AUG 16 1990

MEMO/CHERY - 2 -

MEMORANDUM FOR: Ronald L. Ballard, Chief
Geosciences & Systems Performance Branch
Division of High-Level Waste Management, NMSS

THRU: David Brooks, Section Leader
Hydrologic-Transport Section
Geosciences & Systems Performance Branch
Division of High-Level Waste Management, NMSS

FROM: Donald L. Chery, Jr., Sr. Hydrologist
NRC Liaison to the National Research Council
Water Science and Technology Board
Hydrologic-Transport Section
Geosciences & Systems Performance Branch
Division of High-Level Waste Management, NMSS

SUBJECT: TRIP REPORT, 21ST MEETING OF THE WATER SCIENCE AND TECHNOLOGY BOARD, AUGUST 6-7, 1990 (9AIE)

My report on the 21st meeting of the National Research Council, Water Science and Technology Board is attached for your information.

/S/
Donald L. Chery, Jr., Sr. Hydrologist
NRC Liaison to the National Research Council
Water Science and Technology Board
Hydrologic-Transport Section
Geosciences & Systems Performance Branch
Division of High-Level Waste Management, NMSS

Enclosure: As stated

cc: S.D. Parker, WSTB

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TRIP REPORT

Twenty-First Meeting of the

WATER SCIENCE AND TECHNOLOGY BOARD
August 6-7, 1990

by

Donald L. Chery, Jr.
NRC Liaison to the Water Science and Technology Board
August 15, 1990

OPENING

The National Research Council, Water Science and Technology Board, was convened by Chairman Michael Kavanaugh at 8:30 a.m. at the National Academy of Sciences Study Center at Woods Hole, Massachusetts. A list of board members attending the Board meeting is attached (Attachment 1).

AGENDA

The agenda for the meeting is attached for information (Attachment 2).

REVIEW OF PROJECTS

Three newly initiated projects were discussed. The one most likely of interest to the Nuclear Regulatory Commission is the Environmental Monitoring and Assessment Program (EMAP) project. The WSTB along with the National Research Council Board on Environmental Studies and Toxicology (BEST) are to evaluate the scientific and technical aspects of EPA's EMAP and consider ways to increase its usefulness in monitoring conditions and trends in six representative types of ecosystems: wetlands, forests, arid lands, estuarine ecosystems, inland surface waters, and agro-ecosystems. This project is being sponsored by EPA with $900,000 and is to begin October 1, 1990 and be completed in 39 months. EPA's current plans for EMAP are that it will be a multi-year program that will have five major activities: development and testing of indicators, development of integrated statistical monitoring networks, nationwide characterization of ecological resources (landscape characterization), demonstration studies, and data management. The Board discussed the statistical design of the program, what impact that its findings and recommendations would have on the program, and outside user and modeler representation on the evaluation committee.

The two other projects reviewed by the Board were "Glen Canyon Environmental Studies" and "Joint project with the Academia de la Investigacion Cientifica (AIC) on some aspect of water issues in Mexico. The Board discussed their role and objectives of these new projects. The "Glen Canyon Environmental Studies" project is a follow-on project to a previous project funded by the

Bureau of Reclamation. The joint project with the Mexican Academy is a new venture being underwritten by grants from the Tinker Foundation and the Rockefeller Foundation. The WSTB appointed participants in this project are: Carl Bartone, The World Bank; John Boland, John Hopkins University; Raphael Bras, Massachusetts Institute of Technology; Richard Conway, Union Carbide; and George Pinder, University of Vermont.

Steve Parker reported on the publication of the report from the committee on "Opportunities in the Hydrologic Sciences" which was chaired by Peter S. Eagleson. The report is quite comprehensive, has passed all reviews and will be published as a hard-back book. The artists rendition of the cover was circulated. There was a discussion of how best to bring it to the attention of educational administrators. A preprint of the "Summary and Conclusions" chapter was distributed to attendees at the meeting.

Brief reference was made to other ongoing projects of the WSTB. Two which are of interest to the Nuclear Regulatory Commission are "Climate Change and Water Resources Management" and "Techniques for Assessing Ground Water Vulnerability."

REPORT FROM COMMISSION ON GEOSCIENCES, ENVIRONMENT, AND RESOURCES

February 5, 1990, there was a reorganization of National Research Council at the commission level which disbanded the Commission on Physical Sciences, Mathematics, and Resources (under which the WSTB functioned) and established two commissions: the Commission on Physical Sciences, Mathematics, and their Applications and the Commission on Geosciences, Environment, and Resources (CGER). The WSTB was reassigned to CGER and it also continues to have oversight from the existing Commission on Engineering and Technical Systems. M. Gordon Wolman is the chairman of the new CGER and Stephen Rattien is the new director. Steve Parker continues as executive director of the WSTB and is also associate director of the CGER.

The Board on Radioactive Waste Management is also under the aegis of CGER and Frank Parker, Chairman of that Board, was attending the meeting and commented on that Board's Position Paper on the disposal of high-level waste that they just published after a two year gestation period. He announced a Symposium on Radioactive Waste Repository Licensing to be held in Washington, DC, September 17-18, 1990 (an announcement for this meeting is attached, Attachment 3). EPA Administrator, Mr. William K. Reilly, will be the keynote speaker at the symposium. He also mentioned that the next meeting of the Board on Radioactive Waste Management will be held August 23-24, 1990, at the Whiteshell Nuclear Research Establishment, Manitoba, Canada. A preliminary agenda for that meeting is attached (Attachment 4). The following CGER Board meeting will be held at the same time as that the next Water Science and Technology Board meeting (December 13-14, 1990, Irvine, California).

COMMENTS OF DENNIS UNDERWOOD, COMMISSIONER OF RECLAMATION, US BUREAU OF RECLAMATION

Mr. Dennis Underwood, President Bush's appointment as Commissioner of Reclamation to the U.S. Bureau of Reclamation spoke to the Board and outlined

the programs of the Bureau and those areas where they could benefit from advice from entities such as the Board. His presentation was very articulate and comprehensive - a real "tour de force" as remarked by one board member. He spoke on the "Interesting and Important Crossroads: Reclamation/Water Resources-Management in the 1990's" and covered the following topics: Partnerships, Research, Best Management Practices, Education; Reclamation History; Water Resources Management in the 1990's; Drought Planning and Management; Water Quality Management; National Energy Strategy; Wetlands, Fish and Wildlife Resources Restoration and Enhancement; and Operation and Maintenance.

WSTB PROGRAM - NEW DIRECTIONS

The Board launched into a special exercise for this board meeting of attempting to divine new initiatives for the 1990's. Don O'Connor of the board summarized the basic premise underlying this exercise to be the increasing complexity of water resources problems throughout the country. Of the factors contributing to the complexity, he thought that the interrelation and interdependence of quantity and quality was of major importance. Other factors are "the larger spatial and temporal scales of contemporary and anticipated questions and the increasing significance of inter-media effects between water and atmosphere, land and bed." Board member, Bob Meglen, was concerned about the new pollutants will be introduced by the new technologies of ceramics, superconductors, and biotechnologies. He asked the following questions:

- Are emerging technologies leading to new kinds of products, by-products and pollutants that will challenge water quality into the next century?
- Are the new technologies generating qualitatively different types of potential pollutants?
- What new standards are likely to be required?
- What new measurement and monitoring tools are likely to be needed?
- What new disciplinary links (scientific, engineering expertise) will be required for future WSTB's?

In a letter from John Schaake, Liaison from National Oceanic and Atmospheric Administration, Dr. Schaake proposed to the Board that they consider for their 1990's agenda its role in assisting various agencies with the hydrology and water resources aspects of the climate program. He included with his letter information on the Global Energy and Water Cycle Experiment (GEWEX) which has the objectives of:

- Develop and validate macroscale hydrological models and coupled hydrological/atmospheric models, to obtain a quantitative understanding of the energy and water cycles over extended land areas.
- Develop and validate information retrieval schemes incorporating existing and future satellite observations with in-situ measurements to enable expanding the GEWEX models and data base to the global domain.
- Provide a capability to translate the effects of a future climate change into impact on water resources on a regional basis.

From the Board members came the following list of issues for consideration:

- Drought Management
- Groundwater recharge with wastewater

- Water quality impacts of remediation of contaminated sediments
- Uncertainty in environmental decision making
- Ecological risk assessments: New frontiers in water quality management
- Incident (spills) response study teams
- The selling of [drinking] water safety
- Role of tradeoffs in managing hazardous waste
- Regional and large-scale problems
- Surface water: models
- Role of particulates in the origin, transport and fate of chemical [radionuclide] contaminants in water
- "Best" method for sampling ground water for contamination
- Contamination of water resources by abandoned mining, milling and smelting wastes
- Conflicts in water use between the national parks and other groups
- Transition from a [water resource] project construction and operation agency to a management agency
- Environmental education in water science and technology
- Physical loss of aquatic habitat
- Water supply and sewerage treatment for increasing urban areas and remaining rural areas

Also, a potential involvement for the Board may develop fro the environmental restoration efforts (radioactive waste clean-up) of the Department of Energy and their MOU with the U.S. Army Corps of Engineers for assistance. (See Attachment 5 for a news article about the MOU from "Inside Energy..." 7/23/90.)

The Board members and Liaisons divided into four groups to discuss these issues, group them and rank them for further Board consideration. The four groups were designated I. Regional/large scale problems; II. Scientific basis of environmental policy and management; III. Environmental processes and tools for analysis; and IV. Education and communications. I participated in Group I. Monday afternoon and Group II. Tuesday morning. Each group prepared a report which was presented at the Tuesday afternoon plenary session and then issue by issue the group worked through each selecting those on which they thought it most appropriate for them to focus.

CONCLUSIONS

As usual, the interactions with the Board were most stimulating. As can be appreciated from the preceding report, several of the projects and some of the contemplated projects of the Board have relevance to the Nuclear Regulatory Commission. Management of the Division of High Level Waste Management will be interested to note that at the simultaneous meetings of the Water Science and Technology Board and the Board on Radioactive Waste Management (BRWM) in December, 1990, the BRWM plans to come from their meeting and make a report to the WSTB on the status of their committee's evaluation of coupled heat-stress-water flow processes for the Yucca Mountain site and the modeling of such processes. The discussions I had with several members on risk evaluation and modeling will be useful in work that I am pursuing for the Division of High-Level Waste. Completed WSTB projects in which the Nuclear Regulatory Commission has participated are listed in Attachment 6.

Donald L. Chery, Jr.
Senior Hydrologist

ATTACHMENT 1
Trip Report Water Science and Technology Board Meeting
August 6-7, 1990

Board Members attending the 21st WSTB Meeting were:

Michael Kavanaugh, Chairman, James M. Montgomery Consulting Engineers
Norman Brooks, James Irvine Professor of Environmental and Civil Engineering
Richard Conway, Union Carbide Corporation
Duane Georgeson, Metropolitan Water District of So. California
Howard Kunreuther, Department of Decision Sciences, The Wharton School, Univ. of Pennsylvania
Robert Meglen, Univ. of Colorado at Denver, Center for Environmental Sciences
Judy Meyer, Professor, Zoology Department, Univ. of Georgia
Donald O'Connor, Professor of Civil Engineering, Environmental Engineering and Science, Manhattan College
Kenneth Potter, Professor, Department of Civil and Environmental Engineering, Univ. of Wisconsin-Madison
Suresh Rao, Professor, Soil Science Department, Univ. of Florida
Donald Runnells, Professor of Geochemistry, Univ. of Colorado, Boulder
Philip Singer, Director/Professor Water Resources Program, Department of Environmental Sciences and Engineering,
Dan Tarlock, Professor of Political Science, Chicago Kent College of Law
Hugo Thomas, State Geologist, Dept. of Environmental Protection, Connecticut
James Wallis, Mathematical Sciences Department, IBM Watson Research Cntr.

Board members not attending were:
Betty Olson, Professor, Program in Social Ecology, Univ. of California at Irvine
Gordon Wolman, Professor, Department of Geography and Environmental Engineering, The Johns Hopkins University.

Liaison members and others attending were:

Ed Bryan, Liaison from the National Science Foundation
Philip LaMoreaux, Liaison from the Nat. Resh. Council, Geotechnical Board
Frank Parker, Chairman of the Nat. Resh. Council, Board on Radioactive Waste Management
Richard Porter, Liaison from the U.S. Bureau of Reclamation
Kyle Schilling, Liaison from the U.S. Army Corps of Engineers, Director Engineer Institute for Water Resources
Donald Chery, Jr. Liaison from the U.S. Nuclear Regulatory Commission

NATIONAL RESEARCH COUNCIL
WATER SCIENCE AND TECHNOLOGY BOARD
2101 Constitution Avenue Washington, D.C. 20418

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ATTACHMENT 2

WATER SCIENCE AND TECHNOLOGY BOARD

TWENTY-FIRST MEETING
AUGUST 6-7, 1990
PROPOSED AGENDA

National Academy of Sciences Study Center
Woods Hole, Massachusetts

Sunday, August 5

7:00 - 8:30 p.m.	Evening social event at Study Center (cocktails and ample hors d'oeuvres)	

Monday, August 6

7:30 a.m.	Meet in lobby for transporation to NAS Study Center	
7:45 a.m.	Breakfast at Study Center	
8:30 - 9:15 a.m.	Preliminaries/housekeeping in executive session • Call to order, introductions and welcome new members • Review and adoption of agenda • Approval of minutes of twentieth WSTB meeting, February 15-16, 1990 • Future meeting schedule: -22nd Meeting; December 13-14, 1990; Irvine, California -23rd Meeting; May ± 1991 (Washington, D.C., to include second Abel Wolman lecture)	M. Kavanaugh May 13-14
9:15 - 10:00 a.m.	Project oversight business	S. Parker
10:00 - 10:15 a.m.	Comments on first meeting of Commission on Geosciences, Environment, and Resources	M.G. Wolman, S. Parker
10:15 - 10:45 a.m.	Comments of Dennis Underwood, Commissioner of Reclamation, on water management issues	
10:45 - 11:00 a.m.	Break	

11:00 a.m. - 12:30 p.m.	Open discussion of Board roles and operating strategies and philosophies	M. Kavanaugh
12:30 - 1:15 p.m.	Lunch	
1:15 - 3:30 p.m.	Open discussion of issues and strategy for pursuit of studies	M. Kavanaugh
3:30 p.m.	Break	
4:00 - 5:00 p.m.	Board organized into four workgroups for assessment of issues/pursuit of activities:	

I. Regional/large scale problems
   Tarlock, chair
   Brooks
   Georgeson
   O'Connor
   Elfring

II. Scientific basis of environmental policy and management
   Kunreuther, chair
   Conway
   Kavanaugh
   Olson
   Connick

III. Environmental processes and tools for analysis
   Runnells, chair
   Meyer
   Potter
   Singer
   Wallis
   Parker

IV. Education and communications
   Thomas, chair
   Meglen
   Rao
   Wolman
   David

5:00 p.m.	Recess
5:30 - 7:30 p.m.	Cocktails and Clambake at Study Center

Tuesday, August 7

7:30 a.m.	Meet in lobby for transporation to NAS Study Center

7:45 a.m.	Breakfast at Study Center	
8:30 a.m. - 12:00 noon	Working in four groups, including development of written reports	
12:00 noon - 1:00 p.m.	Lunch	
1:00 - 5:00 p.m.	Plenary session of Board for presentation and discussion of group reports and development of plans	M. Kavanaugh
5:30 - 7:00 p.m.	Beer, wine, and cheese at Study Center	

FL PARKER

ATTACHMENT 3

U.S. National Academy of Sciences

National Research Council

Board on Radioactive Waste Management
September 17-18, 1990
2101 Constitution Avenue NW
Auditorium
Washington, DC

SYMPOSIUM ON RADIOACTIVE WASTE REPOSITORY LICENSING

Due to widespread scientific concern and interest in the revisions planned during the remand of 40 CFR 191 ("Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Wastes"), the Board on Radioactive Waste Management will hold a symposium in September 1990 on Radioactive Waste Repository Licensing. The symposium, scheduled for 17-18 September 1990 at the NAS/NRC Building, 2101 Constitution Avenue N.W., Washington, D.C., will examine the status of repository licensing requirements in the United States and elsewhere, and especially the impact of recent information from efforts to implement the Waste Isolation Pilot Plant (WIPP) in New Mexico and to characterize the Yucca Mountain site in Nevada. Both 40 CFR 191 and 10 CFR 60 "Disposal of High-Level Radioactive Wastes in Geologic Repositories" will be considered.

The symposium will include contributions from Sweden, Canada, Switzerland, and other countries where investigations have shed further light on the safety analyses of repositories. In addition, the Board on Radioactive Waste Management has recently issued a report "Rethinking High-Level Radioactive Waste Disposal" that has examined many issues impacting the licensing process.

The symposium will feature critiques of the U.S. approach by the Department of Energy, the Nuclear Regulatory Commission, the Environmental Protection Agency, the Advisory Committee on Nuclear Waste, the Nuclear Waste Technical Review Board, and other interested parties, including states and environmental interest groups, and will consider approaches to reconciliation of the divergent viewpoints.

ATTACHMENT 4

PRELIMINARY AGENDA

U.S. National Academy of Sciences
Board on Radioactive Waste Management
Whiteshell Nuclear Research Establishment
Kelsey House - Manitoba Room
Pinawa, Manitoba
23/24 August 1990

Thursday, 23 August 1990

9:00 am	Introductions - Welcome	D.F. Torgerson
	LOW-LEVEL WASTE MANAGEMENT	
9:10 am	Low-Level Waste in Canada - Current Initiatives	R.W. Pollock
9:40 am	Intrusion Resistant Underground Structure Disposal Facility	D.J. Cameron
10:10 am	Coffee	
	NUCLEAR FUEL WASTE MANAGEMENT	
10:30 am	Overview	K.W. Dormuth
11:00 am	Technical Advisory Committee	L.W. Shemilt
11:30 am	Disposal Concept Review Process	H. Tamm
12:00 pm	Lunch	
1:10 pm	Tour: Immobilized Fuel Test Facility	K. Nuttall
2:00 pm	Tour: Fracture Zone Tracer Experiment	C.C. Davison
2:30 pm	Tour: Dry Storage Canisters	D.F. Dixon
3:00 pm	Coffee	
3:20 pm	Performance Assessment*	
3:50 pm	Engineered Barriers	L.H. Johnson
5:00 pm	Adjourn	

** The regulations in Canada will be discussed as part of the presentation on performance assessment.*

Tentative Agenda
page 2

Friday, 24 August 1990

8:00 am	Executive Session	
12:00 am	Depart Kelsey House for Underground Research Laboratory (URL)	

NUCLEAR FUEL WASTE MANAGEMENT (continued)
UNDERGROUND RESEARCH LABORATORY CONFERENCE ROOM

12:30 am	Welcome - Introductions - Lunch	K.W. Dormuth
1:15 pm	Site Characterization	C.C. Davison
1:45 pm	Walkabout Tour of URL Site	C.C. Davison
2:30 pm	Conceptual Engineering	G.R. Simmons
2:50 3:00 pm	Underground Experiments Program	G.R. Simmons
3:10 3:30 pm	Coffee	
3:25 3:45 pm	Underground Tour of URL	D.A. Peters
5:00 pm	Depart URL for Pinawa	

POSSIBLY DELAY DEPARTURE TO 5:30 FOR MORE TIME UNDERGROUND ?

Saturday, 25 August 1990

Easy canoe trip around Pinawa

FRANK: HAVEN'T BEEN ABLE TO REACH TAMM YET (SITTING IN FOR TOBERTSON ON ARRANGEMENTS) BUT THIS IS MY WAY OF ACCOMODATING 2 MAJOR TORCS BY BARRETT/BLACK ON FRIDAY MORNING. (THEY ASKED FOR 2+ HOURS). I'LL GO WITH THIS IN MY BOOK UNLESS I HEAR DIFFERENTLY FROM YOU OR FROM TAMM (WITH COMPELLING REASON)

DOE SIGNS ACCORD WITH ARMY ENGINEERS ON CLEANUP OF WEAPONS PLANTS

DOE and the Army Corps of Engineers have signed a memorandum of understanding outlining areas of cooperation between the agencies in environmental restoration and waste management activities at the DOE nuclear weapons production sites.

The interagency agreement, together with follow-on pacts governing site-specific work, is expected to replace language in the House-passed energy and water development appropriations bill that DOE had strenuously opposed. The bill would direct the Corps to assume full management responsibility for the cleanup at DOE's Hanford Site, the most contaminated of all DOE's nuclear weapons production facilities, containing 600,000 cubic yards of radioactive waste.

Under the agreement, the Corps will be responsible for providing management services to DOE headquarters; providing technical assistance related to the planning, engineering, design and construction of environmental restoration and waste management projects at DOE facilities; and executing program activities as assigned by DOE and its installations. The latter activities could include preparation of cost estimates, furnishing assistance in obtaining required permits; developing work plans; performing environmental studies; designing and building waste remediation facilities; and furnishing other related services such as real estate, r&d, procurement and training.

DOE will maintain responsibility for management and implementation of the program. It will also be responsible for determining the specific services to be requested from the Corps.

Describing the MOU as an "important step," Energy Secretary James Watkins said DOE would continue to provide many technical skills in the area of radiology and radioactivity cleanup that the Corps does not have. "By working together, with very clear lines of authority, responsibility and accountability, I believe we can do a much better job and utilize the national talents available through the Corps.

House Speaker Thomas Foley, whose district includes the Corps district office in Walla Walla, Wash., was chiefly responsible for language in the House-passed energy and water appropriations bill directing DOE to use the Corps to manage the cleanup at Hanford. Congressional sources said the language was meant to prod DOE to complete the MOU and is expected to be removed when the appropriations measure reaches conference with the Senate.

Watkins acknowledged that Foley had "inspired us to get this MOU signed. He has helped us move this thing." But he added that the document will not constitute "a blank check for the Corps to do things they admit they're not qualified to do."

Leo Duffy, DOE's director of environmental remediation and waste management, said the specific skills offered by the Corps include cost estimating and engineering. At Hanford, their expertise in hydrological studies are expected to contribute to the cleanup effort there.

Watkins said the Corps will assist DOE's own financial auditors in attempting to firm up cost estimates for the overall DOE complex cleanup effort. A "strong baseline" estimate of the overall cleanup cost is expected to be in place by 1992.

Duffy told reporters earlier this month that the estimate for cleanup operations over the next five years is $29 billion. That marked a 50% jump from the $19.5 billion projection the agency issued just six months earlier (*IE/FL*, 9 July, 4a).

ATTACHMENT 6

Water Science and Technology Board Completed Projects
in which the Nuclear Regulatory Commission Participated

1. Committee on Techniques for Estimating Probabilities of Extreme Floods.
   Publication: "Estimating Probabilities of Extreme Floods; Methods and Recommended Research," National Research Council, National Academy Press, Washington, D.C., 1988.

2. Committee on Ground Water Modeling Assessment.
   Publication: "Ground Water Models: Scientific and Regulatory Applications," National Research Council, National Academy Press, Washington, D.C., 1990.