pursue this concept further.

He then discussed his perceptions of the critical group definition and the linear no-threshold dose theory. He had attended earlier the RES-sponsored presentation by Dr. Kenneth L. Mossman, Arizona State University, on the latter topic and endorsed several of what he considered to be the key points, viz: the principles of "good science" must always be kept in mind. This requires that the particular study can be replicated by others; that there be a plausible scientific explanation for the observed effect; that the experiment be properly designed; results should be consistent and repeatable and that the study be "peer reviewed".

He also noted the statement in NCRP-116, that the linear no-threshold theory was only "for radiation protection purposes"--- and did not address its relevance to regulations. His review of the literature has led him to believe that there is no evidence of cancer from exposures below 1 rem/year. He further noted a study by Dr. Shirley Frye, Oak Ridge National Laboratory, that indicated that in analyzing the data for all DOE workers who had received >5 rem in any one year, there was found no difference in their cancer rate from that of the public at large.

Dr. Moeller closed by presenting the Committee handouts discussing the various positions and definitions of several technical bodies on the issues of critical group and the LNT theory.

The Committee thanked Dr. Moeller for his presentation, indicating that after further consideration of the issues discussed, if they desired further input they might request his presence.

V. Total System Performance Assessment '95 (TSPA '95) (Open)

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

Dr. John Garrick, Vice- Chairman, ACNW, opened this briefing with some introductory remarks. He said that the session would be concerned with the Nuclear Regulatory Commission's (NRC's) audit review of the Department of Energy's (DOE's) Total System Performance Assessment 1995 (TSPA '95), which was published in November 1995 and transmitted to NRC for review in December. The focus of the meeting would

considered for detailed review include the following: igneous activity, seismicity, evolution of the near-field environment, radionuclide transport, and repository design and thermal mechanical effects.

NRC Staff Presentation:

Dr. Rex Wescott, KTI team leader for TSPA, Division of Waste Management, Office of Nuclear Material Safety and Safeguards, introduced Dr. Robert Baca, who is the Performance Assessment (PA) Program Manager for the CNWRA. Dr. Wescott presented an overview of the staff's audit review of TSPA '95 and discussed what the staff would present to the Committee, including: review of TSPA '95, its relationship to the KTI objectives, strategies, schedule, and audit review issues and associated KTIs. He said that the review of TSPA '95 was one of four major sub-issues for the KTI in fiscal year (FY) 1996 and 1997. These include the following: (1) the DOE waste containment and isolation strategy (WCIS); (2) sensitivity importance analysis; (3) modifications of the NRC's Total Performance Assessment (TPA) code; and (4) integration, which is being done on a working level to determine how output from one KTI or subsystem affects the others.

He also discussed four objectives of the NRC review: (1) providing input to DOE on vulnerabilities and TSPA, (2) refining NRC's review methodology, (3) developing approaches and input to issue resolution; and (4) providing feedback to KTI teams on the significance to performance for various issues and sub-issues. The overall strategy was designed around two reviews. The first was an initial audit, which is completed. The second is a more detailed review, which is to be completed in December. A technical

exchange will be conducted following the review and, subsequently, a letter documenting the results will be issued.

Dr. Wescott discussed the linkage among the five main review issues and the associated KTI issues. He also described the objectives and structure of the technical exchange. One goal was to have an exchange of information in which both DOE and NRC personnel could get together and discuss the issues. Other goals of the exchange included: items such as identifying subjects for further interaction, documenting areas of consensus, and developing a basis for resolving issues. He described the presentations and discussion group sessions held at the technical exchange. He also described the format and approach used for developing and conducting the discussion groups and summary sessions held on the second day of the meeting.

Dr. Wescott provided detailed information about the five review areas that were the focus of the meeting. In the temperature and relative humidity review issue, the main concerns are the thermal calculations done in TSPA '95, which NRC and CNWRA staffs attempted to reproduce. There were significant differences between the NRC and DOE results that required further evaluation. NRC questioned the modeling assumptions for radiative heat transfer and noted that there was insufficient data to reproduce the DOE results. DOE will evaluate their calculations with respect to the temperature history before backfilling around the canisters. One specific area of interest is the thermal conductivity value(s) used in the calculations. Another problem area is the limited ability of the model to handle relatively high infiltration rates. There will also be future interactions on this problem with the flow modeling. Another area discussed is the thermal effect at the edge of the repository.

In the issue area of container degradation, Dr. Wescott stated that they compared methodologies rather than did calculations. A number of questions were raised about the possible lack of conservatism in the corrosion modeling done for TSPA '95. The humid air corrosion model needs to address the effects of salts on the waste packages. The pitting factor distributions may not be conservative. Wet and dry cycles need to be considered. Thermal embrittlement needs to be evaluated. Near-field chemistry needs to be considered in the corrosion and release models. One outcome of the discussion groups was that Lawrence Livermore would synthesize the available corrosion data for extrapolation to long time frames. This will include a specific focus on issues with regard to pit growth and the factors that control it in the near-field environment. Other issues being evaluated by Livermore include the critical relative humidity and the permeability of residue buildups on the waste package. Three areas for future interaction include the following: (1) calculations of temperature and material properties; (2) near-field environment; and (3) long-term material properties.

The third focussed area of review was infiltration in the unsaturated zone. One of the goals was to verify DOE calculations, with primary emphasis on the velocities. They compared DOE's abstracted and process level model calculations. Dr. Wescott discussed assumptions and parameters used in the NRC and DOE modeling to explain significant differences between the results. The staff has not yet evaluated the effect on performance of the various factors, but this will be done in the detailed review. Some of the actions that came out of the discussion group include the following: an evaluation of focussed recharge by the USGS; recognition of different approaches to climate change that need to be resolved; and DOE agreed that fracture velocities should be adjusted for the degree of saturation. Dr. Wescott expressed a hope that resolution of the shallow infiltration issue will lead to resolution of the deep percolation issue, which is the heart of the differences

between DOE and NRC. He noted three areas of future interaction: (1) climate change in 10,000 years, (2) zones of focused recharge and their occurrence, and (3) the importance of lateral flow above the repository.

Dr. Wescott next talked about the issue of dilution in the saturated zone and the NRC/CNWRA attempts to verify DOE's dilution factors. Dr. Baca, CNWRA, used field data from DOE and some of their own data, as input to DOE models, to try to reproduce the results. They obtained much smaller dilution factors that were due to different assumptions with respect to mixing depth, and fluxes in both the unsaturated and saturated zones. Resolution of this issue will require further analysis of existing data and possibly collection of new data south of the site.

In the review of subsystem abstraction, Dr. Wescott said that they attempted to reproduce the converse cumulative distribution functions (CCDF) from TSPA '95 by using the NRC's TPA code and some different input data sets. They compared the result for a particular scenario from the Repository Integration Program (RIP) code, used in the TSPA calculations, with their own TPA results for the same scenario. He said that they concluded that the differences were in large part due to different representations of the hydro stratigraphy, including calculation of fast pathways in the unsaturated zone. There were also significant differences in the conceptualization and treatment of waste package failure that may have contributed to the different results.

The discussion groups identified areas of consensus and disagreement, and produced a set of proposed actions. The NRC is going to evaluate the Markovian transport calculation used by DOE to explain matrix diffusion. They are going to investigate the possible effects of episodic flushing. NRC is also going to investigate the stratigraphy and fast

pathways. DOE is going to address vertical and horizontal correlations of physical properties within the stratigraphic units, which will reduce uncertainty. Dr. Wescott expects early resolution of the hydro stratigraphic representations, since they have enough data to characterize the main features below the ground surface. He expressed a hope that there would be an Appendix 7 visit on the abstraction process in the fall.

The NRC staff also looked at other areas for a more detailed review. Dr. Wescott discussed future activities in two specific areas of disagreement with DOE: (1) igneous activity, and (2) structural deformation and seismicity. He also discussed some of the future staff activities in the three remaining KTI areas -- near-field environment, radionuclide transport, and repository design and thermal mechanical effects. He said that they would be evaluating the importance to performance of many issues and, if they don't appear to be significant, they would not be pursued any further. This feedback on performance will be obtained as part of the detailed review.

There were several questions from the Committee. Dr. Hinze asked what they learned about the pre-licensing strategy and program from the review of TSPA? Dr. Wescott replied that they learned about DOE's emphasis on containment in the engineered barrier system (EBS) and the alternatives being evaluated, like capillary barriers and galvanic protection. Another area of important emphasis is the role corrosion products may play in retarding releases of radionuclides in the source term models. Dr. Hinze also asked how these might be reflected in any changes in the vertical slice approach. Dr. John Austin, NRC staff, noted that they were relating the KTIs to the five hypotheses of the WCIS and determining when they need to provide feedback to DOE. The priorities for the vertical slices are set, in part, by determining when they need to have resolution of issues to provide comments on the Viability Assessment, on the site suitability determi-

nation, and on the license application. Priorities will also be set by the importance to performance of the issues within the vertical slices. If DOE is not seeking credit for something, then NRC can de-emphasize that issue in the vertical slices and focus on those issues that DOE is taking credit for performance. Dr. Hinze asked about problems and weaknesses in the NRC's audit approach. Both Dr. Wescott and Dr. Austin responded that they thought it was a good approach and was working. Dr. Austin added that the NRC had always used an audit approach in reactor licensing. Dr. Hinze also asked if more data needed to be collected. Dr. Wescott replied that in the area of infiltration there was a need for more data. Dr. Hinze asked about natural analogue studies. Dr. Richard Codell replied that the studies at Yucca Mountain have shown that the natural perched water and pore water are not in equilibrium with the matrix rock and that this calls into question DOE's assumptions concerning matrix diffusion as a retardation mechanism. Dr. Pomeroy asked about the number of sub-issues for the 10 KTIs. Dr. Austin replied that there are about seven sub-issues per KTI and that priorities would be set by their importance to performance. Dr. Pomeroy asked if all sub-issues will be considered in a detailed review. Dr. Austin noted his earlier discussion on setting priorities and said that he expected that a number of the sub-issues would be dropped if they are not important to DOE's hypotheses or to NRC's KTIs. Dr. Steindler asked if the questions and concerns, developed for the container degradation review, were based upon subsystem containment and release criteria. Dr. Wescott replied that these were not based upon the 10 CFR Part 60 requirements, but rather on importance to performance. However, since they had not been evaluated through calculations, the staff was not sure which were truly significant and which were not.

Department of Energy (DOE) Presentation:

Dr. Abe Van Luik, DOE, discussed the DOE's perspective on the technical exchange. He said that the technical exchange is only as good as the follow-up. Both sides learned a number of important things from the meeting and that several items that were identified by DOE, NRC, or both groups, would need to be addressed in follow-up work. One general observation was that the assumptions were not always clearly stated. Another was that some analyses were not reproducible based solely on what is in the document. A lesson learned was that fuller documentation would be required in future DOE TSPAs. He discussed the issue of the correlation of properties and what has been done in follow-up work. He stated that they did a new calculation and determined that there was little impact on peak dose. He noted that they had incorrectly used the term, "relative humidity" in TSPA '95 when they should have used the term, "vapor pressure ratio." He also noted discrepancies and disagreements on calculating temperatures and that they were evaluating the effects of 2-D versus 3-D models. The higher calculated temperatures in the 3-D models are artifacts of the boundary conditions. He stated that the heat transfer, before backfill goes in, should be radiation dominated. He said that the Lawrence Livermore group discussed its ongoing and planned work at the technical exchange, and that they believed that this would address most of the issues raised. They also asked for, and received, NRC's basis for their approach to pit growth modeling. He added that in a follow-on study to the infiltration modeling discussion, they determined that minor differences in saturations were included. The process level modeling, being done at the University of California, Berkeley, addresses consistency with observations and climate change effects. The latter model would be used as input to the TSPA for the Viability Assessment. He also discussed the saturated zone flow and transport and noted that

TSPA '93 and TSPA '95 used the same flow model, but that further model development is in progress. He also discussed the different results from modeling the arrival of the neptunium-237 peak by NRC and DOE. He stated that they believed the NRC model was unrealistic, because it did not account for flow between fractures and the matrix at stratigraphic unit boundaries. Their model assumed interruption of flow at three to five different boundaries, whereas NRC's model had one or two interfaces and no interruption. He said that this makes a big difference in the flow modeling. They also looked at solubility and sorption values and believe that, because the solubilities are high, dissolution of the waste form controls radionuclide releases. He then said that the comments and critiques would be looked at systematically and incorporated into the TSPA for Viability Assessment.

Center for Regulatory Analyses (CNWRA) Presentation:

Dr. Robert Baca, CNWRA, presented results from the audit review for two issue areas -- dilution analysis and TSPA abstraction. The audit review was focussed on topics that they considered important for performance. He discussed the approach used by CNWRA and NRC staff in conducting the analyses and then interacting with DOE at the technical exchange. This gave DOE the opportunity to comment on the analyses and correct the NRC if something was missed. He described the two modeling approaches used by DOE to calculate dilution. One approach was a stirred-tank model, which is a box model that uses mass balances of inflow and outflow to calculate dilution. The second model used was an advection-dispersion model, which was coupled with some assumptions about the mixing zone to calculate dilution. He discussed the NRC/CNWRA approach to analyze the modeling, which used the DOE modeling approach, but made independent assumptions. One important parameter was the mixing zone thickness, which DOE had assumed

was 50 meters thick, whereas the site data suggest that the majority of the water moves through, relatively thin, sheer fracture zones. So the NRC/CNWRA averaged the thickness of these interflow zones, assumed contaminants came down vertically along a fast pathway, and got trapped in a high conductivity zone, where it could move horizontally. This approach led to a 10-meter thick mixing zone. He then discussed the order of magnitude differences between the DOE dilution factors and the NRC/CNWRA values. He noted that the TSPA '93 dilution factors at 5 km were much closer to the NRC values, but TSPA '95 did not address these differences. Some recommendations were that DOE make use of available site data and that they need to evaluate what was done before, to ensure consistency, or be able to explain differences. He also stated that, given the very large dilution factors, one might expect the geochemistry to be homogeneous, but it is not.

Dr. Garrick discussed some of the things learned from TSPA '95. One is that, over a period of 10,000 years, percolation flux is most important. But, over a million-year time frame, dispersion and dilution are important. Dr. Garrick noted a need for the Committee to evaluate these and other issues in more detail.

Dr. Baca discussed the TSPA abstraction issue. He discussed some of the differences between TSPA '93 and TSPA '95. He then discussed the NRC/CNWRA approach for the modeling. For the source term module, they tried to make the waste package behave like the DOE waste package so that the only differences were with the site subsystem abstraction. The NRC/CNWRA group ran two cases -- one like DOE's TSPA and the other like the NRC's IPA Phase 2. He then discussed the results. Dr. Garrick asked if they used best estimate analyses or if they used real means of the distributions? Dr. Baca said that they sampled distributions for about 200 parameters using Latin-Hypercube

sampling and then converted the histogram of outcomes to a CCDF. They used the undisturbed case and did not have any [disruptive] scenarios. Dr. Baca then described the attempt to understand the source of the differences between the NRC/CNWRA results and the DOE results. Much of the difference could be explained by different approaches for modeling the hydro stratigraphy. They got a CCDF much closer to the DOE result when they used the same hydro stratigraphic model. He also discussed some of the NRC/CNWRA concerns with the Markovian process model that takes credit for matrix interactions in a way that NRC believes is not conservative. In addition, the large number of DOE CCDFs tend to obscure what was actually driving the results. They recommended that DOE evaluate selected plots to be able to track what is occurring.

Dr. Garrick thanked him and all the presenters. He noted the importance of the technical exchanges. The ACNW members expressed an interest in receiving a more detailed briefing in focussed areas at a future meeting. These briefings would include specific focuses on the abstraction process and on the viability assessment.

VI. Department of Energy's Program Budget (Open)

[Note: Ms. Virginia Colten-Bradley was the Designated Federal Official for this part of the meeting.]

Stephan Brocoum, Assistant Manager for Stability and Licensing YMSCO, presented the revised Department of Energy (DOE) Yucca Mountain Project Program Plan. Mr. Brocoum began his presentation by explaining why the Program Plan was released in draft form in June 1996 but has a date of May 1996: the Plan contains projected budgets which have not yet been approved by OMB.

Mr. Brocoum presented the rationale for the development and subsequent revision of the Program Plan. Prior to development of the Project Program Plan, the DOE site investigations program operated under the Site Characterization Plan (SCP) which was a comprehensive program of data collection without a Total System Performance Assessment. The SCP program was estimated to cost in excess of \$7 billion. Limited resources for the project, 15 years of data collection, and the development of the TSPA have made it necessary for DOE to develop a plan which emphasizes synthesizing and documenting the collected data. Integration of the program was achieved by consolidation of the labs and technical contractors under TRW's maintenance and operation (M&O). Milestones to demonstrate progress toward determining site suitability and licensing were set. A contingency planning effort has utilized elements of the Waste Containment and Isolation Strategy to focus the Program and testing on the key safety issues. The DOE Program now includes a Viability Assessment milestone for FY '98. The Viability Assessment will consist of four parts: (1) a TSPA, (2) design work on all critical elements that affect performance, (3) a plan for producing a license application, and (4) costs for preparing the application and construction/operation of the repository until closure.

The bases for revising the 1994 Program Plan include a better understanding of what data are necessary to achieve the project objectives, proposed changes to the regulatory framework (i.e., the EPA standard), and the need for better program efficiency. Tunneling and testing in the Exploratory Studies Facility (ESF) are confirming the Environmental Assessment/Site Characterization Plan hypotheses on site conditions. DOE plans to make revisions to 10 CFR 960 that focus on system performance. Project efficiency is being achieved through an integrated top-down planning process, which incorporates input from the technical elements, the DOE staff, and the M&O.

Mr. Brocoum described the Project Integrated Safety Assessment (PISA) which will serve as the single integrating document for technical information, analyses, and conclusions. Project focus will be on this document.

Dr. Garrick asked for clarification concerning the relationship between the PISA and PA work. He commented that the PISA appeared to be similar to the Prioritization Methodology in the Waste Isolation Pilot Program. He wondered whether there were any lessons from the WIPP experience that would impact the PISA. Mr. Brocoum responded that in the WIPP program there was no communication between the PA and regulatory groups. He then stated that the PISA will contain several PA chapters and that there is a concerted effort to coordinate the scientists and the PA modelers within the Yucca Mountain Project. Mr. Brocoum also pointed out that data management will be an important aspect of developing the PISA. He highlighted the problem of producing the Advanced Conceptual Design (ACD) without the most current information. In an effort to improve the data management issue and to address 10 CFR Part 2, which requires a computer-based information management system, DOE is working with the NRC and the Affected Units of Government define such a system.

Mr. Brocoum presented the present schedule for the Yucca Mountain Project, highlighting sensitivity analyses after the development of TSPA-VA, and three phases of repository design.

Dr. Pomeroy asked if the Phase I Design would be submitted with the Viability Assessment. Mr. Brocoum replied affirmatively and that the Phase I Design will focus on things that don't have precedent. He added that there may be another TSPA done after the TSPA-VA. He then highlighted other milestones in the DOE Program: Viability

Assessment (1998), Site Recommendation to the President (2001), License Application (2002), waste acceptance (2010). Mr. Brocoum then stated that DOE believes it can achieve those milestones with a budget of about \$300 million per year.

Dr. Pomeroy asked who the Viability Assessment would be submitted to. Mr. Brocoum answered that it would go to Congress with a letter from the Director of the Program and the DOE Secretary. The Viability Assessment is not a statutory document, but will define the status of the Program at that time.

Dr. Garrick asked who, other than the President, would decide that the evidence presented supports the viability of the project. Mr. Brocoum responded that he believes "everybody" will review the viability assessment. It will not be addressed to any single party such as the NRC. It will be a document that puts forward the case that with a "good enough design, a good enough PA, good enough cost estimate" the DOE can decide whether to continue the Project.

Dr. Garrick inquired what criteria are used at DOE to determine the sufficiency of the design and PA? Mr. Brocoum responded that there are no criteria. Dr. Garrick argued that the DOE has to state whether or not the project is feasible. Mr. Brocoum agreed and stated that the transmittal letter with the Viability Assessment will state such a conclusion.

Dr. Hinze asked Mr. Brocoum to discuss his view of the quality of NRC/DOE interactions. Mr. Brocoum stated that the DOE Program's highest priority is now the Viability Assessment. After completion of this VA, the license application will be the highest priority. Mr. Brocoum noted that the DOE will resolve issues when they are "ripe for

resolution." DOE does not intend to continue debating issues with the NRC as it has for ten years. DOE does not consider this activity a productive use of its time.

Dr. Hinze asked how the information from thermal tests will be incorporated in the Viability Assessment. Mr. Brocoum responded that very little information will be available for incorporation into the Viability Assessment and that is why there is an effort to do another TSPA after the Viability Assessment.

Dr. Hinze asked how will the confirmatory studies be used in the second (post-VA). Mr. Brocoum stated that there will be another year or two of information that can be incorporated in the PA. He added that the confirmatory period is 100 years which will enable more data collection and more analysis.

Dr. Hinze inquired about whether there will be a decision concerning the thermal loading strategy for the Viability Assessment. Mr. Brocoum responded that the repository must be designed to contain 70,000 metric tonnes or the site will not be viable.

Dr. Hinze inquired about what kinds of interactions DOE anticipates in response to a revision to 10 CFR Part 960. Mr. Brocoum stated that the revisions would be published and would go out for comment. However, in the absence of an EPA standard, Part 960 will not have a standard. Mr. Brocoum added that there will be a new site-specific subpart, Subpart E, and that the original Part 960 would be fixed only to be consistent with Subpart E. In doing so, there is still the flexibility to select another site.

Dr. Hinze inquired about the revised Waste Containment and Isolation Strategy and whether it would be available soon. Mr. Brocoun stated that the goal is to make it available at the Nuclear Waste Technical Review Board meeting in July.

VII. Meeting with Commission (Open)

The Committee held discussions with the Commissioners on items of current and mutual interest, including:

- Health Effects of Low Levels of Ionizing Radiation
- Time Span for Compliance of the High-Level Waste Repository
- Comments on High-Level Waste Prelicensing Program Strategy and Key Technical Issues
- Issues and ACNW Activities Associated with the National Research Council's Report, "Technical Bases for Yucca Mountain Standards"
- ACNW Priorities
- Use of Expert Judgment in the Regulatory Process

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

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

Dr. Martin J. Steindler chaired this session of the meeting. He noted that the purpose of this session was to review and evaluate technical and policy issues in specifying a compliance period for 10 CFR Part 61, the low-level waste (LLW) regulation. He also noted that the Committee had recently issued a letter on high-level waste (HLW) time of

compliance. One of the main issues is that Part 61 relies, in part, on dose-based performance objectives, but does not specify a time of compliance. The result is varying approaches for dealing with the time frame. He noted the differences between LLW and HLW, but both are disposed in geologic media. The Committee's view is that any logical basis for time of compliance should be related to the geology of the site. A specific objective of the session was to develop information that can be applied to the two-tiered approach. Another objective was to obtain the views and comments of state developers and regulators on the issue. Finally, the last objective of this session was to obtain input from DOE Headquarter's representatives on DOE's policy with regard to the time of compliance for LLW disposal at DOE sites.

Mr. Andrew Wallo, Director, Air, Water, and Radiation in the Office Environmental Policy and Assistance, Office of Environment, Safety and Health (EH), introduced Gary Roles as the LLW and Waste Management Program Manager within the office. Mr. Wallo discussed their role in the DOE complex. They serve a number of functions, one of which is to exercise regulatory authority within DOE and to develop rules and regulations to protect public health and safety and the environment. The office also handles worker safety and nuclear safety issues. He discussed the time of compliance with respect to DOE radiation protection requirements for the public. These requirements are covered under DOE Order 5400.5, "Radiation Protection of the Public and Environment," as part of the general environmental order - 5400.1. These orders establish radiation protection requirements for the different DOE sites and facilities. The specific waste management order is 5820.2A. DOE is moving toward a rule-based approach for regulation, which is expected to be promulgated, in 1996, as 10 CFR Part 834.

Mr. Wallo discussed the radiation protection program and its specific components. Some parts are similar to NRC's 10 CFR Part 20, but others are more expansive. Some of the regulations require compliance in "real time," but four areas require prospective analyses and the time over which the analyses are done must be considered. He stated that performance assessment does not protect the public. It improves design. Long-term control protects the public. He noted that uranium mill tailings sites, DOE LLW sites, HLW sites, and other sites are required to be licensed forever, with surveillance and monitoring and land control. He discussed several other aspects of DOE waste management programs, some of the problems they must deal with, i.e., previous multiple disposals at different facilities and sites. He discussed the uses of prospective analyses in terms of design, remediation, technical studies, and land use planning. They felt that large uncertainties in an analysis could bias the process and lead to a wrong decision. The time of compliance, he stated, should support the decision-making process.

He discussed some of the temporal considerations in risk management, such as intergenerational equity. DOE went to the National Academy of Public Administration (NAPA) to develop methods for addressing intergenerational equity as part of NAPA's charge to look at environmental equity and environmental decisions in government. Some general issues include: approaches to employ in balancing near-term and future risks, costs, and benefits. Included in this are: uncertainty, the nature of the risks, and how to balance risks to existing workers with integrated risks to future members of the public. He discussed cost and risk discounting guidance for the Office of Management and Budget, which says that 200 years is the limit for concern. Another consideration is the irreversible damage to the environment that may occur through clean-up actions. Also, how does one treat risks to different generations? He discussed some of the diverse views from the literature on the subject. NAPA conducted a literature search, and held a

3-day workshop on June 26-28, 1994. One conclusion was that each generation is responsible for the next -- the rolling futures concept. Another is that there is an obligation to protect future generations as long as it does not jeopardize the immediate generation. A third conclusion is that near-term hazards have a priority over long-term, unless irreversible harm is involved.

DOE proposed operational principles are: (1) address the highest, near-term risk first, recognizing worker risks, (2) give additional priority if high, long-term risks are involved, and (3) seek to minimize long-term risk, consistent with principles of intergenerational equity. For the time of compliance for LLW sites, DOE recommends that quantitative analyses up to 1,000 years may be useful for decision making for near-surface disposal and waste management, but analyses in excess of 1,000 years are of limited value. He then discussed the rationale and considerations in their policy decision. He stated that they felt that the analyses should only be done up to the point that they are useful in the decision-making process. This is not the only factor in providing for safety. Long-term care and maintenance also help. From DOE's perspective creating multiple disposal sites at DOE facilities because of a 50 mrem dose, which exceeds the limit at 5,000 years, is not desirable. They do not believe such an approach reduces overall risk. Also, they do not want to divert resources from near-term protection to avoid long-term effects for hypothetical individuals. They also said that the doses are a small fraction of background and therefore, they believe, it is questionable to do analyses for long time frames to justify decisions about what to do in the near time frame.

Mr. Wallo later discussed various approaches to time of compliance in radioactive waste and hazardous waste management regulations. Mr. Wallo also noted that Environmental Protection Agency standards for surface disposal are typically design standards. He also

cited both uranium mill tailings regulations, 40 CFR Part 192, and Resource and Conservation Recovery Act (RCRA) disposal regulations as examples where continuous maintenance and monitoring provide protection. He and Mr. Roles also discussed the volumes of hazardous and other types of waste being disposed of using a design basis approach. Mr. Wallo stated that the hazards from LLW were not that different from these wastes and that performance assessments do not provide protection -- management of the waste and control of the system provide protection.

Dr. Hinze asked about 10 CFR 834, and what the rule entailed. Mr. Wallo described it as a general radiation protection rule. Dr. Hinze also asked whether a time frame would be dependent on inventory of long-lived radionuclides. Mr. Roles responded that the point of the discussion was that source term should not affect the time of compliance. Dr. Hinze asked why 1,000 years as opposed to some other time, like 10,000 years? Mr. Wallo responded that it was totally arbitrary. They believe that only 200 years could be justified on the basis of as low as reasonably achievable, but that from a political standpoint that would be unacceptable. So they worked in factors of 10. In addition, they believe several thousand years was too long. Dr. Hinze asked about design standards and how long the analysis would be done for design. Mr. Wallo responded that there is no time limit to the design analysis and the models would not be limited for that purpose. But for the purpose of compliance with a standard that is a small fraction of background, one would use the time limit. Dr. Hinze asked what the criteria were for determining a good design? Mr. Wallo responded that they were concerned with the uncertainty of calculations being based upon only a few data points and that they are now pushing for performance assessment (PA) maintenance programs -- to develop more data over the life of the facility and improve the PA. Dr. Hinze asked about quantifying the uncertainty. Mr. Wallo responded that they do not do that because they are not satisfied with the

amount of data. Dr. Garrick asked about long-lived radionuclides, such as uranium. Mr. Wallo responded they have always been dealing with long-lived radionuclides in DOE, and that these sites have larger inventories than commercial sites. Mr. Roles added that if the decision is based on peak dose, then they would have multiple sites instead of one. From the standpoint of long-term management and control, they believe that one site better protects public health and safety, given the low level of the standards, which are based on the linear-no-threshold model. Dr. Garrick noted that he believed the two National Academy reports -- Rethinking High-level Waste and The Technical Basis for Yucca Mountain Standards -- were consistent in the sense that you cannot develop long-term predictions without a solid scientific basis. He discussed why this was important. Dr. Pomeroy asked if the NAPA study was available? Mr. Wallo responded that the Workshop proceedings' summary, and the Draft Final Summary could be provided. It was also suggested that the Chairman of the NAPA Committee brief the ACNW sometime. Dr. Pomeroy asked about DOE PAs being run to 10,000 years. Mr. Wallo responded that the PAs typically go to 10,000 years, but that is not for compliance. Also he noted that the compliance time of 1,000 years was an official DOE policy. Dr. Steindler asked how the decision is made about an acceptable disposal and whether other factors besides the dose calculation are involved? Mr. Wallo responded that other factors are considered in the decision. Mr. Roles noted that PA modelers go out to 10,000 years to set waste acceptance criteria and, even further, to ensure that large peaks have not been simply shifted out past 10,000 years by the assumptions in the model. Dr. Steindler noted some differences in DOE's responsibilities for their waste and the regulatory responsibilities in the commercial sector. Mr. Roles pointed out that 10 CFR Part 61 assumes perpetual governmental control of the site after closure. Mr. Wallow pointed out their concern with long-term calculations leading to multiple disposal sites at DOE facilities. Dr. Steindler asked about discounting risk in the NAPA studies. Mr. Wallo responded,

that the NAPA group advised against that approach, saying that it does not work over long time frames. However, he said that the recommended approach was a form of discounting. Dr. Pomeroy asked if DOE provides policy guidance to the states? Mr. Wallo said no, only technical advice. Mr. Wallo also discussed the type of assistance DOE provides to development of LLRW disposal in the states.

Presentation by State of Texas Developer:

Mr. Ruben Alvarado, Texas Low-Level Radioactive Waste Development Authority, provided information about how time of compliance was handled in the License Application submitted to the state of Texas regulatory authorities. He discussed the general approaches to time frame in the development of Part 61, which are generally on the order of a few hundred years. Also, there are specific requirements for 500 years for intruder barriers and site characterization and 300 years for waste form stability. From the standpoint of waste form degradation, one might be concerned with 1,000 years. And so, they originally considered this a reasonable time frame. But, as they began doing site work, the time frame became extended and they considered peak dose calculations. But, he noted, calculations at a million years are not believable, so they ended up with a shortened time frame. He discussed the change in radionuclide inventory with time by showing a time versus inventory chart for different radionuclides. At 1,000 years about 90% of the inventory has decayed away. He also discussed the release and transport calculations that they did for their inventory. The criterion they used for cutting off further consideration of a radionuclide was a concentration in soil, air, or the aquifer of less than 10^{-10} curies per cubic meter. In their model it takes about 1,000 years for carbon [-14], chlorine [-36] and technetium [-99] to reach the soil surface. To reach groundwater in the model, which they do not believe will happen, takes about 50,000 years and

produces a dose of about one millirem. Although they did not necessarily believe the numbers, they decided to report them to the regulators for licensing purposes. They believed this was more prudent than attempting to defend a statement that the groundwater dose was zero. He pointed out the decay curves for uranium and thorium are flat lines because of their long half-lives. Mr. Alvarado stated that if one worried about these radionuclides at long time frames, then inventory limits are an appropriate way to deal with them. He noted that the thorium dose was about a millirem at a million years, and, although he did not believe it, the information was provided to the regulator for their consideration. He recommended that the time of compliance should be shorter rather than longer. Both 100,000 and a million years were, he believed, too long. He thought that either 1,000 years or 10,000 years were reasonable time frames. He noted that most people are concerned with their children, grandchildren or perhaps great-grandchildren. If every generation does that, then one gets the same kind of answer discussed earlier in the day, which he is comfortable with. He closed by stating that there is a need to defend what is defensible. The numbers are not absolutes and these are not absolutely predictive tools.

Dr. Hinze asked about problems in defining the source term. Mr. Alvarado replied that the I-129 is a calculated value and is difficult to obtain a more realistic value. They used the 3-R Stat Model. Also there are uncertainties due to the relatively young age of the Texas nuclear power plants, which do not have the long data sets that the older plants in Maine and Vermont have. In addition, there are uncertainties such as a decision by industrial radiographers to dispose of all their sources. He said that by comparing historical records and projections of generators they have a reasonable source term. He said he was equally confident in the transport part of the modeling. In response to another question, Mr. Alvarado stated that the lifetime of the facility was 30 years. After

being asked about site characterization, he proceeded to describe some of the problems in evaluating a desert site. One was that they had to drill deep boreholes, which were about 1,000 feet at the site in Texas. Another was the general problem in characterizing the unsaturated zone. He also described problems with different types of instrumentation and collection techniques. In response to further questions, Mr. Alvarado described the scenarios they used for canister failure and the transport calculations to the aquifer. He also noted that because the site data suggest an upward gradient in moisture, one of the exposure pathways is diffusion to the surface soils. Dr. Garrick asked if a 10,000 year compliance time would be a problem for him. He responded that it wouldn't be. Dr. Pomeroy asked about the status of the Compact. Mr. Alvarado said that if it had been a few years earlier, it would have been easier, but now the opposition is more organized. Dr. Pomeroy also asked about placing bounds on the uncertainty for the site. Mr. Alvarado noted that the information they had developed suggested long term stability. For example, the calcic soils take long periods to develop and so suggest land form stability on the order of 50,000 - 100,000 years. He also discussed the range of climatic conditions they evaluated for the site and possible future changes. He discussed the problems associated with comparing a range of results with a single standard. He also discussed some of the issues that may arise in licensing hearings. He said that most members of the public do not believe calculations at long time frames and are more concerned with the next 5-10 years, not 10,000-year time frames. In response to a question from Dr. Steindler, Mr. Alvarado said that the peak dose from iodine [129] was at 1.6 million years and was less than a millirem. He said that this result, he believes, indicates a very small number at very long time frames, and to him, that satisfies the rule.

Presentation by State of Nebraska Regulator:

Mr. Jay Ringenberg, represented the Nebraska Department of Environmental Quality, presented the Nebraska's regulatory policy with respect to the time of compliance for the license application that was submitted and is currently being reviewed by the state. He discussed the different perspectives and roles of the regulator and the developer, noting that the presenters from both DOE and Texas are developers. He described the review of the license application in Nebraska, which was received in July of 1990. Of the 1200 questions developed through four rounds, 400 of them concerned performance assessment (PA), showing that most of the issues relate to performance assessment. Since July of 1995 they are in final review. They are completing their safety evaluation report and, as part of this, they will include an independent performance assessment (IPA). He discussed the purposes of a PA. One, it is a tool for making a licensing decision. Secondly, it allows one to determine if inventory limits are necessary. Lastly, it relates to the bottom line -- does the application meet compliance of the performance objectives?

There are two fundamental issues that a PA should consider: (1) does the PA cover a sufficiently long time frame to observe peak concentrations of the isotopes of concern? In Nebraska's case these are C-14, Tc-99, and I-129; and (2) the PA needs to consider a sufficiently long time frame at which it can be reasonably assumed that geosphere changes would render the performance assessment model assumptions, design inputs, or model methodology invalid, for the purposes of estimating radionuclide media concentrations, such as an ice age. Although farmers in Nebraska, like ranchers in Texas, are concerned primarily with shorter time frames, there are those who are concerned with peaks for particular nuclides. So it is important to do the work, but the interpretation is another issue. The time frame for a particular assessment involves site specific investiga-

tions and source term. He stated that the source term is very important and he disagreed with the DOE concept that you don't have to look at source term to do a PA. He discussed how the dose limitation may lead to multiple sites, which is essentially the compact concept, with all the sites in the country. He said that if we were not interested in meeting a dose objective all the sites would be combined into one national site, but you would not meet 25 mrem. He discussed some of the issues involved in site characterization and the development of inventory limits. For Nebraska, the issue is iodine. The developer did an analysis to 25,000 years, but for the bounding analyses, the peaks came in at less than 10,000 years, so that became the time frame. The regulators are reviewing this to see if they agree. The 10,000 year time frame does bound many of the peaks of interest, but it is dependent on the site and assumptions that are made in the PA. For some sites there may be a technical support for going to 10,000 years or less. But, he has a problem if you go beyond that and don't use the two criteria he discussed. He was concerned that arbitrary decisions are also characterized as capricious, which means you lose. Licensing decisions based on an arbitrary standard are not defensible.

Mr. Ringenberg discussed the possible disposal of depleted uranium (DU) from the Clairmont Enrichment Facility, in Louisiana, at the Nebraska site. The compact commission was asked by the generator if they could accept the DU waste. The developer did an analysis that showed very long travel times (48,000 to 113,000 years). Bechtel's response was, that since the travel times were significantly longer than the 10,000-year time frame identified in the [NRC] Branch Technical Position paper, they would find it acceptable. He noted that they missed the two key issues: is it a peak? and is it in compliance with the performance objectives? He stated that this was a misapplication of the concept. His concern is that a de facto regulation comes out of an arbitrary standard. He also noted that the decision is not just scientific and technical; it is also public and a

political process. If the regulators don't think something is valid out to a million years, they need to be the ones to tell the public.

Dr. Hinze asked how they deal with the changing lifestyle of the public at the edge of the site. Mr. Ringenberg replied that the PA is done on the basis of a potential receptor at the boundary even if it doesn't exist. He noted the issue of climate change is discussed in the IPA, but that he could not talk about a number of issues because the review needs to be completed first. Dr. Hinze asked that they be briefed on the IPA when it is done. Mr. Ringenberg noted that they had a lot of interaction with NRC on the PA and other issues. In an independent analysis, more is involved than simply a review. One is developing one's own rationale, assumptions, and scenarios that have to be defended. Dr. Garrick noted that many policy decisions are arbitrary. Mr. Ringenberg said that he agreed that public policy will be involved with decisions on radioactive waste management, and these, as well as technical issues, are involved in the licensing decision. His biggest concern with arbitrary decisions is that the basis or rationale is not provided and that this is key to being able to defend a decision. A legislative body making an arbitrary law is different from an administrative body making an arbitrary decision. Dr. Poméroy also asked that the Committee be briefed when the IPA is finished. Dr. Steindler asked about the exposure scenario and the individual involved. Mr. Ringenberg replied that the individual at the site boundary is used because it is believed to be conservative -- a reasonable, yet conservative estimate.

IX. Executive Session (Open)

A. Reports:

Health Effects of Low Levels of Ionizing Radiation (Report to Chairman Shirley Ann Jackson, NRC, from Paul W. Pomeroy, ACNW Chairman, dated July 10, 1996)

Elements of An Adequate NRC Low-Level Radioactive Waste Program (Report to Chairman Shirley Ann Jackson, NRC, from Paul W. Pomeroy, ACNW Chairman, dated July 24, 1996)

B. Future Meeting Agenda

Appendix IV summarizes the proposed items endorsed by the Committee for the 85th ACNW Meeting, Rockville, Maryland, August 21-23, 1996, and future Working Group meetings.

C. Future Committee Activities (Open)

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

D. New ACNW Members

The Commission has selected Dr. George M. Hornberger to the ACNW. He is to become an ACNW member upon completion of the clearance process. His term is scheduled to expire June 30, 2000.

The meeting was adjourned at 3:45 p.m., Thursday, June 27, 1996.

[Docket No. 85-21848-EA; ASLBP No. 86-716-04-EA]

Emerick S. McDaniel; Establishment of Atomic Safety and Licensing Board

Pursuant to delegation by the Commission dated December 29, 1972, published in the *Federal Register*, 37 FR 28710 (1972), and Sections 2.105, 2.700, 2.702, 2.714, 2.714a, 2.717, 2.721, and 2.772(j) of the Commission's Regulations, all as amended, an Atomic Safety and Licensing Board is being established to preside over the following proceeding.

Emerick S. McDaniel

Denial of Reactor Operator's License Application

This Board is being established as a result of an April 4, 1996 letter from NRC staff sustaining a denial of Mr. McDaniel's reactor operator's license application. The petitioner, Emerick S. McDaniel, requests a hearing in accordance with 10 C.F.R. § 2.103(b)(2).

The Board is comprised of the following administrative judges:

B. Paul Cotter, Jr., Chairman, Atomic Safety and Licensing Board Panel, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555

Peter S. Lam, Atomic Safety and Licensing Board Panel, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555

Peter A. Morris, 10825 South Glen Road, Potomac, MD 20854

All correspondence, documents and other materials shall be filed with the Judges in accordance with 10 CFR § 2.701.

Issued at Rockville, Maryland, this 23rd day of May 1996.

B. Paul Cotter, Jr.,

Chief Administrative Judge, Atomic Safety and Licensing Board Panel.

[FR Doc. 96-13512 Filed 5-29-96; 8:45 am]

BILLING CODE 7890-01-0

Advisory Committee on Nuclear Waste; Notice of Meeting

The Advisory Committee on Nuclear Waste (ACNW) will hold its 84th meeting on June 25-27, 1996, Room T-2B3, at 11545 Rockville Pike, Rockville, Maryland. The date of this meeting was previously published in the *Federal Register* on Wednesday, December 6, 1995 (60 FR 62485).

The entire meeting will be open to public attendance.

The agenda for this meeting shall be as follows:

Tuesday, June 25, 1996—8:30 A.M. until 6:00 P.M.

Wednesday, June 26, 1996—8:30 A.M. until 6:00 P.M.

Thursday, June 27, 1996—8:30 A.M. until 4:00 P.M.

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

A. Total System Performance Assessment 1995—The Committee will review comments from the NRC staff on the Department of Energy's Total System Performance Assessment 1995. Participation by the staffs of both DOE and NRC is anticipated.

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

C. Preparation of ACNW Reports—The Committee will discuss proposed reports, including: timeframes for regulatory concern, the use of expert elicitation, elements of an adequate low-level waste program, Committee priorities and task action plans, and biological effects from low-levels of ionizing radiation. The Committee may also prepare reports on topics discussed during this meeting.

D. Meeting with the NRC Commissioners—The Committee will discuss items of mutual interest with the Commissioners. Potential topics include: Issues and NRC activities associated with the National Research Council's Report, "Technical Bases for Yucca Mountain Standards." ACNW comments on High-Level Waste Prelicensing Program Strategy and Key Technical Issues, ACNW Priority Issues, health effects of low-levels of ionizing radiation, timespan for compliance of the proposed high-level waste repository at Yucca Mountain, Nevada, and the use of expert judgment in nuclear waste licensing.

E. Discussions with Dr. Dade Moeller, Moeller and Associates, Inc.—The Committee will discuss several topics of interest to the ACNW with Dr. Moeller including: the open market trading rule which would allow the operator of a facility that is releasing contaminants into the environment the option of reducing its own discharges or those of other sources in the same geographical area, the use of the linear-no-threshold model of response to doses of ionizing radiation, and defining a critical group to predict the anticipated effects of a waste repository.

F. DOE's Program Plan—The Committee will meet with representatives of the Department of Energy and the NRC staff to review DOE's current program for developing a high-level waste repository.

G. Specification of Critical Group and Reference Biosphere—The Committee will review options under consideration for specifying the critical group and reference biosphere to be used in a performance assessment of a nuclear waste disposal facility.

H. Time of Compliance in Low-Level Waste Disposal—The Committee will discuss options for setting a regulatory time of compliance for a low-level waste disposal facility. Participants may include representatives of the NRC staff, the DOE, and individual states.

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

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

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

rescheduling would result in major inconvenience.

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

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

Dated: May 23, 1996.

Andrew L. Bates,

Advisory Committee Management Officer.

[FR Doc. 96-13513 Filed 5-29-96; 8:45 am]

BILLING CODE 7999-01-P

Advisory Committee on Reactor Safeguards; Subcommittee Meeting on Planning and Procedures; Notice of Meeting

The ACRS Subcommittee on Planning and Procedures will hold a meeting on June 11, 1996, Room T-2B1, 11545 Rockville Pike, Rockville, Maryland.

The entire meeting will be open to public attendance, with the exception of a portion that may be closed pursuant to 5 U.S.C. 552b(c) (2) and (6) to discuss organizational and personnel matters that relate solely to internal personnel rules and practices of ACRS, and matters the release of which would constitute a clearly unwarranted invasion of personal privacy.

The agenda for the subject meeting shall be as follows:

Tuesday, June 11, 1996—1:30 p.m. until 3:30 p.m.

The Subcommittee will discuss proposed ACRS activities and related matters. It may also discuss the status of appointment of members to the ACRS. The purpose of this meeting is to gather information, analyze relevant issues and facts, and to formulate proposed positions and actions, as appropriate, for deliberation by the full Committee.

Oral statements may be presented by members of the public with the concurrence of the Subcommittee Chairman; written statements will be accepted and made available to the Committee. 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 Subcommittee, its

consultants, and staff. Persons desiring to make oral statements should notify the cognizant ACRS staff person named below five days prior to the meeting, if possible, so that appropriate arrangements can be made.

Further information regarding topics to be discussed, the scheduling of sessions open to the public, whether the meeting has been cancelled or rescheduled, the Chairman's ruling on requests for the opportunity to present oral statements, and the time allotted therefor can be obtained by contacting the cognizant ACRS staff person, Dr. John T. Larkins (telephone: 301/415-7360) between 7:30 a.m. and 4:15 p.m. (EDT). Persons planning to attend this meeting are urged to contact the above named individual one or two working days prior to the meeting to be advised of any changes in schedule, etc., that may have occurred.

Dated: May 23, 1996

Sam Duraiswamy,

Chief, Nuclear Reactors Branch.

[FR Doc. 96-13511 Filed 5-29-96; 8:45 am]

BILLING CODE 7999-01-P

OFFICE OF MANAGEMENT AND BUDGET

Information Collection Activity Under OMB Review

AGENCY: Office of Management and Budget.

ACTION: Notice.

SUMMARY: In accordance with the Paperwork Reduction Act of 1980, as amended (44 U.S.C. 3501 et seq.), this notice requests further comment on the following proposed information collection contained in the revision to Office of Management and Budget (OMB) Circular A-21, "Cost Principles for Educational Institutions," published in the Federal Register on May 8, 1996 (61 FR 20880).

The information collection request involves a submission of the Cost Accounting Standards Board's (CASB) Disclosure Statement (DS-2) by educational institutions receiving more than \$25 million in Federal sponsored agreements. Circular A-21's information collection requirement covers approximately 20 additional educational institutions than those subject to CASB's regulatory requirement for filing the DS-2, pursuant to Public Law 100-679, which was previously approved and assigned OMB control number 0348-0055 (which expires August 31, 1997).

OMB estimates that the preparation of the DS-2 will take 120 hours to complete.

FOR FURTHER INFORMATION CONTACT: For further information or a copy of the revision, contact Gilbert Tran, Office of Federal Financial Management, OMB (telephones: 202-395-3993).

ADDRESSES: Written comments should be sent by July 29, 1996 to: Gilbert Tran, Office of Federal Financial Management, OMB, Room 6025, New Executive Office Building, Washington, DC 20503.

John B. Arthur,

Associate Director for Administration.

[FR Doc. 96-13533 Filed 5-29-96; 8:45 am]

BILLING CODE 3110-01-P

SECURITIES AND EXCHANGE COMMISSION

Submission for OMB Review; Comment Request

Upon written request, copies available from: Securities and Exchange Commission, Office of Filings and Information Services, Washington, DC 20549.

Extension:

Rule 11Ab2-1 and Form SIP; SEC File No. 270-23; OMB Control No. 3235-0043.

Notice is hereby given that pursuant to the Paperwork Reduction Act of 1995 (44 U.S.C. §§ 3501 et seq.), the Securities and Exchange Commission ("Commission") has submitted to the Office of Management and Budget requests for approval of extension on the following rule and form: Rule 11Ab2-1 and Form SIP.

Rule 11Ab2-1 and Form SIP establish the procedures by which a Securities Information Processor ("SIP") files and amends its SIP registration form. The information filed with the Commission pursuant to Rule 11Ab2-1 and Form SIP is designed to provide the Commission with the information necessary to make the required findings under the Act before granting the SIP's application for registration. In addition, the requirement that a SIP file an amendment to correct any inaccurate information is designed to assure that the Commission has current, accurate information with respect to the SIP. This information is also made available to members of the public.

Only exclusive SIPs are required to register with the Commission. An exclusive SIP is a SIP which engages on an exclusive basis on behalf of any national securities exchange or registered securities association, or any national securities exchange or

APPENDIX II



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

Rev. 3 June 20, 1996

SCHEDULE AND OUTLINE FOR DISCUSSION
84TH ACNW MEETING
JUNE 25-27, 1996

Tuesday, June 25, 1996, Two White Flint North, Room T-2B3, 11545
Rockville Pike, Rockville, Maryland

- | | | |
|--|---|--|
| 1) 8:30 - 8:35 A.M. | } | <u>Opening Remarks by the ACNW Chairman</u>
(Open)
1.1) Opening Statement (PWP/RKM)
1.2) Items of Current Interest (PWP/RKM) |
| 2) 8:35 - 2:30 P.M. | | <u>Specification of Critical Group and Reference Biosphere</u> (Open) (PWP/HJL)
A review of options under consideration for specifying the critical group and reference biosphere to be used in a performance assessment of a nuclear waste disposal facility |
| 8:40 - 9:40 A.M. | } | 2.1) Presentation on relevant issues addressed in the National Research Council/National Academy of Sciences "Technical Bases for Yucca Mountain Standards (TBYS)" report. Dr. Fred M. Phillips, Member TBYS Committee |
| 9:40 - 10:15 A.M. | | 2.2) NRC Staff - Considerations for Specification of the Reference Biosphere and Critical Group at Yucca Mountain
Dr. Tim McCartin, NRC |
| 10:15 - 10:30 A.M. | | * * * BREAK * * * |
| 10:30 - 11:30 A.M. | | 2.3) Personal Supplementary Statement on TBYS Report and other relevant issues
Dr. Tom H. Pigford, Member, TBYS Committee |
| 11:45 - 12:00
11:20 - 11:45 A.M. | } | 2.4) Wrap up of Morning Presentations |
| 12:00 - 12:30
11:45 - 12:15 P.M. | | * * * LUNCH * * * |
| 12:35 - 2:10
12:15 - 2:30 P.M. | | <u>Reference Biosphere/Critical Group Presentations (cont'd)</u> |
| 12:35 - 12:50
12:15 - 12:45 P.M. | | 2.5) Perspectives of the Environmental Protection Agency
Mr. Ray A. Clark, EPA |

[Denotes transcribed portions.

~~12:45 - 1:15 P.M.~~
cancelled

~~1:15 - 1:45 P.M.~~
12:50 - 1:25

~~1:45 - 2:15 P.M.~~
1:25 - 2:10

~~2:15 - 2:30 P.M.~~
Cancelled

2:10 - 2:35 P.M.

3) ~~2:30 - 3:20 P.M.~~
2:35

- 2.6) Perspectives of the Department of Energy
Mr. Steve J. Brocum, DOE (Invited)
- 2.7) Perspectives of the Electric Power Research Institute
Dr. John H. Kessler, EPRI
- 2.8) Perspectives of the State of Nevada
Mr. Steve Frishman, NV
- 2.9) Working Group Wrap up Discussions -
Chairman, Members, Presenters

BREAK

Meeting with the Director, NRC's Division of Waste Management, Office of Nuclear Materials Safety and Safeguards (Open) (PWP/RKM)

The Director will discuss recent items of interest with the Committee, topics may include:

- Progress at the Yucca Mountain Site
- Status of EPA's Yucca Mountain Standards and NRC's HLW regulations
- Status of Draft Technical Guidance on Expert Elicitation

4) 3:20 - ~~5:00~~ ^{4:30} P.M.

Discussion with Dr. Dade Moeller, Moeller and Associates, Inc. (Open) (PWP/HJL)

Discussions with Dr. Moeller on areas of interest to the Committee:

- 4.1) Open Market Trading Rule
- 4.2) Health Effects of Low-Levels of Ionizing Radiation
- 4.3) Defining a Critical Group for the performance assessment of a waste repository

4:30 - 4:48 **BREAK**

5) ~~5:00 - 6:00 P.M.~~
4:48 - 6:38

Preparation for Meeting with Commission (Open) (PWP/RKM)

The Committee will discuss presentations it will make to the Commission on June 26 from 2:30 - 4:00 P.M. Topics include:

- 5.1) Health Effects of Low-Levels of Ionizing Radiation (BJG-MJS/HJL)
- 5.2) Time Span for Compliance of the HLW Repository (WJH-BJG/ACC)
- 5.3) Comments on High-Level Waste Prelicensing Program Strategy and Key Technical Issues (WJH-ACC/LGD)
- 5.4) Issues and NRC Activities associated with The National Research Council's Report,

"Technical Bases for Yucca Mountain Standards" (BJG-MJS/HJL)

- 5.5) ACNW Priorities (PWP-RKM/LGD)
5.6) Expert Judgment (PWP-ACC/VCB)

6:00 P.M.

* * * RECESS * * *

Wednesday, June 26, 1996, Two White Flint North, Room T-2B3,
11545 Rockville Pike, Rockville, Maryland

- 10:15*
- 6) ~~8:30 - 10:00~~ *10:15* A.M. Total System Performance Assessment '95
(Open) (BJG/ACC)
Review NRC staff comments on DOE's TSPA '95
- 6.1) NRC staff presentation
 - 6.2) DOE response to NRC's review
 - 6.3) Roundtable discussion/future ACNW Action
- 10:15 - 10:30*
~~10:00 - 10:15~~ A.M. * * * BREAK * * *
- 7) ~~10:15 - 11:30~~ *10:30 - 11:20* A.M. Department of Energy's Program Budget
(Open) (WJH/VCB)
Discuss current DOE program for developing a HLW repository
- 7.1) Presentation by DOE
 - 7.2) Roundtable discussion/future ACNW plans
- 11:35 - 12:00*
12:00 - 12:40 *Prep. for Mtg w/Comm. (during)*
- 8) ~~11:30 - 12:00~~ NOON Preparation of ACNW Reports (Open)
Discuss possible reports on the following topics:
- 8.1) Health Effects of Low-Levels of Ionizing Radiation
 - 8.2) Elements of an Adequate LLW Program
 - 8.3) Use of Expert Elicitation
- 12:40 - 1:40*
~~12:00 - 1:00~~ P.M. * * * LUNCH * * *
- 9) ~~1:00 - 2:15~~ *1:40 - 2:15* P.M. Continue Preparations for Meeting with the Commission and Discussion of topics listed in agenda item 3 (Open)
recessed
Note: The Committee will leave for Commissioner's Conference Room at OWFN at 2:15 p.m.
- 10) 2:30 - 4:00 P.M. Meeting with the Commission
Commissioner's Conference Room OWFN
(Open)
Discuss items listed in agenda item 5
(return to TWFN, room T2B3 at 4:00 p.m.)

11) ~~4:00 - 5:30~~ P.M.
4:15 - 5:35

Committee Activities/Future Agenda
(Open) (PWP/RKM)

- 11.1) Set Agenda for 85th ACNW, August 21-23, 1996
- 11.2) Review Items for the Out Months
- 11.3) Future Working Group Topics/Dates
- 11.4) Report on Outside Meetings
- 11.5) Future Outside Meetings Members may attend
- 11.6) Reconcile EDO Responses to Committee Reports

5:35
~~5:30~~ P.M.

* * * RECESS * * *

Thursday, June 27, 1996, Two White Flint North, Room T-2B3, 11545 Rockville Pike, Rockville, Maryland

12) 8:30 - 11:00 A.M.

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

Discuss options for setting a regulatory time of compliance for a low-level waste disposal facility

- 12.1) DOE discussion
- 12.2) Representatives of individual States
- 12.3) NRC staff comments (tentative)
- 12.4) Roundtable discussion/future ACNW plans

13) ~~12:00~~
~~11:00~~ - 2:00 P.M.

Continue Preparation of ACNW Reports noted in item 8 (Open)

11:00 11:40
11:40 12:00 Recess
12:00 - 1:00 P.M.

* * * LUNCH * * *

14) 1:00 - ~~2:00~~ P.M.

Continue Preparation of ACNW Reports (Open)

3:00 - 3:15 BREAK

15) ~~2:00 - 2:15~~ P.M.

Election of ACNW Officers for July '96 - June '97 (Open)

3:15 - 3:17

16) ~~2:15 - 4:00~~ P.M.

ACNW Priorities/Task Action Plans (Open)
(ACNW Members/ACNW Staff)

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

- 16.1) Coupled Processes
- 16.2) Radionuclide Transport
- 16.3) Igneous Activity

3:45
~~4:00~~ P.M.

ADJOURN

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

APPENDIX III: MEETING ATTENDEES

**84TH ACNW MEETING
JUNE 25-27, 1996**

<u>ACNW MEMBERS</u>	<u>1st Day</u>	<u>2nd Day</u>	<u>3rd Day</u>
Paul W. Pomeroy	<u>X</u>	<u>X</u>	<u>X</u>
Dr. William J. Hinze	<u>X</u>	<u>X</u>	<u>X</u>
Dr. B. John Garrick	<u>X</u>	<u>X</u>	<u>X</u>
Dr. Martin J. Steindler	<u>X</u>	<u>X</u>	<u>X</u>
<u>ACNW STAFF</u>	<u>1st Day</u>	<u>2nd Day</u>	<u>3rd Day</u>
Dr. Virginia Colten-Bradley	<u>X</u>	<u>X</u>	<u>X</u>
Dr. Andrew Campbell	<u>X</u>	<u>X</u>	<u>X</u>
Ms. Lynn F. Deering	<u> </u>	<u>X</u>	<u>X</u>
Mr. Howard J. Larson	<u>X</u>	<u>X</u>	<u>X</u>
Mr. Richard K. Major	<u>X</u>	<u>X</u>	<u>X</u>
Dr. John T. Larkins	<u>X</u>	<u>X</u>	<u>X</u>
Dr. Richard P. Savio	<u>X</u>	<u>X</u>	<u>X</u>
Ms. Michele S. Kelton	<u>X</u>	<u>X</u>	<u>X</u>

ATTENDEES FROM THE NUCLEAR REGULATORY COMMISSION

June 25, 1996

P. Reed, RES
J. Firth, NMSS
K. McConnell, NMSS
N. Eisenberg, NMSS
B. Leslie, NMSS
M. Nataraja, NMSS
R. Johnson, NMSS
B. Ibrahim, NMSS

ATTENDEES FROM THE NUCLEAR REGULATORY COMMISSION (CONT'D)

June 26, 1996

P. Reed, RES
R. Wescott, NMSS
J. Firth, NMSS
B. Ibrahim, NMSS
J. Austin, NMSS
B. Leslie, NMSS

June 27, 1996

P. Reed, RES
J. Firth, NMSS
R. Cady, RES
M. Weber, NMSS

ATTENDEES FROM OTHER AGENCIES AND GENERAL PUBLIC

June 25, 1996

R. Baca, CNWRA
M. Uman, National Research Council/NAS
F. Phillips, New Mexico Tech.
D. Weigel, General Accounting Office
J. Docha, Intera/DESI
J. Gruhlke, EPA
J. Treichel, Nevada Nuclear Waste Task Force
S. Frishman, State of Nevada
B. Snyder, Energy & Management Cons. Corp.
J. York, Weston
L. Rickertsen, M&O/TRW
H. Bliss, ANL
D. Metlay, NWTRB
A. Van Luik, DOE
C. Hanlon, DOE
T. Pigford, Univ. of California
J. Kessler, EPRI
P. Cummings, CLV
J. Schmitt, NEI
D. Piccirillo, DOE
J. Thompson, DOE
C. Henkel, NEI
P. Krishna, M&O/TRW
M. Olson, Nuclear Information & Resource Service
T. Barney, Envirocare of Utah
A. Clamp, NEI

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

June 25, 1996 (Cont'd)

T. Zama, TEPCO
G. Roseboom, USGS (retired)
J. Johnsrud, ECNP
. Arriz, Nuclear Information & Resource Service
T. Giroux, Jr., NC Division of Radiation Protection
R. Wallace, USGS
P. LaPlante, CNWRA
A. Huang, Golder Associates, Inc.

June 26, 1996

R. Baca, CNWRA
R. Wallace, Jr., USGS
D. Weigel, General Accounting Office
J. Gruhlke, EPA
T. Barney, Envirocare of Utah
H. Bliss, ANL
L. Rickertsen, M&O/TRW
J. Kessler, EPRI
A. Van Luik, DOE
t. Giroux, NC Division of Radiation Protection
J. York, Weston
G. Roseboom, USGS (retired)
a. Huang, Golder Federal Services, Inc.
J. Docha, Intera/DESI
B. Gamble, CRWMS M&O/WCFS
R. Andersen, NEI
P. Cummings, CLV
P. Krishna, M&O/TRW
J. Johnsrud, ECNP
M. Olsen, Nuclear Information & Resource Service
J. Treichel, NV Nuclear Waste Task Force
S. Frishman, State of Nevada
K. Cline, Woodward/Clyde
V. Sjobh, General Accounting Office
C. Hanlon, DOE

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

June 27, 1996

R. Alvarado, TX LLW Disposal Authority

R. Wallace, USGS

J. Ringenberg, Nebraska Dept. Of Environmental Quality

A. Huang, Golder Federal Services, Inc.

Roles, DOE

S. Neuder, PNNL (Battelle-D.C. Office)

APPENDIX IV: FUTURE AGENDA

The Committee agreed to consider the following during the 85th ACNW Meeting, August 21-23, 1996:

- **Thermal-Mechanical-Hydrological-Chemical Coupled Processes**
The Committee will devote an entire day to a study of the Department of Energy and NRC staff plans to develop and use coupled process models in evaluating various aspects of repository performance. The Committee will investigate how thermal input to the host rock and groundwater system will effect the hydrologic, mechanical, and chemical characteristics and processes of the geologic systems.
- **Meeting with the Director, Division of Waste Management, Office of Nuclear Material Safety and Safeguards** - The Director will discuss items of current interest related to the Division of Waste Management programs which may include: progress at the Yucca Mountain site, the status of EPA's Yucca Mountain standards and NRC's HLW regulations, and the status of a branch technical position on low-level waste performance assessment.
- **Technical Guidance on Expert Elicitation** - The Committee will review the NRC staff's draft technical position on the use of expert elicitation in the licensing of a nuclear waste disposal facility.
- **Preparation of ACNW Reports** - The Committee will discuss proposed reports, including: specifying a critical group and reference biosphere to be used in a performance assessment of a nuclear waste disposal facility, the consideration of coupled processes (Thermal-Mechanical-Hydrological-Chemical) in the design of a HLW repository, and comments on a Branch Technical Position on The Use of Expert Elicitation.
- **Time of Compliance in Low-Level Waste Disposal** - The Committee will discuss options for setting a regulatory time of compliance for a LLW disposal facility. Participation by representatives of individual states is anticipated.
- **Committee Activities/Future Agenda** - The Committee will consider topics proposed for future consideration by the full Committee and Working Groups. The Committee will discuss ACNW-related activities of individual members.
- **Miscellaneous** - The Committee will discuss miscellaneous matters related to the conduct of Committee activities and organizational activities and complete discussion of matters and specific issues that were not completed during previous meetings, as time and availability of information permit.

**APPENDIX V
LIST OF DOCUMENTS PROVIDED TO THE COMMITTEE**

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

MEETING HANDOUTS

<u>AGENDA</u>	<u>DOCUMENTS</u>
<u>ITEM NO.</u>	

2 Specification of Critical Group and Reference Biosphere

1. Report on relevant issues addressed in the National Research Council/National Academy of Sciences "Technical Bases for Yucca Mountain Standards (TBYS)." Dr. Fred M. Phillips, Member, TBYS Committee [Viewgraphs]
2. NRC Staff-Considerations for Specification of the Reference Biosphere and Critical Group at Yucca Mountain, presented by Norman A. Eisenberg, Division of Waste Management, Office of Nuclear Material Safety and Safeguards, dated June 25, 1996 [Viewgraphs]
3. Specification of Critical Group and Reference Biosphere, E-mail from Jean M. Bahr, University of Wisconsin, TBYS Member, re T. H. Pigford's Personal Statement, submitted by H. Larson, dated June 21, 1996 [Agenda Item 2.1, Handout #1]
4. The Yucca Mountain Standard for Protecting Public Health, presented by Thomas H. Pigford, Department of Nuclear Engineering, University of California, dated June 25, 1996 [Viewgraphs]
5. Critical Group and Future Biosphere, presented by Ray Clark, EPA, dated June 1996 [Viewgraphs]
6. Overview of the Revised Yucca Mountain Project, presented by Stephan J. Brocum, Assistant Manager for Suitability and Licensing Yucca Mountain Site Characterization Project Office, Las Vegas, Nevada, dated June 1996 [Viewgraphs]
7. The Who, When, and Where of Critical Groups, presented by John H. Kessler, Electric Power Research Institute, dated June 25, 1996 [Viewgraphs]

4 Discussion with Dr. Dade Moeller, Moeller and Associates, Inc.

8. Innovative Policies for Radioactive Waste Management, presented by Dade Moeller, Dade Moeller & Associates, Inc., dated June 25, 1996 [Viewgraphs]
9. A Historical Note -- The Saga of the Genetic Dose, information submitted by Dade Moeller, dated May 31, 1996 [Handout]
10. Article from Health Physics Society Newsletter, Feature Article, Support for the Linear, No-Threshold Model, by Daniel J. Strom, Ph.D., CHP, dated October 1995 [Handout]

MEETING HANDOUTS

AGENDA
ITEM NO.

DOCUMENTS

4 (cont'd) Discussion with Dr. Dade Moeller, Moeller and Associates, Inc. (Cont'd)

11. Excerpt from International Council on Radiation Protection, Publication 42, 1984, "Critical groups" [Handout]

5 Preparation for Meeting with Commission

12. Letter from Dr. Jean Bahr, University of Wisconsin, Member NAS/TBYMS Committee to ACNW: Specification of Critical Group and Reference Biosphere, dated June 21, 1996 [See Handout #4 above]
13. Background Material from Rich Major for Meeting Between the Commissioners and the ACNW, dated June 26, 1996 [Agenda Item 5, Handout #1]

6 Total System Performance Assessment '95

14. Audit Review of DOE TSPA 95, presented by Rex Wescott, NRC, and Robert Baca, CNWRA, dated June 26, 1996 [Viewgraphs]
15. Total System Performance Assessment '95 Technical Exchange - DOE Response to NRC's Review, presented by Abraham Van Luik at June 25-26, 1996 meeting [Viewgraphs]
16. Total System Performance Assessment Focus Topic: Dilution, presented by Robert G. Baca, CNWRA, dated June 26, 1996 [Viewgraphs]
17. Total System Performance Assessment Focus Topic: TSPA Abstraction, presented by Robert G. Baca, dated June 26, 1996 [Viewgraphs]

7 Department of Energy's Program Budget

18. Draft: Civilian Radioactive Waste Management Program Plan, Revision 1, from the U.S. Department of Energy [Handout]

8 Preparation of ACNW Reports

19. Low-Level Waste Program for NRC, 1) Faxed copy from J. Garrick to M. Steindler re LLW Program for NRC, dated June 21, 1996 and (2) LLW Forum News Flash dated June 21, 1996 re NRC Publishes Nuclear Power Plant License Renewal Rule; submitted by H. Larson [Agenda Item 8.2, Handout #1]
20. Proposed Staff Resolution of Public Comments on Draft BTP on Expert Elicitation, Comments Received, and Draft Overheads for Commission Briefing, dated June 13, 1996, submitted by A. Campbell, ACNW [Agenda Item 8.3, Handout #1]

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12 Time of Compliance in Low-Level Waste Disposal

21. **Time of Compliance within the Context of DOE Radiation Protection Requirements for Public Protection, presented by Andy Walls, dated June 27, 1996 [Viewgraphs]**
22. **Comments on the Time of Compliance by Ruben A. Alvarado, P.E. Texas Low-Level Radioactive Waste Disposal Authority, dated June 27, 1996 [Handout]**
23. **Time Frame for Performance Assessment Analyses, by J. Ringenberg, Nebraska Department of Environmental Quality [Handout]**

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DOCUMENTS

1 Opening Remarks by ACNW Chairman

1. Introductory Statement by the ACNW Chairman, undated
2. Items of Current Interest, undated
3. Introductory Statement by the ACNW Chairman - Second Day, undated
4. Introductory Statement by the ACNW Chairman - Third Day, undated

2 Specification of Critical Group and Reference Biosphere

5. Table of Contents
6. Status Report
7. Draft Task Action Plan for Critical Group/Reference Biosphere
8. Institute for Energy and Environmental Research (IEER), Press Release, August 1, 1995
9. National Research Council/NAS report "Technical Bases for Yucca Mountain Standards"
10. "Comments Regarding the NAS Report on Yucca Mountain Standards," C. Whipple, ICF Kaiser, reported in High Level Radioactive Waste Management, Proceedings of the Seventh Annual International Conference (7thIntHLWConf)
11. "NRC Staff Considerations for Specification of Reference Biosphere and Critical Group(s) at Yucca Mountain," BIOMOVs II Joint Working Group Meeting, April 26, 1996 (Viewgraphs)
12. "Regulatory Perspective on Future Climates at Yucca Mountain," N. Coleman, N. Eisenberg, and D. Brooks, NRC (7thIntHLWConf)
13. "NAS Recommendations and Current Legislative Proposals: Implications for U.S. NRC's Regulatory Program," J. Kotra, M. Federline, T. McCartin, N. Eisenberg, and J. Austin, NRC (7thIntHLWConf)
14. Letter from T. H. Pigford, University of California, Berkeley, CA, to H. J. Larson, ACNW, dated June 12, 1996, forwarding his recent relevant reports and correspondence re NAS report
15. "The Yucca Mountain Standard: How Lenient Should it be?" T. H. Pigford, University of California, Berkeley, CA (7thIntHLWConf)
16. UCB-NE-9523, "Invalidity of the Probabilistic Exposure Scenario Proposed by the National Research Council's TBYMS Committee", November, 1995, T. H. Pigford, University of California, Berkeley, CA, North Carolina (all similar perspectives)

MEETING NOTEBOOK CONTENTS (CONT'D)

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2 (cont'd) Specification of Critical Group and Reference Biosphere (Cont'd)

17. Comments received by EPA on NAS TBYS Report". NOTE: Included are comments from Nevada; Nye Nuclear Waste Task Force, Inc.; Inyo County; Clark County; Sierra Club; Environmental Coalition on Nuclear Power; IEER; Nuclear Information and Resource Service (NIRS); and Clean Water Fund of
18. "The National Academy of Sciences Report and Environmental Radiation Standards for Yucca Mountain", L. Weinstock and R.L. Clark, EPA, (7thIntHLWConf)
19. "Regulatory Perspective on NAS Recommendations for Yucca Mountain Standard", S. J. Brocoum, DOE, M. Lugo, TRW Environmental Safety Systems, Inc., S. Nesbit, Duke Engineering & Services, Inc., J. Duguid, INTERA, Inc., and P. Krishna, TRW Environmental Safety Systems, Inc. (7thIntHLWConf)
20. EPA additional detailed recommendations on TBYS report. Relevant sections:

 pp A24 - A27, Reference Biosphere
 pp A8-2 - A8-14, Reference Biosphere Critical Group
21. "Critical Groups for Geological Disposal Performance Assessments", J. Kessler, EPRI and G.M. Smith, QuantiSci, (7thIntHLWConf)
22. Summaries from the 7th International High Level Radioactive Waste Conference, April 29 - May 3, 1996, Las Vegas, NV
 - (1) "Biosphere Modeling for radioactive Waste Disposal," R. Klos, Paul Scherrer Institute and F. Van Dorp, Switzerland
 - (2) "Biosphere Model for Assessing Doses from Nuclear Waste Disposal," M. I. Sheppard, R. Zach, S. C. Sheppard, B. D. Amiro, G. A. Bird, J. A. K. Reid, and J. G. Szekeley, AECL, Canada
 - (3) "Biosphere FEP List Development Specific to Yucca Mountain," G. Smith, B. Watkins and R. Little, QuantiSci, UK
 - (4) "How Can Coupled Systems Evolve? A Scenario Simulation Methodology", H. Takese, JGC Corp, P. Grindrod and S. P. Compton, QuantiSci, UK

4 Discussion with Dr. Dade Moeller, Moeller and Associates, Inc.

23. Table of Contents
24. Status Report
25. Paper: "Innovative Policies for Radioactive Waste Management", prepared by Dr. Dade W. Moeller, President, Dade Moeller & Associates, Inc.

MEETING NOTEBOOK CONTENTS (CONT'D)

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- 4 (cont'd) Discussion with Dr. Dade Moeller, Moeller and Associates, Inc. (Cont'd)**
- 26. Statement of Work for D. W. Moeller, Technical Assistance in Radiation Dose Rate Matters
 - 27. Memo from Richard K. Major, ACNW, to ACNW Members, Subject: Letter from Dr. Moeller concerning the "Open Market Trading Rule", dated February 15, 1996
 - 28. Memo from M. J. Steindler, ACNW, to Richard Major, ACNW, Subject: Comments on Dade Moeller's proposed "Open-Market trading Rule," dated March 21, 1996 [Facsimile]
- 5 Preparation for Meeting with Commission**
- 29. Table of Contents
 - 30. Status Report
 - 31. Memo from Richard Major, ACNW, to ACNW Members and Staff, Subject: Suggestions for the Next Meeting with the Commission, dated May 24, 1996
 - 32. Memo, John T. Larkins, ACNW, to John c. Hoyle, SECY, Subject: Background Material for Meeting Between the Commissioners and the Advisory Committee on Nuclear Waste, June 26, 1996, 2:30 p.m., dated June 14, 1996 (with Attachments)
- 6 Total System Performance Assessment '95**
- 33. Table of Contents
 - 34. Status report
 - 35. Memo from Andy Campbell, ACNW, to ACNW Members, Subject: Meeting Report: NRC/DOE Technical exchange on TSPA '95, May 22-23, 1996, dated June 13, 1996 (with Attachments)
 - 36. Memo from Andy Campbell, ACNW, to ACNW Members, Subject: Meeting Report for October 18, 1995 NWTRB Meeting on TSPA '95 (with Attachments)
 - 37. November, 1995, "Total System Performance Assessment-1995: An Evaluation of the Potential Mountain Repository" (supplied previously to members)
 - 38. October, 1995, "NRC Interactive Performance Assessment Phase 2," NUREG-1464, (supplied previously to members)

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7 Department of Energy's Program Budget

- 39. Table of Contents
- 40. Status Report
- 41. Overview of the Revised Yucca Mountain Project, presentation by Stephen Brocoum at the 1996 International High-Level Waste Management Conference, April 30-May 1, 1996

8 Preparation of ACNW Reports

- 42. Final Draft Letter to Chairman Jackson from ACRS/ACNW, Subject: Health Effects of Low-Levels of Ionizing Radiation, dated May 17, 1996
- 43. Memo from Martin J. Steindler, ACNW, to Distribution, Subject: Elements of an Adequate Low Level Radioactive Waste Program, Version 3.0a, dated June 5, 1996

11 Committee Activities/Future Agenda

- 44. Table of Contents
- 45. Set Agenda for 85th ACNW Meeting, August 21-23, 1996
- 46. Review Items for the Out Months
- 47. Future Working Group Topics
- 48. Future Outside Meetings Members and Staff may attend
- 49. Reconcile EDO responses to ACNW reports
- 50. Agenda Items for ACNW Proposed by the Staff (Blah List)
- 51. CRWMS/M&O Meeting Status
- 52. One year Calendar of Events

12 Time of Compliance for Low-Level Waste Disposal

- 53. Table of Contents
- 54. Status Report
- 55. Letter from Martin J. Steindler, Chairman, ACNW, to Ivan Selin, Chairman, NRC, Subject: Review of the Low-Level Radioactive Waste Performance Program, dated June 3, 1994
- 56. Letter from Paul Pomeroy, Chairman, ACNW, to Shirley Ann Jackson, Chairman, NRC, Subject: Time Span of Compliance of the Proposed High-Level Waste Repository at Yucca Mountain, Nevada, dated June 7, 1996

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57. **Issues and Perspectives on the Time Frame of Regulatory Compliance for Low-Level Radioactive Waste Disposal, prepared by Andrew C. Campbell to LLW Forum Meeting in Annapolis, MD, May 3, 1996 (Viewgraphs)**
58. **Letter from Martin J. Steindler, Chairman, ACNW, to Ivan Selin, Chairman, NRC, Subject: Regulatory Issues in Low-Level Radioactive Waste Disposal, dated June 28, 1995**
59. **Considerations for Selecting Compliance Periods in Performance Assessments for Waste Disposal and Decommissioning, presented by Tim McCartin DWM/NMSS, March 27, 1996, Working Group Session on Regulatory Issues in Low-Level Waste Disposal Performance Assessment**
60. **Letter from James M. Taylor, EDO, NRC, to Paul W. Pomeroy, Chairman, ACNW, Subject: Regulatory Issues in Low-Level Waste Disposal Performance Assessment, dated May 17, 1996**

16 ACNW Priorities/Task Action Plans

61. **Status Report**