

MINUTES OF THE 8TH ACNW MEETING  
MARCH 23, 1989

**CERTIFIED**

- TABLE OF CONTENTS -

	<u>PAGE</u>
I. Chairman's Report (Open).....	1
II. Site Characterization Study Plans (Open).....	1-6
III. Quality Assurance for Site Characterization Study Plans (Open).....	6-8
IV. ACNW Consultants' Reviews of ESF-Related Study Plan No. 8.3.1.2.2.2, Water Movement Tests (Open) .....	8-12
V. Status of the Site Characterization Analysis (SCA) (Open).	12
VI. Executive Session (Open/Closed).....	12-15
A. Reports, Letters, and Memoranda.....	12
Letter to Chairman Zech dated March 24, 1989 on ACNW Staff Support Recommendations	
B. Other Committee Conclusions (Open).....	13-15
1. Feasibility of a Scoping Study PRA for the Yucca Mountain Repository (Open).....	13
2. Zeolite Concern (Open).....	13
3. Air Quality EPA Standards.....	13
4. Proposed Deletion of Section 20.205 from the Pro- posed Revision of 10 CFR Part 20 (Open).....	13
5. Proposed Committee Working Groups (Open).....	13-14
6. Mail Delivery (Open).....	14
7. Future ACNW Activities.....	14-15
C. Future Activities.....	15
VII. Appendices	
Appendix I - Attendees.....	I-1/2
Appendix II - Future Agenda.....	II-1/3
Appendix III - Other Documents Received.....	III-1/2
Appendix IV - ACNW Letter Reports/Memoranda.....	IV-1

*rsa*  
*o/i*

8908180399 890323  
PDR ADVCM NACNUCLE  
PNU

DESIGNATED ORIGINAL

Certified By *EMB*

Issued: 5/23/89

MINUTES OF THE 8TH ACNW MEETING  
MARCH 23, 1989

The 8th meeting of the Advisory Committee on Nuclear Waste was convened by Chairman Dade W. Moeller at 8:30 a.m., on Thursday, March 23, 1989, at 7920 Norfolk Avenue, Bethesda, Maryland.

[Note: For a list of attendees, see Appendix I, ACNW members, Drs. Dade W. Moeller, Clifford V. Smith, and Martin J. Steindler were present. ACNW consultants, Drs. Konrad B. Krauskopf, William J. Hinze, Judith B. Moody, Donald A. Orth, and Mr. Eugene E. Voiland were also present.]

The Chairman said that the agenda for the meeting had been published. He also identified the items to be discussed. He stated that the meeting was being held in conformance with the Federal Advisory Committee Act and the Government in the Sunshine Act, Public Laws 92-463 and 94-409, respectively. He also noted that a transcript of some of the public portions of the meeting was being made, and would be available in the NRC Public Document Room at the Gelman Building, 2120 L Street, N.W., Washington, D.C.

[Note: Copies of the transcript taken at this meeting are also available for purchase from the Heritage Reporting Corporation, 1220 L Street, N.W., Washington, D.C. 20005.]

I. Chairman's Report (Open)

[Note: Mr. R. Fraley was the Designated Federal Official for this portion of the meeting.]

Dr. Moeller announced that Dr. Judith Moody, ACNW consultant, was one of the two recipients of the Outstanding Scientist of the Year Award from the Association for Women in Science of Central Ohio.

II. Site Characterization Study Plans (Open)

[Note: Mr. O. S. Merrill was the Designated Federal Official for this portion of the meeting.]

Dr. Stephan J. Brocoum, Chief, Siting and Geosciences Branch, U.S. Department of Energy (DOE), presented an overview and status of the DOE Site Characterization Study Plans. He discussed the following topics:

1. Relationship of the Study Plans to the Site Characterization Plan (SCP)

The SCP is the basis for each study plan because it presents the overall rationale for the site characterization program and thereby identifies the information needed from that characterization. The purpose of the study plans is to obtain that information.

## 2. Study Plan Content and the DOE/NRC Level-of-Detail Agreement (May 1986)

During a meeting in May 1986, it was determined that each study plan would provide more detail on each study described in the SCP, including information on (1) activities, (2) tests and analyses, (3) methods and procedures, (4) duration and sequencing of activities, (5) constraints, and (6) QA requirements. The study plans define the technical work to be performed by the investigators.

## 3. Issuance and NRC Review of the Study Plans

Dr. Brocoum said that, whenever possible, the DOE plans to issue study plans 6 months prior to the start of work. He also said that DOE understands that the NRC Review Plan for Study Plans calls for: (1) review of all study plans and identification of major concerns within 3 months, and (2) detailed technical review of selected (20%) study plans.

## 4. Principal Areas of Geologic Uncertainty at the Yucca Mountain Site

He said that the principal areas of uncertainty are: (1) geohydrology, (2) tectonics, (3) the potential impact of climate change on the hydrologic system, and (4) the potential for the presence of significant natural resources.

## 5. Relationship of the Study Plans to Principal Areas of Geologic Uncertainty

In each of the four principal areas of geologic uncertainty identified in Item 4, Dr. Brocoum identified the relevant study plans, the concerns addressed in each, and its status. For example, pertaining to the characterization of the unsaturated zone, he said Study Plan No. 8.3.1.2.2.4 will address the subject of Unsaturated Zone Percolation - Multipurpose Borehole (MPBH) testing near the exploratory shafts (ES). The U. S. Geological Survey (USGS) has prepared this Study Plan. It was submitted to NRC on February 9, 1989 as one of the first 5 ESF-related study plans. He identified and briefly discussed 9 additional study plans, each of which has a specific role to play in the site characterization process.

## 6. Status of the High-Priority Study Plans

Dr. Brocoum identified 17 High-Priority Study Plans by number, title, responsible organization, and estimated transmittal date. The study plans are to be submitted to NRC by October 1989, the majority of them (15) by June 1989 and one on Historical and Current Seismicity by a date yet to be determined.

## 7. Status of the Commitments from the DOE/NRC Study Plan Meeting held in December 1988

The status of these commitments was given by Dr. Brocoum as follows:

- 1) The Study Plan Analysis (SPA) for five ESF study plans -- this is to be covered in a subsequent presentation on the QA of study plans.
- 2) The list of study plans covering all ongoing activities and the responsible participant organization -- this list was transmitted to the NRC during the week of March 20-24, 1989.
- 3) The position of DOE relative to QA requirements on prototype testing -- DOE is evaluating its position on prototype testing.
- 4) Study Plan References -- All but two references for the ESF plans have been transmitted to NRC; two references are still pending copyright release.

The highlights of the Committee's discussion with Dr. Brocoum follow.

Dr. Steindler asked if all study plans are limited to items that are in the SCP and if there would be other study plans than those required for site characterization. Dr. Brocoum answered yes and said that new study plans will be added, if and when required, and that they will be described in the semiannual updates of the SCP.

Dr. Moody inquired about how DOE would handle unanticipated findings in the SCP. Dr. Brocoum said that the SCP would not be revised to accommodate such an item, but that new studies or activities would be reported in the above-mentioned semiannual updates.

Dr. Moeller asked if each study plan would be assigned to a contractor to prepare, and are all 106 study plans currently being worked on. Dr. Brocoum said that the study plans are, in general, being prepared by one of DOE's contractors -- U.S. Geological Survey (USGS), Los Alamos National Laboratory (LANL), Sandia National Laboratory (SNL), Lawrence Livermore National Laboratory (LLNL), and SAIC, Inc., DOE's technical support contractors. About 50 study plans are currently being worked on.

Dr. Steindler asked if each study plan was self-contained, i.e., would it stand alone as a complete document. Dr. Brocoum said that the SCP is needed with the study plan in order to understand the rationale for the study plan.

Dr. Smith expressed concern about the sequence of the development of the SCP and the study plans. Dr. Brocoum said that the SCP and the study plans were developed in parallel. He restated the iterative nature of the program.

Dr. Hinze asked what kind of scientific license is permitted under the study plans. Dr. Brocoum said that the principal investigator will have a sufficient latitude to make minor changes, but that if there are changes in the

goal or scope of the study or the kind of information the study is supposed to gather, the study plan will go through a formal change control process.

Dr. Moody expressed concern about who would do the work described in a study plan. She was particularly interested in the credentials and technical expertise of the individuals who prepare the plan. Dr. Brocoum said that contractors for the work would be selected by competitive bidding and that whoever was selected would have to have a qualified quality assurance (QA) program in place to do the work.

Drs. Smith and Steindler, and Mr. Voiland, discussed the procedures and logistics for submission of the study plans to NRC, and their implementation. Concern was expressed about the time element involved. Dr. Brocoum stated that: (1) DOE would issue the study plan to NRC and to the state of Nevada six months prior to starting the study, (2) the preparatory work has been underway for some time -- several years in some cases, and (3) DOE would consummate contracts and have the contractor ready to start the study before the study plans are approved. Since most reviews are expected to go relatively smoothly, approaching it in this manner will, overall, be more cost and time efficient.

In response to a question by Dr. Moeller regarding NRC's review of the DOE study plans, Dr. Brocoum said it was his understanding that NRC would review all of the study plans for acceptance, but select only 20% of them for full review, i.e., those in the areas of greatest uncertainty such as geohydrology, the flow processes in the unsaturated zone, tectonics, surface faulting, climate, etc.

Dr. Moeller commented about preclosure accident analysis in the safety analysis report, but said he found no mention of postclosure accident analysis in the SCP. Dr. Brocoum and Mr. Robert Gamble, Weston, explained that accident analysis is the terminology used for the operating system during preclosure only, and that in the postclosure period it is included as part of the scenario analysis.

Dr. Moody asked if, in their current seismic monitoring activities the DOE contractors at Yucca Mountain are able to detect underground explosions at the Nevada Test Site. Dr. Brocoum said that they do and that DOE is installing a strong motion instrument for that purpose.

Dr. Brocoum reported that, as of March 20, 1989, 19 study plans were being reviewed by DOE Headquarters personnel, of which 14 are high priority plans (out of a total of 17 previously identified as high priority plans). In response to a question by Dr. Moeller, Dr. Brocoum said that the 17 plans are high priority in terms of timing, i.e., out of the total of 106 plans, these 17 plans include activities that DOE wants to begin early on during site characterization. The other three high priority plans may have arrived at DOE Headquarters recently.

Dr. Brocoum assured Drs. Orth, Moody, and Steindler that the technical people that are reviewing the plans are well-qualified. The reviewers are primarily from the national laboratories.

Dr. Hinze asked if the surface facility at Midway Valley is required for site characterization or for an operational phase and why it is of high priority. Dr. Brocoum said that the surface facility is important for preclosure accident scenarios because it will include the surface waste handling building where waste will be repackaged or put into containers. That is why the surface facility is of high priority.

Dr. Smith expressed concern about the enormous cost of the site characterization process before a decision is made as to whether the site is suitable. Dr. Brocoum assured him that, in order to arrive at such a decision as soon as possible, and thus minimize costs, the areas of uncertainty are the ones they will look at relatively early in the site characterization process. He said that the single most important area is the unsaturated zone and that the seismic tectonics area is also very important.

Dr. Moeller noted that a high percentage of the study plans are to be done by the USGS which concerns him in view of the alleged difficulty in getting data and final reports from them. Dr. Brocoum said the USGS had been responsive in preparing the study plans. He added that DOE has a configuration management system that is being put in place to control the flow of data from some 27 subcontractors, including USGS, into the reference information data base. The problem is project wide, not just a problem with USGS, which is under the same contractual constraints to provide data in a timely manner as the other subcontractors.

Dr. Steindler asked why, in view of the high priority of the hydrology and tectonics areas, study plans dealing with these two topics are not much more prominent in DOE's early schedule. Dr. Brocoum explained that, of the 320 activities currently planned for the site, 80 are classified as ongoing, for which study plans will be issued in the relatively near future, including those dealing with the two named areas. He said that a list of the study plans that covers all ongoing activities has been prepared by DOE in response to a request made by NRC during a December 15, 1988, NRC/DOE meeting and that they would soon be provided to NRC.

Following Dr. Brocoum's comments that the NRC also asked DOE to reevaluate its position on prototype testing, Dr. Steindler suggested that it ought to be QA Level 1 and asked what is meant by prototype testing and is it NRC's position that it should be QA Level 1? Dr. Brocoum answered that prototype testing is the testing done in G-tunnel or outside the control zone to develop or verify procedures for doing a test. He said that it was a suggestion by NRC, not a position, that prototype testing should be QA Level 1.

Dr. Moeller noted that the U.S. National Park Service, Water Resources Division, had reportedly filed a formal protest opposing the DOE application to Nevada for a water permit to support the work at the Yucca Mountain site.

Mr. Edward Regnier, DOE, said that he was not aware of the status of that matter, and that there is no question but what DOE would have to get water from somewhere.

### III. Quality Assurance for Site Characterization Study Plans (Open)

[Note: Mr. O. S. Merrill was the Designated Federal Official for this portion of the meeting.]

Dr. David C. Dobson, Chief, Regulatory Interaction Branch, Yucca Mountain Project Office (YMPO), DOE, briefed the Committee on the controls that DOE has applied to the development and the reviews of the study plans. He said that the purpose of the briefing was to give the Committee an overview of whom they have to review the study plans, how they are reviewed, and what sort of controls DOE believes are required in their review. He made the following points.

1. Study plans were controlled according to a process designed to ensure that the requirements for development, review, and approval were met.
2. The process was consistent with the QA program then in existence but not necessarily with the current NRC-accepted QA program.
3. Study plan content was controlled and reviewed against the agreements reached with the NRC in the May 1986 meeting on level of detail in the SCP and study plans.

He said that the process was consistent with the QA plans DOE has had in place throughout the program, at least since DOE started reviewing study plans in mid-1987. However, the QA plan has evolved since 1987 both in terms of DOE's QA program and procedures. The one consistent factor since mid-1987 is that the content of the study plans has been controlled and reviewed against agreements DOE made with NRC during the May 1986, meeting on the level of detail in the SCP and the study plans. He illustrated this evaluation by discussing the review and approval process for the five Exploratory Shaft Facility (ESF) construction phase study plans.

Dr. Dobson explained the current YMPO procedure for study plan preparation, review, and approval, emphasizing that it is not intended to implement the controls given in Subpart G (Quality Assurance) of 10 CFR Part 60. He said that the YMPO procedure contains requirements for study plans in the following categories:

1. Study plans must be written and reviewed by qualified personnel.
2. Study plans must conform to the May 1986 DOE/NRC agreement on format, content, and level of detail, and must be consistent with the SCP.
3. The process of development, review, revision, and approval of study plans is controlled according to specified procedures.

4. Records documenting that all requirements have been fulfilled are maintained.

He said that the requirements have since been formalized in the YMPO Quality Assurance Plan (88-9 QA Plan, Revision 2), which has been accepted by NRC.

He discussed the format and content of each study guide, referred to above, which are:

1. Purpose and objective of the study, including scientific and technical objectives as well as the regulatory rationale and justification for the information to be obtained.
2. Rationale for the study, i.e., the need arising out of the SCP, including the rationale for (a) the selection of the type of test and (b) what sort of constraints exist on the study.
3. The description of activities to be performed during the study.
4. The application of study results, i.e., where the data produced will be used, specific to both the performance aspects and the design aspects of the program, as well as to site characterization.
5. Schedules and milestones for performance of the study.

Regarding the five ESF study plans, but equally applicable to each study plan, a study plan analysis is expected to conclude that:

1. Controls were substantially equivalent to those for a QA Level 1 activity.
2. Reviewer qualifications have been verified and documented.
3. No deficiencies in content have been identified.

The principal discussions on the overall topic, QA for study plans, were instigated by the following questions by members of the Committee (and answers by DOE representatives).

Dr. Steindler asked if there are any approved DOE plans for review of these study plans. Dr. Brocoum explained that the study plans that have been reviewed by DOE Headquarters to date have been done under a detailed interim procedure. Starting on March 27th, the technical reviews are to be completed under a formalized Headquarters' QA plan. Although there will not be any substantive differences from how they have been done in the past, there are documentation requirements of the qualifications and training of the people who will do the technical reviews.

Dr. Steindler, after confirming with Dr. Dobson that the study plans are not protocols giving explicit, detailed procedures, asked if DOE requires that

the principal investigators have, at hand, the detailed procedures of how to actually perform the study. Dr. Dobson explained that DOE attempted to write the study plans at a level that is sufficiently detailed for a technical expert, or peer, to perform the study. There is sufficient detail in each plan for them to determine that the plan is adequate for performance of the work, without the necessity of detailed procedures per se. He added that DOE has on file the qualifications of all the individuals and what aspects they will be reviewing. Using the Water Movement Test study plan as an example, he said that it had probably been technically reviewed independently by 10 to 12 people before it was received by YMPO. Dr. Brocoum added that this process is formalized in the QA procedures, and it is required by both the DOE Headquarters procedures and the YMPO procedures.

#### IV. ACNW Consultants' Reviews of ESF-Related Study Plan No. 8.3.1.2.2.2, Water Movement Tests

[Note: Mr. O. S. Merrill was the Designated Federal Official for this portion of the meeting.]

##### A. Introduction

The water movement tracer test is designed to produce information derived from isotopic measurements of radioactive chlorine-36 in soil and tuff samples (as a function of the depth from the surface to the repository horizon) to help characterize the percolation of precipitation into the unsaturated zone. These data constitute part of the input for developing numerical models of ground water flow for the Yucca Mountain site.

Because this is one of the highest priorities in the site characterization process, Dr. Moeller requested that ACNW consultants Drs. M. W. Carter, J. B. Moody, and K. B. Krauskopf, independently review this study plan. It is one of the five ESF-related study plans that DOE provided to NRC on February 9, 1989. Only Drs. Moody and Krauskopf were present at this meeting, each of whom gave a report on her or his review of the study plan. The highlights of each report are given below.

##### Dr. J. B. Moody's Report

Dr. Moody stressed that this was an independent consultant's report to the ACNW on the subject study plan. The highlights of Dr. Moody's presentation follow.

##### Purpose:

Dr. Moody stated that the purpose of the water movement tests was, by the measurement of chlorine-36 in Yucca Mountain soils and tuffaceous rocks, to determine water movement from the surface through the vadose (unsaturated) zone to the repository horizon. This measurement assumes that water variability with depth should be expected and that, according to Dr. Moody, one should also expect chemical variability with depth,

based on the usually valid assumption that chlorides move at the same rate that water moves. She said that there are three specific items critical to the water movement tests: (1) sample procedures, (2) chemical analytical techniques, and (3) data collection, analyses and interpretation.

In addition to these three topics, she also discussed hydrologic modeling, which she also believes to be very important.

The highlights of her presentation in each of these areas follow.

### 1. Sample procedure

Dr. Moody defined three sampling procedures: marginal, reasonable, and ideal, and discussed the various crucial factors in each. She concluded that:

- a. The present site study plan is proposing to use sampling procedures that are marginal.
- b. There is a problem of contamination of samples from both water and explosive material during sampling.
- c. Decision making should center around whether the blasted rubble samples are worth obtaining for the chlorine-36 measurements, given their most probable state of contamination.

### 2. Chemical analytical techniques

After citing and discussing two tables from the study plan (i.e., Table 2 -- Instrumentation, Equipment, Materials and Services for This Test, and Table 3 -- Technical Procedures for Study Plan 8.3.1.2.2.2), Dr. Moody made the following summary observations and/or recommendations.

- a. According to Table 3, the primary analysis will be for total chloride only.
- b. Usage of short leach times to avoid removing rock chlorine must be proven valid.
- c. A carefully chosen set of samples should be analyzed for chlorine-36 and total chemical content (major, minor, and trace element).

### 3. Data collection, analysis, and interpretation

Dr. Moody said the major data interference problems would be:

- a. Sample contamination.
- b. Faster movement of chloride compared to cations.
- c. Episodicity in water input.
- d. Water movement both vertically and laterally.

#### 4. Hydrologic modeling

Dr. Moody discussed the fact that, in a vadose medium, nonuniform hydrologic flow is most probable. This includes upward vertical and lateral flow, in addition to the expected downward vertical flow. Also, she said that rock faults and fractures will influence fluid flow and that fallout from surface nuclear explosions would have already increased the total amount of chlorine-36 in the hydrologic system. This contribution could pose a problem to the use of chlorine-36 data in modeling the Yucca Mountain hydrologic system as proposed in this study plan. She recommended that, (a) this work be integrated with the proposed USGS hydrochemical work, and (b) chlorine-36 traceability should be checked to the depth of the total saturated rock, i.e., to the water table itself, rather than just to the repository horizon, as this study plan proposes.

Dr. Moody's overall conclusion was that the study plan is presently not adequately complete because of the deficiencies defined.

Some of the pertinent points of discussion among Dr. Moody and the ACNW members and other consultants follow.

Dr. Voiland asked if it was a correct assumption to view this whole system as a steady state system. Dr. Moody said it was incorrect when the 10,000-year time period for the repository is considered, but it may be correct for 1000 years and possibly up to 10,000 years.

In response to a question by Dr. Parry regarding water movement in the saturated zone, Dr. Moody agreed that the feasibility of very rapid vertical and lateral water movement exists and that this was one of the reasons that studies of the hydrology of the site must not stop at the repository horizon, but include consideration downward to the water table.

Dr. Moeller asked about the method of drilling the shafts. Dr. Moody explained that the shaft will not be drilled dry, but wet, which contributes to the water contamination of the chlorine-36. If it could be dry drilled, this source of contamination could be eliminated.

In response to a question posed by Dr. Steindler about whether the proposed method would work, Dr. Moody said that she was not saying that it would not work, but that the interpretation of the data will be very difficult. In summary, she stated that this study plan only addresses the hydrology in the unsaturated zone from the surface to the repository horizon and is therefore an inadequate study for the site.

Dr. K. B. Krauskopf's Report

Dr. Krauskopf commented that Dr. Moody had covered the topic quite thoroughly and that he had no major points of controversy with what she had to say. His primary observations and/or recommendations were:

1. The proposed plan is a good, feasible plan and the chances of obtaining useful results are sufficiently high that it would be worthwhile to do it as proposed, although it will be difficult to carry out.
2. If it is decided that this kind of an investigation can give precise information about water movement, the refinements proposed by Dr. Moody could be added later, since the shaft will still be there.
3. The study plan should address how risky the chlorine-36 method is, since it has never been used in a situation comparable to that at Yucca Mountain.
4. The proposed test method does not appear to give enough consideration to the interpretation of the various types of possible results, e.g., if there is no change in the chlorine-36 ratio as a function of depth, or if the change is erratic and not systematic as expected. What conclusions can be drawn, if any, from these types of results?
5. There is a possibility of confusing the chlorine that is obtained by leaching with the chlorine that's already in the rock. He discussed the work and comments of Dr. Norris, LANL, who is the author (and principal advocate) of this study plan. He commented on the various sources of chlorine-36 which could possibly make interpretation of results very difficult, viz.
  - (a) chlorine already in the rocks as a product of volcanic activity,
  - (b) chlorine-36 resulting from neutron capture by chlorine-35. Although the plan states that the amount of chlorine-36 generated can be calculated, no explanation is given of how the calculation can be done.
  - (c) chlorine from explosives used to excavate the shaft which, even though the amount would be small, can be analyzed to determine how much interference it might cause.
  - (d) chlorine from the wash water which would be more troublesome, although by using a bromine tracer in the wash water, the amount of chlorine in the wash water could be determined.

7. Dr. Krauskopf believes that the study plan identifies the difficulties that may arise from the various routes through which water may descend through the tuff, besides downward motion, i.e., upward, horizontal, evaporation, and erratic motion.
8. In regard to the results that might be expected when testing the water age as a function of depth, he said that in the best possible circumstances the test results might indicate that the water simply gets older with depth, ages at the bottom being on the order of 100,000 to 200,000 years. If there is a systematic succession of ages going down, it would mean that the water has been moving regularly downward for a long period of time and will therefore probably continue to do so. However, in the Calico Hills formation, which has a good deal of clays and zeolites, the groundwater will almost certainly not move faster than at the repository horizon. He believes that the chance of this result is good enough to justify the proposed test. Such a result would go far toward qualifying the site. He also discussed other, less promising result scenarios.

Dr. Voiland discussed how the petroleum companies acquire geophysical information in their quest for oil and mentioned a few companies that study the subsurface of sites. He offered to provide this information to the Committee.

#### V. Status of the Site Characterization Analysis (SCA) (Open)

[Note: Mr. O. S. Merrill was the Designated Federal Official for this portion of the meeting.]

The Committee was briefed by Mr. Robert Browning, NMSS, on the current status of the SCP review and future schedule for ACNW review of the SCA. Mr. Browning indicated that the NRC staff would be available some time after April 7, 1989, to discuss with the Committee their comments as presented in the SCA .

The Committee agreed to schedule 2 hours during the April meeting to continue these discussions.

Mr. Browning suggested that the Committee should visit the Center for Nuclear Waste Regulatory Analyses. The Committee agreed to place the visit as a possible item on its future agenda.

#### VI. Executive Session (Open)

##### A. Reports, Letters, and Memoranda

The Committee completed a letter (dated March 24, 1989) to Chairman Zech on ACNW staffing support recommendations.

**B. Other Committee Conclusions****1. Feasibility of a Scoping Study PRA for the Yucca Mountain Repository**

The Committee discussed Dr. Okrent's recommendation that DOE support the performance of a scoping study PRA for the Yucca Mountain site. The Committee requested that a background and status report be prepared, including whether a similar study was completed for the Waste Isolation Pilot Plant (WIPP). The Committee will discuss this topic again during a future meeting after the background and status report has been prepared and distributed.

**2. Zeolite Concern**

Dr. Moody discussed the importance of research on zeolitic minerals found in Yucca Mountain rock. Zeolitic minerals indicate that water once was present.

**3. Air Quality EPA Standards**

The Committee discussed the EPA Air Quality Standards and the LLW Disposal Site Release Standards.

**4. Proposed Deletion of Section 20.205 from the Proposed Revision of 10 CFR Part 20**

The Committee discussed the fact that the Commission has received a number of letters from industry (primarily fuel fabrication organizations) that take exception to the ACNW advice on the deletion of Section 20.205 from the proposed 10 CFR Part 20.

Dr. Orth offered to make an inquiry of Savannah River Plant staff who are responsible for maintaining exposure (dose) records and submit a report on their approach and procedures.

**5. Proposed Committee Working Groups**

The Committee agreed that additional meetings are needed to make in-depth studies of several major issues. The Committee agreed to establish the following ad hoc working groups, each consisting of a member and a few consultants:

- Site Characterization Analysis Review (DWM)
- Deletion of Section 20.205 (DWM)
- Waste Confidence Rulemaking (DWM)
- Technical Positions (case-by-case)
- Technical Study Plans (case-by-case)

- LLW Topics, e.g. Cementation (unassigned)
- SAR for HLW Repository (unassigned)
- Technical Position on Post Closure Seals in an Unsaturated Media (MJS)
- Licensing Support System (DWM)

#### 6. Mail Delivery

Dr. Smith stated that he is receiving too much mail to handle effectively. After appropriate consultation, the Technical Information Group will reduce the number of documents sent to Dr. Smith.

#### 7. Future ACNW Activities

The Committee agreed to schedule two additional full Committee meetings, May 11, 1989 and June 13, 1989, for reviewing the Site Characterization Analysis of the DOE SCP. If time permits, the meetings will also include other topics.

The Committee agreed to place on its calendar a visit to the Center for Nuclear Waste Regulatory Analyses (CNWRA) in San Antonio, Texas, in July 1989. Dr. Steindler suggested that the Committee should question the need for CNWRA to regularly issue summaries of key radioactive waste items from publications.

The Committee reconfirmed its intention of visiting the West Valley Demonstration Project in the fall of 1989.

The Committee agreed to consider the draft NRC scoping package for a proposed rulemaking, "Design Basis Accident (DBA) Dose Limit" for the HLW repository. Mr. Merrill was assigned as the responsible engineer.

The Committee agreed to consider Regulatory Guide 3.61, "Standard Format and Content for a Topical Safety Analysis Report for a Spent Fuel Dry Storage Cask," when time permits. Mr. Merrill was assigned as the responsible engineer.

The Committee discussed the invitation for an ACNW representative to participate in a meeting on Long-Term Safety of a Final Repository for Radioactive Waste to be held in Bonn, W. Germany on April 27-28, 1989. The Committee reconfirmed that because of the demands of the current SCP/SCA review it would regrettably not be able to send a representative to this meeting.

The Committee discussed the preparation of a safety research report. The Committee agreed to consider this item at a later date.

The Committee suggested that an ACNW staff keep members informed on the program development for the 1st International High Level Radioactive Waste Management Conference, sponsored by the American Nuclear Society, to be held in Las Vegas, April 8-12, 1990. It was also recommended that an ACNW staff member attend this Conference.

The Committee requested that ACNW staff learn more about the program at DOE for storing sealed radioactive sources that exceed Part 61 Class C concentrations, as described in SECY-89-083. Dr. Parry was assigned as the responsible engineer.

C. Future Activities

The Committee agreed to the tentative future agenda as shown in Appendix II.

The 8th ACNW meeting concluded at 4:30 p.m. on March 23, 1989.

APPENDIX I - ATTENDEES

8TH ACNW MEETING  
MARCH 23, 1989

ACNW MEMBERS:

Dr. Dade W. Moeller

Dr. Clifford V. Smith

Dr. Martin J. Steindler

ACNW CONSULTANTS:

Dr. Konrad B. Krauskopf

Dr. William J. Hinze

Dr. Judith B. Moody

Dr. Donald A. Orth

Mr. Eugene E. Voiland

APPENDIX I - 8TH ACNW MINUTES

APPENDIX I - ATTENDEES (CONT'D)

NRC STAFF

J. Kotra  
M. Lopez-Otin  
R. Browning  
J. Scarsborough  
S. Bilhorn  
G. Lear  
R. Adler, CNWRA  
P. LaPlanta, CNWRA

DOE STAFF

R. Jackson - HQ - Weston  
E. Regnier - HQ  
S. Brocoum - HQ  
D. Dobson - Yucca Mtn. Project  
A. Norris - Los Alamos National Lab.  
R. Gamble - HQ - Weston

PUBLIC

S. Sharron, SERCH  
P. Austin, SAIC  
F. Killar, USCEA  
K. Unnerstall, Newman & Holzinger  
E. Helminski, The Radwaste Exchange

U.S. GEOLOGICAL SURVEY

E. Roseboom

APPENDIX II  
FUTURE AGENDA

9th ACNW Meeting on April 26-28, 1989

Meeting with the Commission (Open) - The Committee will meet with the Commission to discuss a variety of topics, such as:

- Review procedures of SCP and SCA
  - o SCP Study Plans
  - o Meeting with DOE/NRC/state of Nevada on CDSCP and SCP Review Plan
- West Valley Demonstration Project
- Division of High-Level Waste Management FY89 Program
- Greater-Than-Class-C radioactive waste
- Other items as identified by the Commission

Mixed Waste (Open) - The Committee will be briefed by NRC staff and NUMARC on the status of the disposal of mixed wastes

Post Closure Seals (Open) - The Committee will be briefed on the technical position on post closure seals in an unsaturated media.

Update on the Site Characterization Plan (Open) - The Committee will be briefed on the status of the NRC review of the SCP. The Committee will discuss whether the data that the state of Nevada has requested can be obtained in a realistic time period.

Expedited Handling of Petitions for Disposal of Radioactive Waste Streams that are Below Regulatory Concern and Update on the BRC Policy Statement (Open) - The Committee will be briefed on the procedures and schedule proposed by the NRC staff for the expeditious handling of petitions, which includes early ACNW involvement.

Waste Confidence Rulemaking (Open) - The Committee will meet with the NRC staff to discuss the preliminary findings on waste confidence rulemaking.

Licensing Support System (Open) - The Committee will be briefed on the development of the Licensing Support System for the High-Level Waste Repository.

Committee Activities (Open) - The Committee will discuss anticipated and proposed Committee activities, future meeting agenda, and organizational matters, as appropriate. Discussions will also include critical issues related to the high-level waste repository.

10th ACNW Meeting on May 11, 1989 (tentative)

Update on the Site Characterization Plan (Open) - The Committee will be briefed on the status of the NRC review of the SCP and will review the Site Characterization Analysis (SCA).

Quality Assurance (Open) - As time permits, the Committee will be briefed on the status of NRC/DOE interactions on the DOE Quality Assurance Program.

Committee Activities (Open) - The Committee will discuss anticipated and proposed Committee activities, future meeting agenda, and organizational matters, as appropriate.

11th ACNW Meeting on June 13, 1989 (tentative)

Site Characterization Analysis (Open) - The Committee will be briefed on the NRC review of the SCP and will continue review of the SCA.

Committee Activities (Open) - The Committee will discuss anticipated and proposed Committee activities, future meeting agenda, and organizational matters, as appropriate.

12th ACNW Meeting on June 28-30, 1989 (tentative)

Site Characterization Analysis (Open) - The Committee will finalize comments on the SCA, as needed.

EPA Low Level Waste Standards (Open) - The Committee will be briefed on the release standards for LLW disposal sites.

Waste Management Research Program and Strategy Plan (Open) - The Committee will be briefed on HLW and LLW research programs.

Performance Assessment (Open) - The Committee will be briefed on the NRC approach to performance assessment and status of activities (NMSS/RES Memorandum of Understanding).

Greater Than Class C Radioactive Waste (Open) - The Committee will be briefed on the DOE storage and disposal of Greater Than Class C radioactive waste.

13th ACNW Meeting on July 26-27, 1989 (tentative)

Status of Cementitious Waste Forms (Open) - The Committee will be briefed on the status of cementitious waste forms.

14th ACNW Meeting on August 3-4, 1989 (tentative)

Retrievability Demonstration (Open) - The Committee will be briefed on the Technical Position on demonstration of retrievability during site characterization.

Tectonic Models (Open) - The Committee will be briefed on the technical position on tectonic models.

15th ACNW Meeting on September 13-15, 1989 (tentative)

Data Availability (Open) - The Committee will invite representatives of DOE and USGS to discuss delays in making data available and coming to closure.

Meeting with Director of Office of Nuclear Reactor Regulation (NRR) (Open) - The Committee will be briefed by NRR on the licensing program for LLW handling systems, fuel compaction, decontamination and decommissioning. The Committee will discuss any crossover issues with representatives of NMSS and EDO.

## APPENDIX III - OTHER DOCUMENTS RECEIVED

### A. Meeting Handouts from ACNW Staff and Presenters

#### I. Executive Session

1. Editorial regarding Searching for New Levels of Confidence from Radiation Protection Dosimetry, Vol. 25, No. 3, p. 155, 1988

#### II. DOE Discussion of Site Characterization Study Plans

2. Viewgraphs regarding Overview and Status of Study Plans by S. Brocoum, OCRWM, March 23, 1989
3. Viewgraphs regarding Quality Assurance for Study Plans by D. Dobson, OCRWM, March 23, 1989

#### III. Water Movement Tests Study Plan Review

4. Viewgraphs regarding Review of DOE/YM Site Study Plan 8.3.1.2.2, Water Movement Tests by J. Moody, March 23, 1989
5. Additional Key References (from J. Moody) undated
6. Letter for ACNW from Krauskopf, March 20, 1989, regarding Review of DOE Study Plan on Water Movement Tests
7. Chart of Qualifications of Study Plan Reviewers for Water Movement Test, undated

#### IV. Status of Site Characterization Analyses

8. Letter for Bernero from Rousso, OCRWM, March 7, 1989, regarding Greater-Than-Class-C Low-Level Waste
9. Letter for Rousso from Bernero, NMSS, March 1, 1989, regarding Key Supporting Documents
10. Schedule of Major SCP Review Activities, undated

#### V. Administrative Session

11. Notes for 7th Meeting ACNW, by D. Moeller, March 18, 1989

APPENDIX III (CONT'D)

B. Meeting Notebook Contents Listed by Tab Number

TAB

1.

1. Table of Contents
2. Status Report regarding DOE Site Characterization Study Plans
3. Memorandum for ACNW Members from Merrill, February 16, 1989, regarding Site Characterization Study Plans, with attachment
4. Presentation Viewgraphs regarding Overview of Study Plans by S. Brocoum, OCRWM, February 22, 1989
5. Presentation Viewgraphs regarding Quality Assurance for Study Plans by D. Dobson, OCRWM, February 22, 1989

2.

6. Memorandum for Moeller from Merrill, March 22, 1989, regarding Consultants' Reports on DOE Study Plan Number 8.3.1.2.2.2, Water Movement Tests, Dated January 1989, with attachments (Meeting Handout #1)
7. Table of Contents
8. Status Report regarding ACNW Consultants' Review of ESF-Related Study Plan No. 8.3.1.2.2.2, Water Movement (Tracer) Tests, March 23, 1989
9. Letter for Browning, NRC, from Stein, OCRWM, regarding Five ESF Study Plans
10. Water Movement Tests, Study Plan 8.3.1.2.2.2, January 1989, LANL
11. Letter for Moeller from Carter, March 13, 1989, regarding Water Movement Tests
12. Memorandum for Parry from Moody, March 13, 1989, regarding Review of DOE/YM Study Plan
13. Memorandum for Merrill from Krauskopf, March 14, 1989, regarding Review of DOE Study Plan on Water Movement Tests [Official Use Only]

APPENDIX III, NOTEBOOK CONTENTS, 8TH ACNW MEETING

3.

- 14. Future Schedules, Administrative Session, undated
- 15. Memorandum for Fraley from Blaha, March 6, 1989, regarding Proposed Agenda Items for the ACRS and the ACNW, with attachment

4.

- 16. Status Report regarding Draft Letter - Regulatory Schedule/ Critical Issues
- 17. Memorandum for ACNW Members from Parry, March 14, 1989, regarding Status Report - Draft Letter - Repository Schedule and Critical Issues, with attachments [Official Use Only]

5.

- 18. Memorandum for ACNW Members from Parry, March 21, 1989, re SCP Review - Supplemental Background Material, with attachment [Official Use Only]
- 19. Memorandum for ACNW Members from Parry, March 14, 1989, regarding SCP Review - Status Report/Task Action Plan and Draft Letter with attachments [Official Use Only]

6.

- 20. Table of Contents
- 21. Status Report regarding Deletion of Section 20.205
- 22. Letter for Zech from Vaughan, GE, February 8, 1989, regarding Proposed Revision of 10 CFR Part 20
- 23. ACNW Report for Zech from Moeller, December 30, 1988, regarding Comments on the Proposed Deletion of Section 20.205 from the Proposed Revision of 10 CFR 20
- 24. ACNW Report (Draft #4) for Zech from Moeller, March 6, 1989, regarding Response to February 8, 1989, Letter from Charles M. Vaughan [Official Use Only]
- 25. Memorandum for Moeller from Major, February 27, 1989, regarding ACNW Response to Letter to Chairman Zech from Charles W. Vaughan, GE [Official Use Only]
- 26. Memorandum for Fraley from Merrill, February 27, 1989, regarding Advanced Nuclear Fuels Corporation Letter Regarding ACNW's Position on the Deletion of Part 20.205, with attachments

**APPENDIX IV - ACNW LETTER REPORTS/MEMORANDA**

**The letters/memorandum listed below were issued as result of the 8th ACNW meeting and are attached.**

**Letter to Chairman Zech dated March 24, 1989, on the ACNW Staffing Support Recommendations**

significant effect on the quality of the human environment.

For further details with respect to this action, see the request for the exemption dated October 25, 1988, and its supplement dated January 12, 1989, which are available for public inspection at the Commission's Public Document Room, 2120 L Street, NW., Washington, DC, and at the Appling County Public Library, 301 City Hall Drive, Baxley, Georgia.

Dated at Rockville, Maryland, this 9th day of March 1989.

For the Nuclear Regulatory Commission,  
David B. Matthews,  
Director, Project Directorate II-3, Division of Reactor Project I/II, Office of Nuclear Reactor Regulation.

[FR Doc. 89-6098 Filed 3-15-89; 8:45 am]  
BILLING CODE 7590-01-M

#### Advisory Committee on Nuclear Waste; Meeting Revision

The Advisory Committee on Nuclear Waste (ACNW) meeting scheduled for March 22-23, 1989 has been rescheduled for March 23, 1989, Room P-110, 7920 Norfolk Avenue, Bethesda, MD. Portions of this meeting will be closed to discuss information the release of which would represent a clearly unwarranted invasion of personal privacy 5 U.S.C. 552b(c)(6). Notice of this meeting was published in the Federal Register on March 9, 1989 (54 FR 10062).

The following topics will be discussed:

Thursday, March 23, 1989—8:30 a.m.—5:00 p.m.

1. DOE discussion of Site Characterization Study Plan (Open)
2. Discussion lead by ACNW Consultants M. Carter, K. Krauskopf and J. Moody on ESF Study Plan for study 6.3.1.2.2.2 re: Water Movement Tests (Open)
3. Administrative Session to include:
  - Future Schedules (Open)
  - Membership (Closed)
  - ACNW discussion of a possible report related to the repository development schedule, implementation of Study Plans and resolution of critical issues, etc. (Open)
  - ACNW planning its review schedule for the SCP/SCA including additional meeting dates, consultants and topics (Open)
  - Possible discussion of ACNW response to letters to the Commission concerning the ACNW position on the elimination of

Section 20.205 from the proposed revision to 10 CFR Part 20 (Open) Procedures for the conduct of and participation in ACNW meetings were published in the Federal Register on June 6, 1988 (53 FR 20699). In accordance with these procedures, oral or written statements may be presented by members of the public, recordings will be permitted only during those portions of the meeting when a transcript is being kept, and questions may be asked only by members of the Committee, its consultants, and Staff. The Office of the ACRS is providing Staff support for the ACNW. Persons desiring to make oral statements should notify the Executive Director of the Office of the ACRS 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 a prepaid telephone call to the Executive Director of the Office of the ACRS, Mr. Raymond F. Fraley (telephone 301/492-4516), prior to the meeting. In view of the possibility that the schedule for ACNW meetings may be adjusted by the Chairman as necessary to facilitate the conduct of the meeting, persons planning to attend should check with the ACRS Executive Director if such rescheduling would result in major inconvenience.

Date March 10, 1989.  
John C. Hoyle,  
Advisory Committee Management Officer.  
[FR Doc. 89-6095 Filed 3-15-89; 8:45 am]  
BILLING CODE 7590-01-M

[Docket Nos. 50-280 and 50-281]

#### Correction to Biweekly Notice; Virginia Electric and Power Co.

On March 6, 1989, the Biweekly Notice of Applications and Amendments to Operating Licenses Involving No Significant Hazards Considerations was published. One notice relating to the Surry Power Station, Units 1 and 2 contained an incorrect reference to a section of the Technical Specifications proposed to be changed. On page 9836, second column, under "Description of Amendment Request," the number "3.18" should be corrected to read "3.16".

For the Nuclear Regulatory Commission,  
Bart C. Buckley,  
Project Manager, Project Directorate II-3,  
Division of Reactor Projects I/II, Office of  
Nuclear Reactor Regulation.  
[FR Doc. 89-6100 Filed 3-15-89; 8:45 am]  
BILLING CODE 7590-01-M

[Docket Nos. 50-412 and 50-334]

#### Duquesne Light Co., et al; Beaver Valley Power Station, Unit Nos. 1 and 2, Proposed Corporate Restructuring

In the matter of Duquesne Light Company, Ohio Edison Company, Pennsylvania Power Company, the Cleveland Electric Illuminating Company, and the Toledo Edison Company

The U.S. Nuclear Regulatory Commission (the Commission) has received a proposed plan to restructure Duquesne Light Company (licensee), which is holder of Facility Operating Licenses No. DPR-66 and NPF-73, for operation of the Beaver Valley Power Station located in Beaver County, Pennsylvania.

The purpose of the licensee's proposed plan is to create a holding company, DQE, Inc., to become the sole owner of Duquesne Light Company, which will remain as licensee for the Beaver Valley Power Station. Current stockholders for Duquesne Light Company will become stockholders of DQE, Inc., upon approval by the stockholders.

For further details with respect to this action, see (1) the licensee's application dated February 6, 1989, and (2) the Commission's letter to the licensee dated March 9, 1989.

These documents are available for public inspection at the Commission's Public Document Room, the Gelman Building, 2120 L Street, NW., Washington, DC and at B.F. Jones Memorial Library, 663 Franklin Avenue, Alliquippa, PA 15001. A copy of item (2) may be obtained upon request addressed to the U.S. Nuclear Regulatory Commission, Washington, DC 20555, Attention: Document Control Desk.

Dated at Rockville, Maryland, this 9th day of March, 1989.

For the Nuclear Regulatory Commission,  
Peter S. Tam,  
Senior Project Manager, Project Directorate I-4, Division of Reactor Projects I/II, Office of Nuclear Reactor Regulation.  
[FR Doc. 89-6101 Filed 3-15-89; 8:45 am]  
BILLING CODE 7590-01-M

(TENTATIVE)  
SCHEDULE AND OUTLINE FOR DISCUSSION  
8TH ACNW MEETING  
MARCH 23, 1989  
BETHESDA, MARYLAND  
(Revision 1)

Thursday:

March 23, 1989, Room P-110, 7920 Norfolk Avenue, Bethesda, Maryland

- |  |   |   |
|--|---|---|
| 8:30 - 8: <del>40</del> <sup>35</sup> a.m.                               | [ | 1. Chairman Comment's (Open)  |
|  |   | 1.1) Opening Remarks  |
|  |   | 1.2) Items of current interest  |
| 8: <del>40</del> <sup>35</sup> - 10: <del>00</del> <sup>10</sup> a.m.    |   | 2. DOE Discussions of Site Characterization Study Plans (OSM)   |
| 10: <del>00</del> <sup>10</sup> - 10: <del>15</del> <sup>25</sup> a.m.   |   | ***** BREAK *****   |
| 10: <del>15</del> <sup>25</sup> - 12: <del>00</del> <sup>10</sup> Noon   | ] | 3. Discussion led by ACNW Consultants M. Carter, K. Krauskopf and J. Moody on ESF Study Plan for study 8.3.1.2.2.2 re: Water Movement Tests (OSM) |
| 1:20 - 2:35 p.m.<br>2:35 - 2:55 Break                                    |   | ***** LUNCH *****   |
| 12: <del>00</del> <sup>10</sup> - 1: <del>00</del> <sup>20</sup> p.m.    |   | 5. Administrative Session to include:   |
| 2: <del>55</del> <sup>4:30</sup> - 5: <del>00</del> <sup>4:30</sup> p.m. |   |   |

- Future Schedule (Open)
- Membership (Closed)
- ACNW discussion of a possible report related to the repository development schedule, implementation of Study Plans and resolution of critical issues, etc. (Open)
- ACNW planning its review schedule for the SCP/SCA including additional meeting dates, consultants and topics (Open)
- Possible discussion of ACNW response to letters to the Commission concerning the ACNW position on the elimination of Section 20.205 from the proposed revision to 10 CFR Part 20 (Open)

4:30  
5:00 p.m.

ADJOURN

[ Transcribed sessions



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

March 24, 1989

The Honorable Lando M. Zech, Jr.  
Chairman  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Chairman Zech:

In accordance with your memorandum, dated May 23, 1988, to the Executive Director, Advisory Committee on Reactor Safeguards, the Advisory Committee on Nuclear Waste (ACNW) has for the past nine months been provided staffing support through that Office. Through means of this letter, members of the ACNW wanted to avail themselves of the opportunity to offer our comments and recommendations relative to how staffing support should be provided to the ACNW in the future.

In short, we have found the current arrangements to be extremely valuable, particularly during the "start-up" phases of this Committee. Although problems have had to be resolved, we believe that overall they have been far fewer than would have been the case if our support had been provided by a completely new staff. All members of the ACNW endorse a continuation of the current arrangements. Our reasons for making this recommendation include the following:

1. Through the resources of the joint ACNW/ACRS support system, we are able to call upon a wider range of people with a wider range of talents than we would if the ACNW had access only to a smaller support group. This expanded group includes both the professional and the clerical staffs as well as the Fellows. Although some of these people are available to us only on a part-time basis, we have found that, when called upon, they have given us their undivided, complete and effective attention.
2. We also believe that the sharing of professional staff, document control facilities, meeting rooms, hotel and travel support, etc., works to the advantage of both Committees. We continue to find that it is essential that we maintain close liaison with the ACRS on a wide range of subjects, including radiation protection, metallurgy, seismology, chemistry, risk analysis, etc. The sharing of supporting staffs facilitates this objective.
3. In addition to these advantages, we believe that the existing arrangement enables the NRC to provide support to the ACNW and the ACRS with fewer people and less equipment and physical facilities than would otherwise be the case. As a result, it is our opinion that the existing arrangement is substantially more economical than

The Honorable Lando W. Zech, Jr.      2

would be the case if each Committee were supported by a separate staff.

We trust you will find these comments helpful. Should you desire, we would be pleased to discuss this matter with you at your convenience.

Sincerely,

A handwritten signature in cursive script that reads "Dade W. Moeller". The signature is written in black ink and is positioned above the typed name and title.

Dade W. Moeller  
Chairman