

NOTE TO: John J. Linehan

MAY 29 1991

FROM: Philip Justus *P. Justus*

SUBJECT: BENEFITS FROM HAVING ATTENDED THE SECOND INTERNATIONAL
HIGH-LEVEL WASTE CONFERENCE

Benefit: NRC Continues to Gain Respect of HLW Community.

The international HLW community expects the NRC to be an independent, but collegial, participant in the geologic repository solution to HLW disposal. When NRC encouraged international communication of ideas and approaches which address resolution of HLW disposal by cooperating in this conference, it maintained the respect of the HLW community. I am pleased to have represented NRC in two leadership roles: Chairman of the Geotechnical Exploration Session and active Program Committee member.

Benefit: NRC Imparts Knowledge of Its Activities and Programs to People Directly Involved in HLW; Improves Understanding of Its Positions.

Dozens of managers and technical staff in DOE and its contractor organizations and from various countries to whom I spoke, do not have frequent direct contact with NRC staff. These HLW practitioners have a disappointingly incomplete and sometimes erroneous view of NRC's role, achievements and positions in the national program. I am pleased to have been able to answer their questions, inform them of our program and results, and in some cases, correct misinformation.

Benefit: NRC Gains Knowledge of "Seasoned" Results From Prepared Talks and of Attitudes of Individuals and Organizations.

Often speakers say things about their work and reflect their (or their institution's) attitudes toward their work that do not appear in the papers and reports. It is especially useful for NRC to know of these, especially on controversial issues. For example, a USGS manager in the audience publicly reprimanded a USGS staff speaker for his attack on the motives of a scientist in the HLW program with competing interpretations, rather than letting the evidence for alternative interpretations amassed by that scientist speak for itself. I had thought to speak out on this breach of scientific protocol, but we didn't need to do so. Also, some of the knowledge that I gained from attending 32 technical talks I will impart at a briefing of the Yucca Mountain Team and directly to individual NRC staff in the next few months. A fringe benefit to the Agency is the increased technical-self-confidence that I, one of its technical managers, gained from learning about such things as tunnel-boring machines and environmental monitoring, in addition to detailed knowledge of my main areas of responsibility of geology and geophysics. A new conceptualization of the behavior of water in fractures and faults around a thermally loaded waste canister surrounded by clay was analyzed numerically (by Stephansson at LBL) and indicated a need for geologists to provide fracture data to performance modelers at a scale of less than 1 meter. This is useful background for on-going guidance development (for DOE).

Benefit: NRC Gained First-Hand Knowledge of Volcanism Analog and Methods of Excavation of Welded Tuff Analog

I actively participated in a pre-conference field trip organized by ACNW to the Lunar Crater basalt volcanic field to inspect surface geologic features of volcanism similar to that which has occurred around Yucca Mountain. Also, I participated in a review of machine-bored and blasted shaft/drift beneath Hoover Dam in welded tuff analogous to Yucca Mountain welded tuff. Separate reports of these trips are in preparation.

cc: R. Ballay *R. Ballay*

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**ATTENDANCE AT SECOND ANNUAL INTERNATIONAL HIGH-LEVEL RADIOACTIVE
WASTE MANAGEMENT CONFERENCE & EXPOSITION**
Caesars Palace, Las Vegas, Nevada
APRIL 28 - MAY 3, 1991

ATTENDEE: Robert E. Adler [CNWRA]

TITLE: Director, Washington Office

DAY(S) ATTENDED: April 29 (Monday), April 30 (Tuesday), May 1 (Wednesday)

SPECIFIC CNWRA RESPONSIBILITIES: Systems Engineering and Analyses; Regulatory Requirements; Long-Range Planning; General Overview of All CNWRA Tasks Supporting NRC

SPECIAL FUNCTIONS: Chairman of Technical Operating Committee on Management and Program Issues of the Fuel Cycle and Waste Management Division of the American Nuclear Society (ANS)

SESSIONS ATTENDED: Opening Plenary
Natural Systems Plenary
Engineered Systems Plenary
Social Systems Plenary
Current Issues in US and International HLW Regulations
Aspects of Repository Performance Under EPA Regulations
Regulatory Aspects of Site Characterization (partial)
Performance Assessment Case Studies (partial)
Implementation of Selected Regulatory Processes

BENEFIT TO NRC/CNWRA:

The Conference provided a direct opportunity to gain additional knowledge on what was being developed and thought of in the regulatory process area, both from a fringe and direct program perspective. Since the Center's role in supporting NRC is to stay abreast of what is being done and how it is being implemented, these sessions were most useful to me in keeping me apprised of new developments. The amount of information provided could not have been obtained in such a short time. Since this is the major and only conference which addresses all aspects of the high-level waste repository program, I feel it is essential each NRC/CNWRA staff member be provided this opportunity to attend. The sessions provided insight in a specific area of expertise, while making available information on all other areas. It also gave the opportunity in a public arena to engage in discussions with a large number of people from industry, DOE, utilities and other interested organizations. Failure to expose a significant number of NRC/CNWRA staff to what is happening outside the realm of NRC does not serve NRC well in its role of regulating a first-of-a-kind national program. The advantage of serving in a major division of the ANS can not be aligned with specific meeting attendance, but carries long-term benefits in presenting unique and special NRC concerns to the overall program area.

**ATTENDANCE AT SECOND ANNUAL INTERNATIONAL HIGH-LEVEL
RADIOACTIVE WASTE MANAGEMENT CONFERENCE & KEYSTONES**
Caesars Palace, Las Vegas, Nevada
April 28-May 3, 1991

ATTENDEE: Simon Hsiung [CNWRA]

TITLE: Senior Research Engineer

DAY(S) ATTENDED: April 29 to May 3

SPECIFIC CNWRA RESPONSIBILITIES: Seismic Rock Mechanics Research, Supporting NRC Reactive and Proactive Activities, Systematic Regulatory Analyses

SPECIFIC FUNCTIONS: Presenting a paper entitled "Field Investigations for Seismic Effects on Mechanical and Geohydrological Response of Underground Structures in Jointed Rock" at the Geotechnical Exploration Session

SESSIONS ATTENDED: Opening Plenary
Seismotectonics and Volcanology
Geomechanics
Engineered Systems Plenary
In Situ and Laboratory Testing
Geotechnical Exploration
Unsaturated Zone Hydrologic Testing (Partial)
Assessment and Evaluation of Underground Excavation Technique (Partial)
Performance Assessment - Case Study (Partial)
Near-Field Processes Affecting the Engineered Systems (Partial)
Performance Assessment - Scenarios and Uncertainties (Partial)
Thermal Considerations in Underground Design (Partial)
Underground Mechanical Excavation Techniques and Technology (Partial)

BENEFIT TO NRC/CNWRA:

The papers presented in the Conference provided the most current information regarding the conditioning and disposal of high-level radioactive waste. Many aspects of high-level radioactive waste management activities and concerns were discussed. The sessions which I attended discussed important issues such as underground excavation techniques, thermal considerations for repository design, thermally-induced coupled effects, ground shock studies at the Nevada test site, and sealing considerations. All of these issues are directly related to the work currently being conducted in the CNWRA's Repository Design, Construction, and Operations

Element (RDCO). The knowledge gained is useful in providing technical assistance for conducting prelicensing activities and review of DOE's License Application.

The technical paper which I presented in the Geotechnical Exploration Session was well received. Technical interactions with several interest professionals regarding the paper took place after the session. Immediate benefit recognized from the interactions includes exposure of the CNWRA's Seismic Rock Mechanics Research activities to scientific community and acquisition of technical information that may be useful in improving technical approaches to be used for data reduction in the field investigations.

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ATTENDEE: John E. Latz [CNWRA]

TITLE: President

DAY(S) ATTENDED: April 28 - May 1

**SPECIFIC CNWRA
RESPONSIBILITIES:** Entirety of the Center for Nuclear Waste Regulatory
Analyses (CNWRA)

SPECIAL FUNCTIONS: Informal recruitment of potential staff members of CNWRA

SESSIONS ATTENDED: Opening Plenary
Natural Systems Plenary
Integrated Systems Plenary
Current Issues in US and International HLW Regulations
Aspects of Repository Performance Under EPA Regulations
Risk Perception and Public Involvement
Performance Assessment Case Studies
Implementation of Selected Regulatory Processes
Near-Field Processes Affecting the Engineered Systems

BENEFIT TO NRC/CNWRA:

This is the first opportunity since the ANS High-Level Radioactive Waste Management (HLWM) Conference in June 1988 that the President of the Center has had to learn current status and state of knowledge across the entire spectrum of the high-level waste program. Such seminar issues as "Human Intrusion" and Performance Assessment methodologies were discussed at length. Specific presentations on experience gained and procedures developed for the WIPP site were examined. The scientific methods employed in these concerns were explained by the particular people involved in the work and the oversight of the work. A most interesting aspect was the hypothetical referencing of the WIPP site work to its possible compliance with existing NRC regulations. Participants concluded there were too many "Regulatory Uncertainties" in 10 CFR Part 60 (cited examples were "Substantially Complete Containment" and "Adequately Investigated") included in 10 CFR Part 60.

Participation at the Conference also permitted meeting and observing potential recruits for Center staff.

ATTENDANCE AT SECOND ANNUAL INTERNATIONAL HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT
CONFERENCE & EXPOSITION
Caesars Palace, Las Vegas, Nevada
April 28 - May 3, 1991

ATTENDEE(S): Hersh K. Manaktala [CNWRA]

TITLE: Senior Research Engineer
CNWRA, San Antonio Office

DAY(S) ATTENDED: April 29 (Monday), April 30 (Tuesday), May 1 (Wednesday), and
May 2 (Thursday)

SPECIFIC CNWRA

RESPONSIBILITIES: Engineered Barrier System (EBS) including testing and evaluation of the performance of candidate container materials for the HLW, vitrified waste forms (borosilicate glass) and spent LWR fuels, and under the Performance Assessment (PA) Element- the modeling of near-field source-term for the geologic repository.

SPECIAL FUNCTIONS: (i) Member of the Technical Program Committee of the International High-Level Radioactive Waste Management Conference (IHLRWMC) series, (ii) Chairman of the technical session on "Vitrified Waste Forms Characteristics", and (ii) Chairman of the technical session on "Spent Fuel Characteristics".

SESSIONS ATTENDED: Opening Plenary
Spent Fuel Characteristics
Engineered Systems Plenary
Vitrified Waste Processing
Vitrified Waste Forms Characteristics
Radionuclide Release from the Engineered Systems
Near-Field Processes Affecting the Engineered Systems
Interim Storage (part-time)
Performance Assessment System Analysis (part-time)
Rapporteur Session

BENEFIT TO NRC/CNWRA:

My membership in the technical program committee provided an opportunity to provide CNWRA's input into the overall program planning of the 2nd and the 3rd conferences in the series, in the areas of vitrified waste forms and spent LWR fuels. For the 2nd conference in the series (which is being reported here), I had the privilege and the responsibility to invite papers from active researchers in the fields of vitrified waste forms (borosilicate glass) and spent LWR fuels, and was actively involved in the process of reviewing the abstracts of contributed papers and 'selecting' the papers for the two technical sessions that I chaired at the conference. Through the process of actively soliciting 'invited' papers for my sessions, I was able to bring increased focus to the types of experimental and theoretical studies which have a greater potential of providing technical information about the likely performance of spent LWR fuels and vitrified waste forms under geological repository conditions. Such a focus is likely to generate technical information more directly relevant to the licensing of the geological repository. There are several research centers outside the U.S. that are active in the areas of vitrified waste forms and spent LWR fuels. The technical sessions that I chaired had enhanced contributions from outside the U.S., including papers from U.S.S.R., Canada, France, and Korea, compared to the earlier conference. Attendance at this conference provided me with the opportunity to become familiar with the focus of their research, including their concepts about the multi-barrier approach to the Engineered Barrier System (EBS), and modeling of waste

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form and spent fuel to predict long-term performance. I believe, the information and technical knowledge I gained from participating in the 2nd IHLRWMC will be usefully applied to my work at CNWRA for the NRC. Attendance at the conference also provided me with the opportunity of making a post-conference trip (with the NRC delegation) to observe excavations in the foundation of Hoover Dam.

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CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

ATTENDANCE AT SECOND ANNUAL INTERNATIONAL HIGH-LEVEL RADIOACTIVE
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April 28 - May 3, 1991

ATTENDEE(S): Prasad K. Nair (CNWRA)
TITLE: Manager, Engineered Barrier Systems
DAY(S) ATTENDED: May 1, 1991 (IHLRWMC)
May 2, 1991 (FOCUS '91)

SUMMARY:

I attended one day of the four-day (IHLRWMC) meeting. I mainly participated in the FOCUS '91 Technical Paper Selection Committee meeting on May 2, 1991. I also attended parts of the EBS- and PA-related presentations. It gave me an insight into the current status of DOE activities in the respective areas. A key area that benefitted me was getting an understanding of how DOE is interpreting parts of 10 CFR Part 60 in the repository program.

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**ATTENDANCE AT SECOND ANNUAL INTERNATIONAL HIGH-LEVEL RADIOACTIVE
WASTE MANAGEMENT CONFERENCE AND EXPOSITION**
Las Vegas, Nevada
April 28 - May 3, 1991

ATTENDEE: Budhi Sagar [CNWRA]

TITLE: Manager, Hydrologic Transport and Performance Assessment Element

DAYS ATTENDED: April 29 (Monday), April 30 (Tuesday)

SPECIFIC CNWRA RESPONSIBILITIES: Hydrologic transport and performance assessment. Integration of technical work

SPECIAL FUNCTION: Chair a session on Hydrology

SESSIONS ATTENDED: All Plenary sessions, Geochemistry, Design, and Performance Assessment sessions

BENEFIT TO NRC/CNWRA: This meeting provides an opportunity to learn about developments in the HLW programs internationally. The NRC/CNWRA staffs also benefit from frank technical discussions among experts from numerous organizations.

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APRIL 28 - MAY 3, 1991**

ATTENDEE: Dr. Gerry L. Stirewalt [CNWRA]

TITLE: Principal Geoscientist

DAY(S) ATTENDED: April 29 - May 2

**SPECIFIC CNWRA
RESPONSIBILITIES:** CNWRA contact for Statens Karnbransle Namdn, Sweden (SKN)
Geotechnical Representative of CNWRA/Geosciences Element
in Washington Technical Support Office

SPECIAL FUNCTIONS: Co-Author for invited technical paper in the Geomechanics
Session

SESSIONS ATTENDED: Opening Plenary
Geomechanics
Geotechnical Exploration
Assessment and Evaluation of Underground Excavation
Techniques
Performance Assessment -- Scenarios and Uncertainties
Underground Mechanical Excavation Techniques and Technology
Rapporteur Session

BENEFIT TO NRC/CNWRA:

The conference provided the opportunity for me to interface with international members of the high-level waste community in fields covering technical, administrative and regulatory aspects of high-level waste. It also gave me the chance to attend numerous sessions relating to problems in high-level waste siting, design and public acceptance which the international technical community must face. These two facets address the concept of maintaining staff who possess a knowledge base about what is being done in the various high-level waste programs -- a point of considerable importance to NRC and CNWRA, since staff must keep abreast of technical developments related to high-level waste. The opportunity to co-author and present a technical paper provided important credibility with my peers. I also had occasion to talk with a representative of SKN, Mr. Harald Ahagen, to foster continued cooperation and exchange of information with the Swedish HLW program.

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ATTENDEE: Stephen R. Young [CNWRA]
TITLE: Senior Research Scientist
DAY(S) ATTENDED: April 29 - May 2
**SPECIFIC CNWRA
RESPONSIBILITIES:** Geosciences Representative
SPECIAL FUNCTIONS: Primary Author of invited paper: Geomechanics Session
SESSIONS ATTENDED: Geomechanics
Unsaturated Zone Hydrology--I
Geotechnical Exploration
Regulatory Aspects of Site Characterization (partial)
Unsaturated Zone Hydrologic Testing (partial)
Saturated Zone Hydrology
Underground Mechanical Excavation Techniques and Technology

BENEFIT TO NRC/CNWRA:

The conference provided an opportunity for contact and communication. We can stay well informed on a personal basis on all the key issues. Additionally, it gave me the chance to get to know key individuals on a personal basis, which improves communication. The opportunity to co-author and present a technical paper provided important credibility with my peers.