

# **NOTICE**

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DOE/NV/10872--T3

I.D. ORGANIC TRACERS

PROF. K. STETZENBACH

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ASSOCIATE VICE PRESIDENT FOR RESEARCH

UNIVERSITY OF NEVADA, LAS VEGAS  
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August 14, 1991

Birdie Hamilton-Ray, Contracting Officer  
U.S. Department of Energy  
Yucca Mountain Project Office  
P.O. Box 98608  
Las Vegas, NV 89193-8608

5/15/91

Dear Ms. Hamilton-Ray:

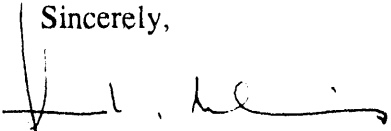
Attached please find project reports for the tasks and periods indicated below:

<u>Title</u>	<u>P.I.</u>	<u>Period</u>
I.D. Organic Tracers	Stetzenbach	1/91-6/91
Institute for Computer & Information Science Research	Nartker	1/91-3/91 3/91-6/91
International High Level Radioactive Waste Mgmt Prog.	Wells	4/91-6/91
Quality Assurance	Smiecinski	1/91-6/91
Waste Package Program	Culbreth & Ladkany	1/91-6/91

The final report on "Technical Review" by Chas. Fitzsimmons was submitted to you on January 14, 1991 and a final report entitled "Socioeconomic Research Program: Econometric and Economic Development Studies" by K. Schwer will be forthcoming shortly.

If you have any questions please do not hesitate to call me.

Sincerely,

  
David N. McNelis  
Associate Vice President for Research

**MASTER**

**IDENTIFICATION AND CHARACTERIZATION OF**  
**CONSERVATIVE ORGANIC TRACERS FOR USE AS**  
**HYDROLOGIC TRACERS FOR THE YUCCA MOUNTAIN**  
**SITE CHARACTERIZATION STUDY**

**PROGRESS REPORT**

**JANUARY 01, 1991 TO JUNE 30, 1991**

DOE Cooperative Agreement

No. DE-FC 08-90NV10872

Klaus J. Stetzenbach, PhD.

Environmental Research Center

University of Nevada - Las Vegas

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## JANUARY 1991 - JUNE 1991

Work performed during this time period has been concentrated in three main areas: the familiarization with, and optimization of, the LC-MS hardware and data system; the initial development of soil column test procedures, which are used for evaluation of both the columns themselves and the tracer compounds; and continuation of the batch sorption and degradation studies for the potential tracers. All three of these tasks will continue, as the addition of new tracer compounds, analytical information, and equipment will necessitate further evaluation of existing methods and procedures.

### LC-MS SYSTEM

The high performance liquid chromatograph-mass spectrometer was installed February 1991. After an initial period of training and familiarization, preliminary evaluation of the aliphatic tracers (trifluoroacetic acid, pentafluoropropionic acid and heptafluorobutyric acid) was started using the Thermabeam interface in both the EI (electron impact ionization), and CI (chemical ionization) modes of operation.

The negative ion CI mode using methane as a reagent gas, gave the best results for trifluoroacetic acid (TFA), Pentafluoropropionic acid (PFP), and Heptafluorobutyric acid (HFB). Initial efforts indicated that detection limits near the ppm range are achievable. Further method development is necessary for optimization of detection limits.

A small amount of data was generated using the Thermospray interface, also operating

in the negative mode. Although the initial results showed a dramatic increase in sensitivity for the TFA, PFB and HFB acids over those achieved using the Thermabeam interface; functional problems with the interface will require hardware modification and further research and method development. It appears that this method will achieve detection limits near the 10 ppb level for the three aliphatic acids.

### **SOIL COLUMN WORK**

Several requirements were considered when selecting a column for the soil column studies. The ability of the column to withstand pressures of up to 120 psi, to be temperature regulated to within a few degrees of set point, and the possibility of interchangeable exit and entrance filters were all considerations in the selection of the column. Once a column was selected which met these requirements, it was packed with medium ground tuff and density measurements were taken. J-13 water was pumped through the tuff and monitored for soil fines and baseline noise by use of a UV detector. It took many column volumes of water to wash away all the fines that interfere with UV detection.

After the clean-up and stabilization phase, injections of a sodium bromide solution, a non-sorbing tracer, were pumped through the soil column to determine approximate pore volume, unretained eluent times, and peak area reproducibility. After establishing reproducibility for the sodium bromide injections, actual tracer compounds were injected in a similar manner and possible sorption or degradation effects were investigated.

Columns of dark and light tuff samples have been packed, and the evaluation of sodium

bromide and other tracer compounds is currently underway for the dark tuff column. When an additional HPLC pump is received, the light tuff soil column will be evaluated in the same manner as the other two.

Soil column evaluation of other tracer compounds is currently underway, and will continue as other possible tracer compounds display positive results in the batch sorption and degradation studies. All tracer compounds will be evaluated on each of the light, medium, and dark tuff columns, using J13 well water.

### **BATCH SORPTION AND DEGRADATION STUDIES**

Previously, batch studies for fluorocinnamic acids were completed for the medium and dark tuff samples in de-ionized water only. Batch tests are now complete for the fluorocinnamic acids in the medium and dark tuff samples using J13 well water. Light tuff samples of these same acids have also been completed for both the J13 well water and de-ionized water.

To be considered as a viable tracer for this project, it was determined that the compound must remain relatively stable over a period of thirty days, in all three tuff samples (and J13 well water). None of the fluorocinnamic acids which were tested met this requirement. However, two remained stable for over thirty days in at least one of the tuffs. Alpha-fluorocinnamic acid and trans-2,5-fluorocinnamic were stable for 30 days in the medium colored tuff (figures 1&2). 5-fluorosalicylic acid was stable for 60 days in the light tuff and showed only slight reduction of concentration in the medium and dark tuffs (figures 3,4&5). The reduction in the dark and medium tuffs appears to be sorption rather than bacterial degradation. Because of the

inconclusive batch test results we will study these acids further with the column experiments.

Continued monitoring of the 3,5 di-chlorosalicylic acid has shown this compound to be relatively stable for 160 days in the light tuff (figure 6) and 250 days for the dark and medium tuff (figures 7&8) in the J13 well water. They also showed the same stability in the de-ionized water for all three tuff materials (figures 9,10&11). This compound will continue to be monitored periodically for degradation or sorption effects. It will also be used in the column tests.

HPLC method development for several new tracer compounds (di-, tri-, and tetra-fluorobenzoic acids and o,m,p-trifluorotoluic acids) is nearly complete, and will be followed by batch sorption and degradation studies.

### **CONTINUING WORK**

Batch sorption and degradation studies will be preformed for the di-, tri-, and tetra-fluorobenzoic acids, and the tri-fluorotoluic acids. All tracers passing the batch tests with the required stability will be evaluated with the column tests, using all three tuff samples.

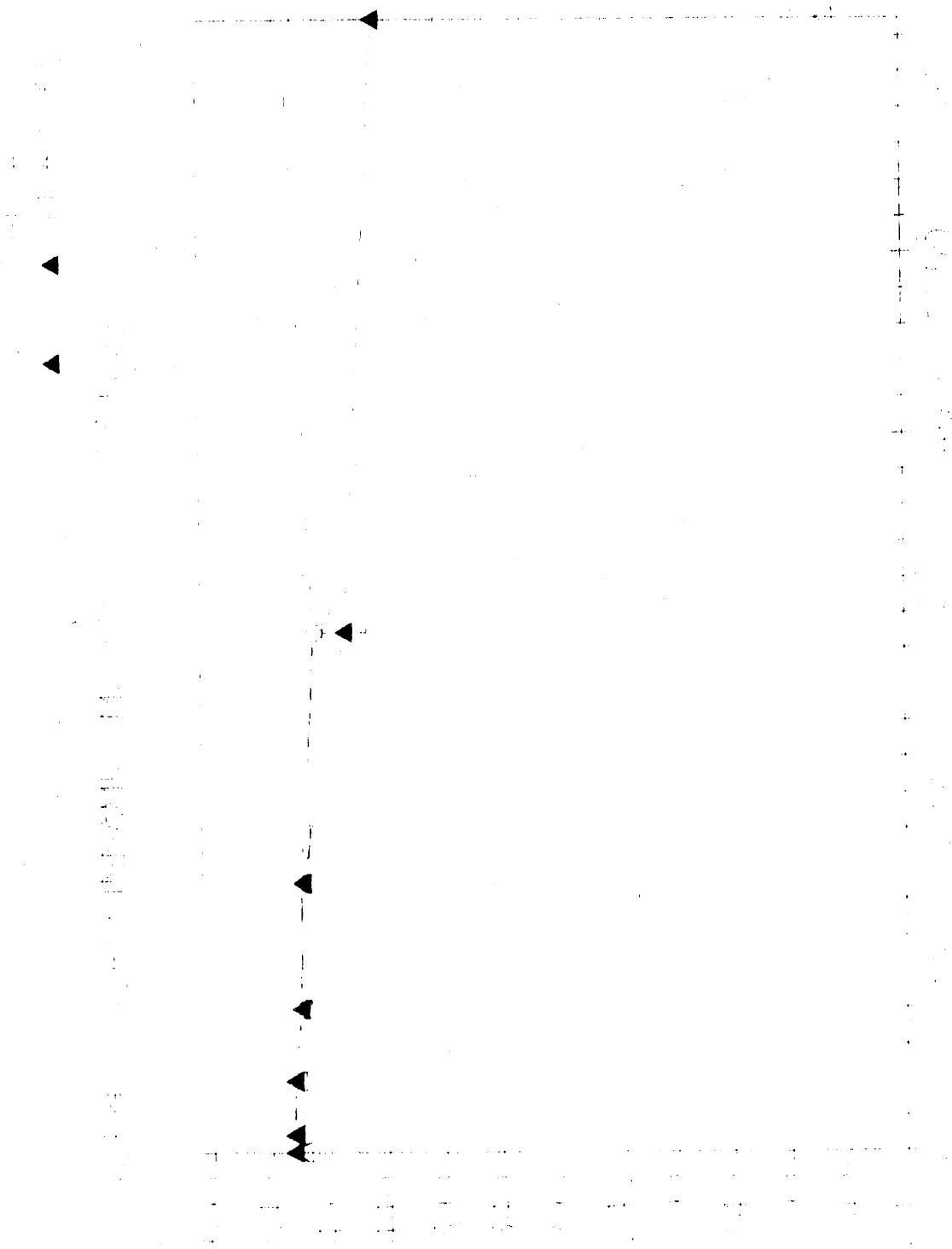
Soil columns will be evaluated at several different temperatures and flow rates to determine if these factors affect sorption or reproducibility of the tracer compounds. The effects of concentrations of injected tracer solutions on retention or sorption will also need to be studied further.



HPLC-MS methods will be developed for as many of the potential tracers as possible because this instrument may provide enhanced sensitivity for all the compounds being tested as well as a positive identification of the tracers in the ground water.

Several new pieces of equipment are being purchased that can be used to further evaluate all three of the tuffs and the J13 well water to determine overall chemical makeup and determine possible contaminant compound levels, (eg trace metal or salt content which may interfere with the analyses).

A new staff member with the expertise to do Ames testing is being hired.



THE UNIVERSITY OF CHICAGO

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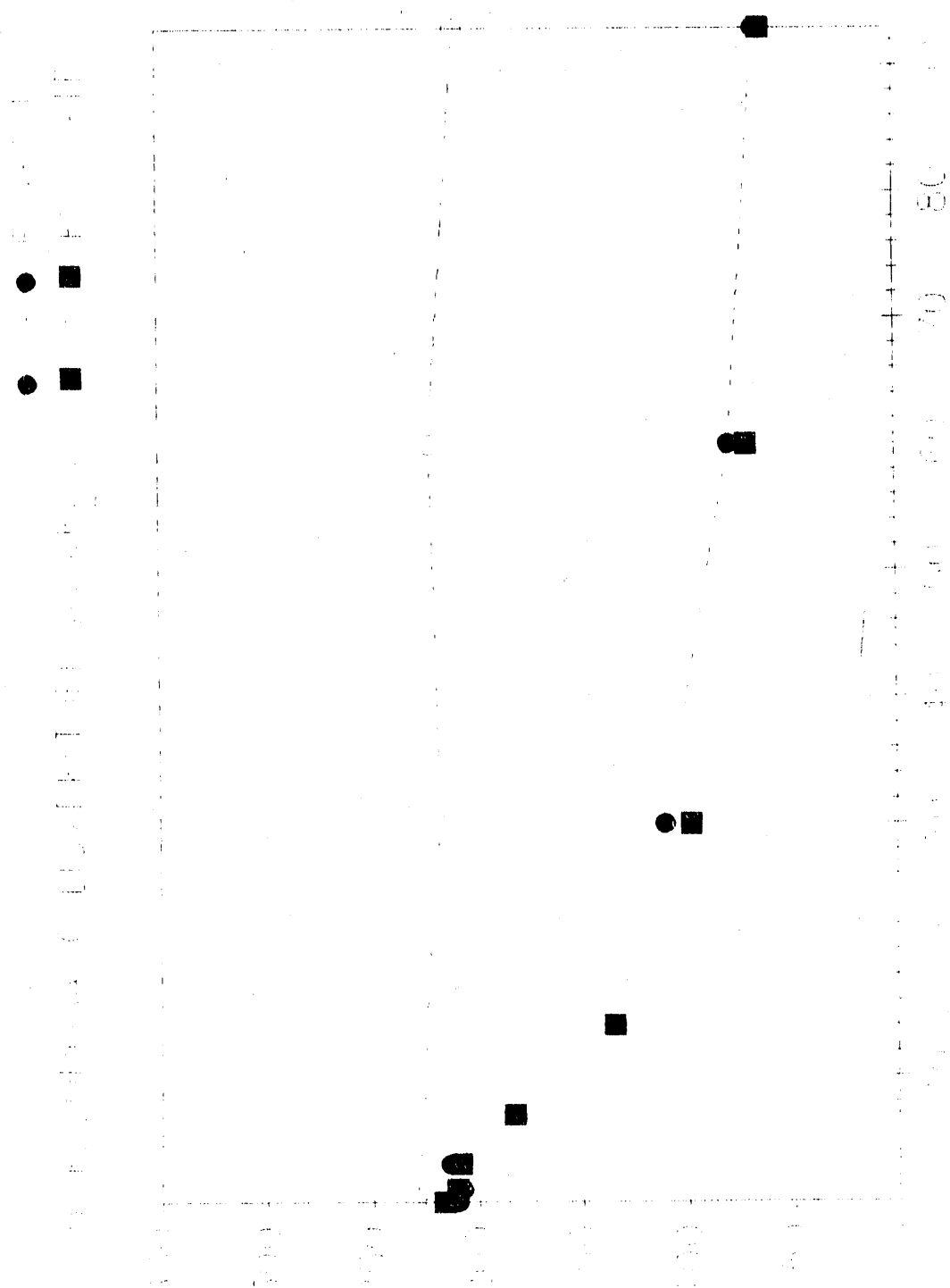


FIGURE 1. RELATIONSHIP BETWEEN ...



CONTENTS

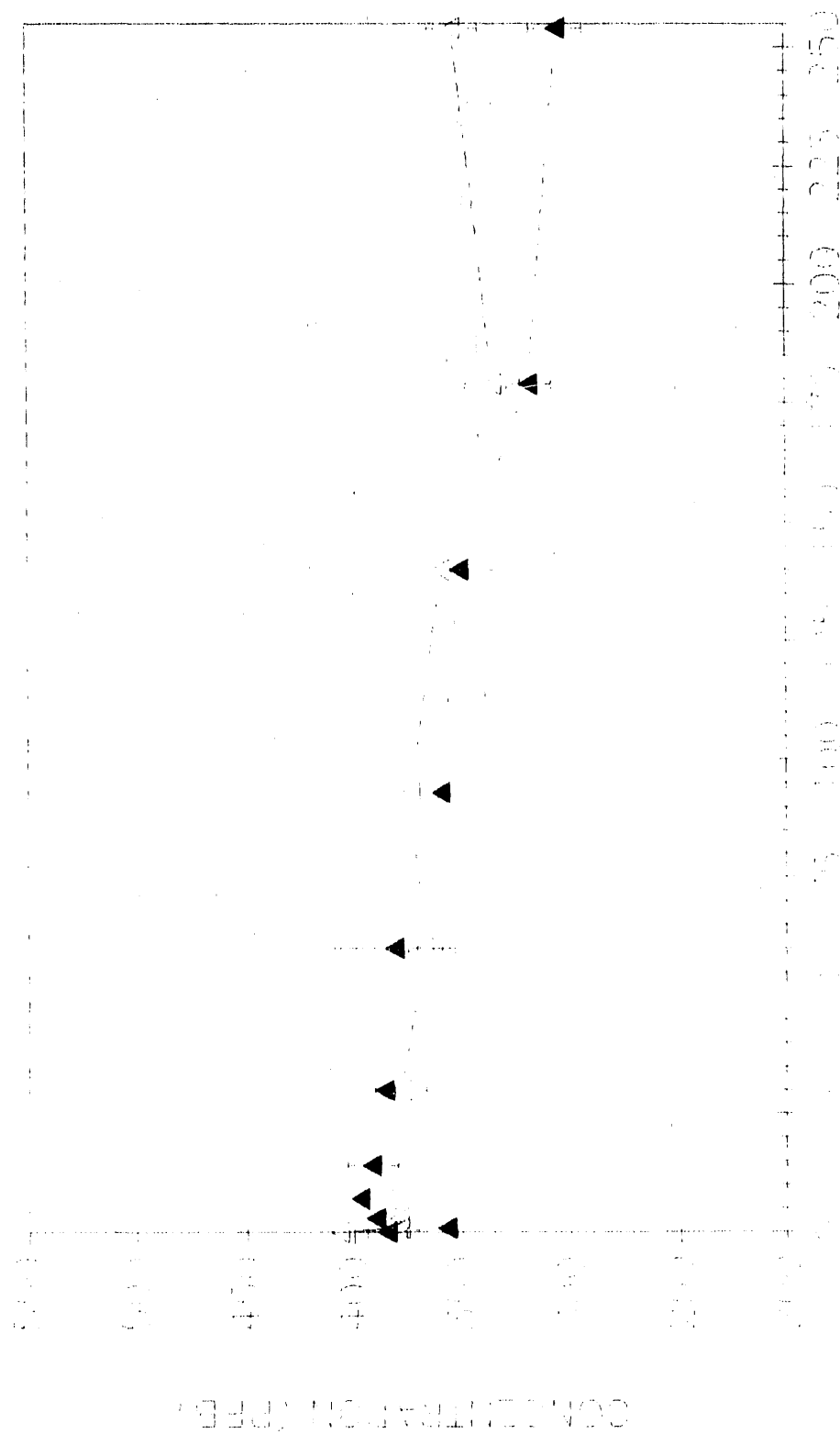
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CHLORINE AND HYDROGEN CHLORIDE



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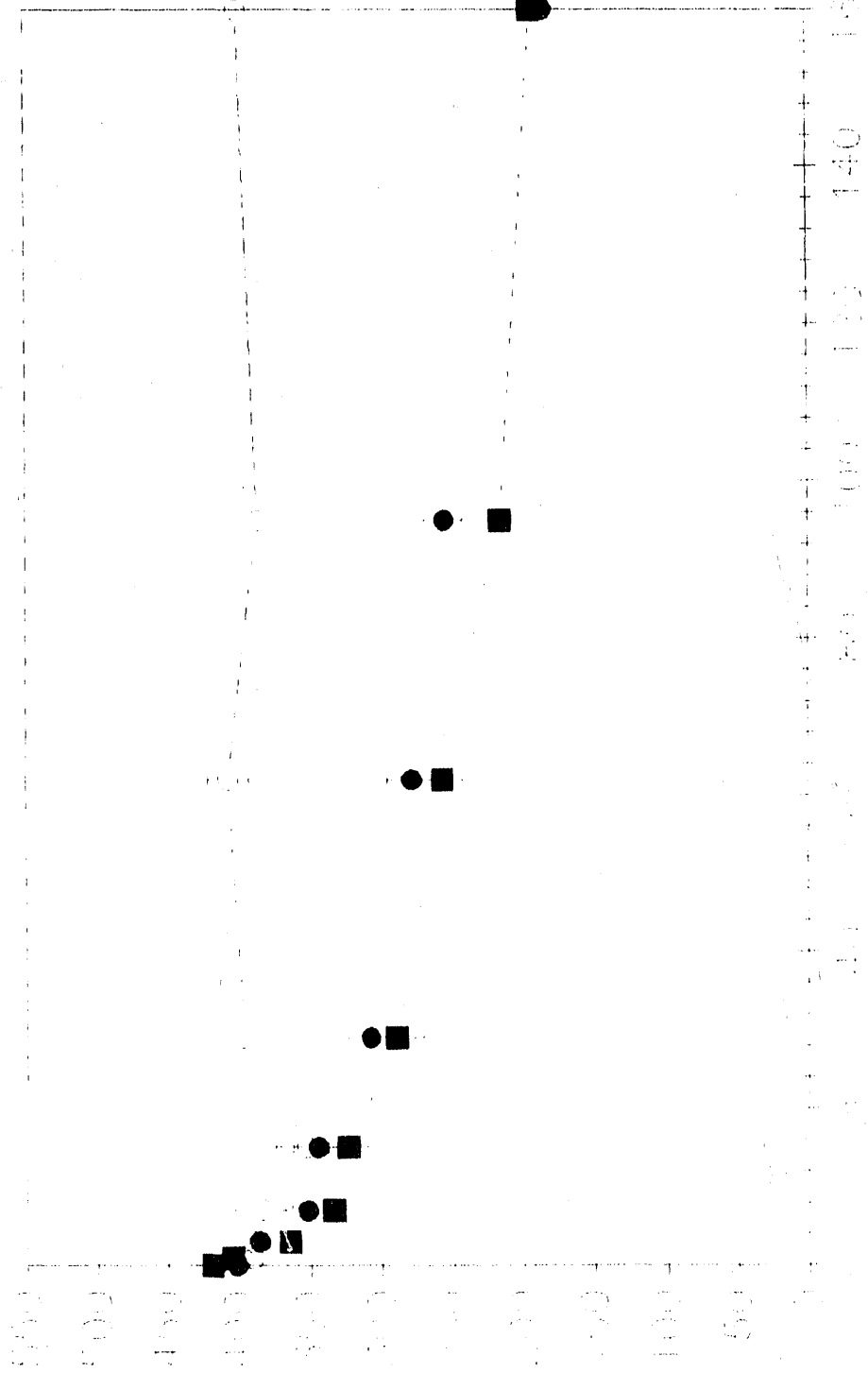
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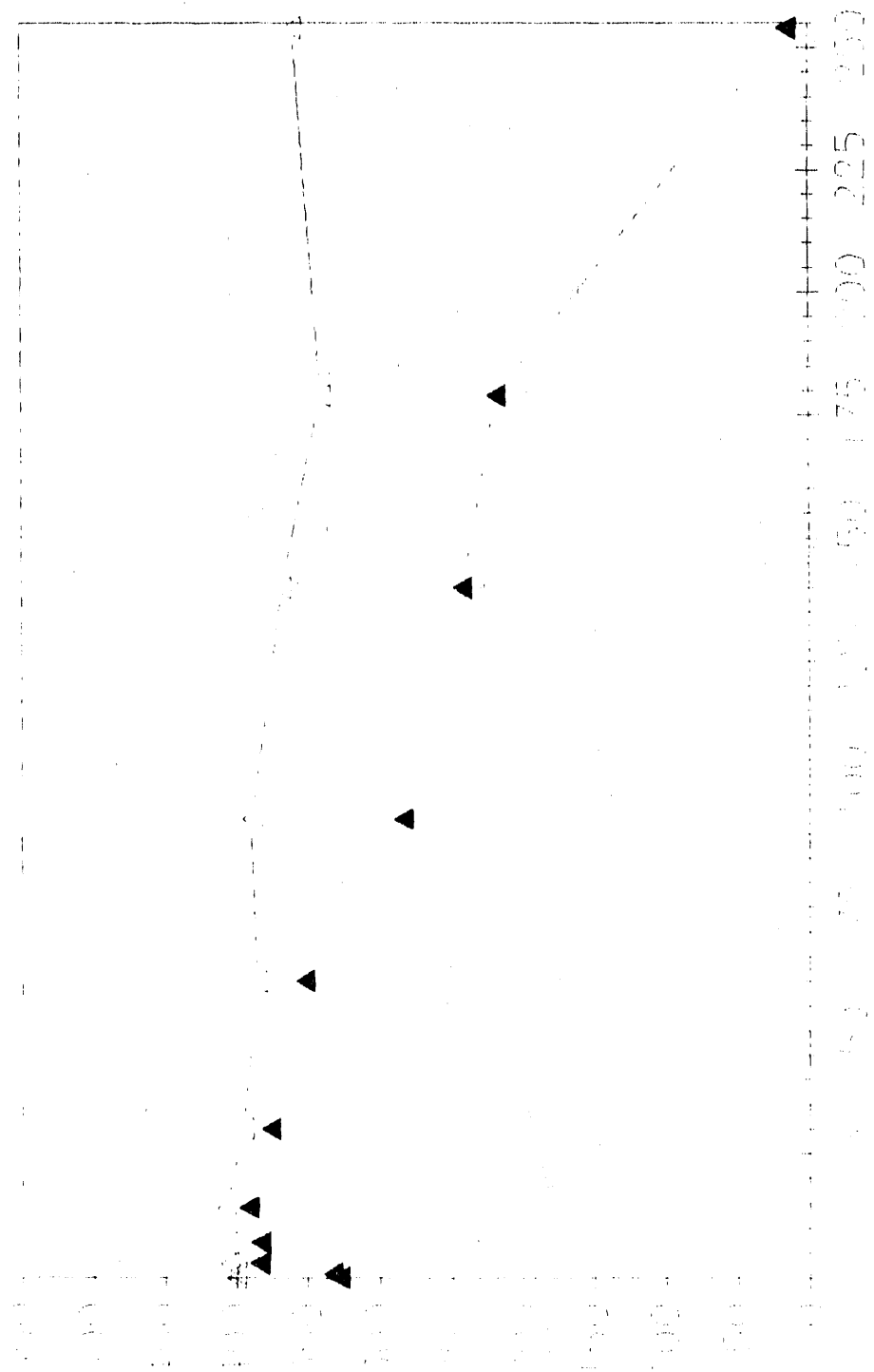
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# UNLV Information Science Research Institute

Quarterly Progress Report  
March 31, 1991

T. A. Nartker

Most Institute activity during the first quarter of 1990 continues to be organizational in nature. As indicated in our previous report, the main exception has been our effort to secure additional support from the Office of Research and Development.

A final proposal to ORD was submitted in January and is pending. ORD support would enable us to significantly accelerate our progress. Also, as discussed below, we need help to complete the transfer of the LSS prototype data from SAIC in McLean to ISRI (us) in Las Vegas. Although our original operating budget anticipated this need, it was not properly identified as an SAIC subcontract, and such help is now not available. Our proposal to ORD specifically identifies our need for an SAIC subcontract and requests ORD funds to solve this problem.

We can provide several benefits to ORD. OCR is a key technology to improve their productivity. They are developing a plan to improve this technology by selective funding of research programs around the country. We can provide access to our experimental environment for their sponsored researchers. More importantly for ORD, it will be very cost effective to generalize our environment for English OCR research to support similar research with foreign languages. Their need for improved OCR technology with several different foreign languages is very great. We have proposed to investigate the availability of material for Ground Truth OCR testing in Cyrillic, Japanese, Arabic, and Chinese during the coming year.

An overview of organizational activities follows:

- Annual Conference on Document Analysis & Inf. Retrieval: The Conference committee has chosen a firm date for our first conference. (March 16,17,18, 1992) B. Brogan and K. Taghva have recruited an appropriate slate of candidates for each program committee. A "Call-For-Papers" has been printed (copy attached) and the first mailing was completed in March. Y. Baghzouz has made arrangements with the Tropicana Hotel to host the meeting. A second mailing of the Call-For-Papers is planned in June.

- **Staff Recruiting:** Dr. Junichi Kanai completed his PhD at RPI during the winter quarter and joined us in January. Junichi will conduct a long range research program in "automatic zoning" and will help us define our OCR research program. In January, we also recruited Mr. Steve Rice (MS in CS at U. Illinois in 1980) as Chief Software Engineer to assume responsibility for creating our experimental environment. He has designed a preliminary "vendor independent interface" to OCR devices which will enable programs on our file server to operate any OCR device without regard to individual differences. We plan to continue recruiting activities later this year.
- **Student Recruiting:** We have employed Mr. Allen Condit (BS CS UT Austin 1990) as a research assistant to be responsible for receiving, cataloging, and inventorying the hard copy documents for our GT1 database. We have also employed Mr. Kevin Grover, an undergraduate student, to help install PC controllers for our OCR machines. We will continue to recruit other graduate and undergraduate students for programming duties during the spring and summer quarters.
- **Equipment Acquisition:** We have opened bids for the four hardware OCR devices currently on the market and for supporting PC and network equipment. All have been ordered and should be delivered within the next two weeks. All new DEC Unix workstations for Institute staff have been installed and are operational. We have received a beginning group of hard disks for our GT1 database. We plan to connect these drives and our OCR devices to a file server, to install Ingres, and to begin loading GT1 data during the coming quarter.
- **GT1 Database:** F. Jenkins and A. Condit are busy sorting and recording magnetic tapes and hard copy documents. The task of extracting the data we need from the tapes received from SAIC is more difficult than we anticipated. For each page in GT1 we need: the actual printed source page, a file containing the bit-mapped image of the page, a file containing the ASCII text, and a file containing the LSS header record for the source document for the page. In a large number of cases we are missing one or more of these files or cannot read the tape the needed file is on. Several different file formats are involved. We need help to recover this data.

- Other Projects: Dr. Kanai and Dr. Nartker are currently teaching a graduate special projects course in "Pattern and Character Recognition". Approximately 10 students are signed up for this class.

Dr. K. Taghva is investigating commercial text-retrieval packages and is beginning to define our program in text-retrieval.

Dr. Laxmi Gewali is surveying the literature on character segmentation and on algorithms from computational geometry which might improve current segmentation technology.

Dr. Shahram Latifi is surveying patent literature in OCR.

Our main tasks for the next quarter will be to complete the initial inventory and verification of all data received from SAIC, and to install (and begin to operate) the OCR devices we have ordered on our file server.



## Call for Papers

# Symposium on Document Analysis and Information Retrieval

March 16-18, 1992  
Tropicana Hotel, Las Vegas, Nevada

### SPONSOR

Information Science Research Institute  
University of Nevada, Las Vegas

### SYMPOSIUM CHAIR

Thomas A. Nartker, UNLV

### PROGRAM CHAIRS

#### Document Analysis:

William L. Brogan, UNLV

#### Information Retrieval:

Kazem Taghva, UNLV

### PUBLICITY

Ajoy K. Datta, UNLV

### LOCAL ARRANGEMENTS

Yahia Baghzouz, UNLV

### SYMPOSIUM SECRETARY

Mary C. Guirsch  
Information Science Research Institute  
4505 Maryland Parkway  
Las Vegas, NV 89154  
(702)739-3338  
(702)739-0962 (fax number)

### SCOPE

The scope of this conference covers research in systems for automatic information retrieval with emphasis on the retrieval of information from printed documents. Specific aspects of such systems include, but are not limited to, the theory and the practice of:

#### Document Analysis:

Page Processing  
Zoning  
Segmentation  
Character Recognition  
Graphic Recognition,  
Maps/Mechanical Drawings

#### Information Retrieval:

Full-Text Retrieval  
Query Optimization  
Expansion/Contraction Tools  
Semantic Access Tools  
Knowledge Extraction From Text  
Information Retrieval and  
Database Systems

### SUBMISSIONS

Please send **seven** copies of complete papers, with the address, and telephone number, to one of the Program Chairs:

William L. Brogan  
Dept. of Elec./Computer Eng.  
Univ. of Nevada, Las Vegas  
4505 Maryland Parkway  
Las Vegas, NV 89154  
eewlb@cs.unlv.edu

Kazem Taghva  
Dept. of Computer Science  
Univ. of Nevada, Las Vegas  
4505 Maryland Parkway  
Las Vegas, NV 89154  
taghva@cs.unlv.edu

The papers should be no longer than 20 double-spaced pages or 5,000 words. To promote cross-fertilization between works in progress, short synopses of substantial projects are also invited. These should be 4-5 double-spaced pages, or 1,000-1,500 words. The papers should contain enough information for the program committee to understand the scope of the solution being proposed. The proceedings will be available at the conference.

Simultaneous submission of essentially the same paper to this conference and to another conference with published proceedings is not allowed.

### CONFERENCE TIMETABLE

Papers Due  
Notification To Authors  
Camera Ready Copy

August 2, 1991  
November 4, 1991  
January 1, 1992

### Document Analysis Committee:

Henry Baird, AT&T Bell Laboratories  
William L. Brogan, Chair, UNLV  
Richard Casey, IBM  
Junichi Kanai, UNLV  
Morton Nadler, Virginia Polytechnic Inst., and  
Image Processing Technology  
Larry Spitz, Xerox Palo Alto Research Center

### Information Retrieval Committee:

Roger Bradford, SAIC  
Jitender Deogun, University of Nebraska  
Suzanne Dietrich, Arizona State University  
Forouzan Golshan, Arizona State University  
Stephen J. Hegner, University of Vermont  
Stephen V. Rice, UNLV  
Kazem Taghva, Chair, UNLV



# **Call for Papers**

## **Symposium on Document Analysis and Information Retrieval**

**March 16-18, 1992**

**Las Vegas, Nevada**

**University of Nevada, Las Vegas  
Information Science Research Institute  
4505 Maryland Parkway  
Las Vegas, NV 89154-4019**

<b>Non-Profit Org. US Postage PAID Las Vegas, NV Permit #200</b>
--

# UNLV Information Science Research Institute

## Quarterly Progress Report June 30, 1991

T. A. Nartker

During the Spring quarter of 1991, we have begun to make progress on several projects. An overview of current activities is given below.

- **Additional Institute Support:** In May, Mrs. Betty Jean and five other ORD staff members visited our laboratory for three days. They seemed pleased with our organization and were excited to try several pages of their data on each of our OCR devices. We were able to construct image files with the Kurzweil scanner which could be recognized by all devices for manual comparisons. In June, we learned that our ORD proposal has been funded. We hope to secure data cataloging help from R. Bradford and/or Lois Dickey as quickly as possible. We plan to continue to solicit research funding from other Federal agencies, and also from vendors, to broaden our support base.
- **Annual Conference on Document Analysis & Inf. Retrieval:** A second mailing of our "Call for Papers" is underway. We have decided to expand the number of invited speakers for this conference. We are screening a set of candidates at the current time.
- **Staff Recruiting:** We have begun to recruit additional software engineering help. We hope to identify and employ an appropriate candidate by the end of the summer.
- **Student Recruiting:** We have employed Mr. Andrew Bagdenov, an undergraduate student, to help in cataloging, and inventorying the tapes and disks from SAIC. We will continue to recruit other graduate students for programming duties during the summer.
- **Equipment Installation:** In May we installed the PC controllers, and our OCR devices, on our network. Our file server, with four gigabytes of hard disk, is also operational. Steve Rice completed implementation of our "vendor independent" interface for each OCR machine in June. Steve has also implemented an initial text-stream synchronization algorithm and has selected and manually corrected the text for six pages from GT1 for initial experiments. In fact, Steve has conducted our first automated comparison of

OCR device performance using these six pages and this synchronization algorithm. (see attached sheets) These experiments are significant only to demonstrate our progress in learning to test OCR technologies under computer control. We have ordered additional hard disks for a separate file server to support text-retrieval experiments.

- **GT1 Database:** Managing the acquisition and setup of 100,000 pages, page image files, and page text files has proved to be a much more difficult task than we had hoped. We have identified 242 documents (approximately 9300) pages for which we have hard copy, images, text, and headers. We refer to this subset as GT0.5. At this time, we plan to load these images onto our file server and to focus our efforts on software development to support automatic testing. We will postpone effort to recover additional pages until help arrives from SAIC.  
In May, Junichi Kanai completed an ISRI version of the TIFF image format (with CCITT group 4 compression) for use as our standard format for GT1 images. All 9300 images from GT0.5 are being converted to this format and loaded onto our file server.
- **Other Projects:** The special projects course in "Pattern and Character Recognition" taught by Dr. Kanai and Dr. Nartker was concluded in May. Several students from this class have begun MS projects in either OCR or text-retrieval.  
Dr. Kanai presented a paper at the RIAO conference in Barcelona Spain in April. He distributed copies of our "Call-For-Papers" at this conference.  
Dr. K. Taghva has received the Basis-Plus text retrieval package from IDI. Basis-Plus is one of the oldest and most mature products in this area. It is the main text-retrieval package used by the DOE and will be part of our first technology assessment in this area.  
Frank Jenkins has prepared text files for several documents for Dr. Susan Taylor, of the Unisys research labs in Paoli, Pa. Dr. Taylor's lab is involved in Document Analysis research. They are interested in our work and in the possibility of future cooperation.
- **Institute visitors:** In addition to the group from ORD who visited us in May, we had several other visitors. Roger Bradford and Lois Dickey spent April 22 and 23 giving a complete briefing to our staff on the work done at SAIC on the LSS prototype. In June, Mr. John Gawkowski, from the IDI development staff in Dublin Ohio, visited us to explore possible avenues of cooperative work.

Our main tasks for the next quarter will be to:

- 1) With help from Lois Dickey, recover magnetic tapes which contain missing LSS prototype data. Use recovered tapes to complete an initial inventory and verification of the data for GT1.
- 2) Install a manually corrected subset of GT0.5 (i.e. GT0) for initial experiments, and to implement key portions of our OCR experimental environment.
- 3) Continue to pursue other sources of support for Institute research.

## #Errors - % Accuracy

			Calera		Kurzweil		Toshiba	
	#Chars	Caere	w/o lex	with lex	w/o lex	with lex	w/o lex	with lex
A1	48	6- 87.5	0-100.0	0-100.0	37- 22.9	37- 22.9	0-100.0	5- 89.6
A2	45	0-100.0	5- 88.9	1- 97.8	5- 88.9	0-100.0	0-100.0	0-100.0
A3	40	3- 92.5	0-100.0	0-100.0	8- 80.0	0-100.0	2- 95.0	2- 95.0
Total	133	9- 93.2	5- 96.2	1- 99.2	50- 62.4	37- 72.2	2- 98.5	7- 94.7
B1	66	9- 86.4	9- 86.4	8- 87.9	15- 77.3	7- 89.4	13- 80.3	13- 80.3
B2	65	0-100.0	0-100.0	0-100.0	0-100.0	0-100.0	0-100.0	0-100.0
B3	32	0-100.0	2- 93.8	2- 93.8	0-100.0	0-100.0	0-100.0	0-100.0
B4	179	0-100.0	4- 97.8	4- 97.8	21- 88.3	4- 97.8	3- 98.3	3- 98.3
Total	342	9- 97.4	15- 95.6	14- 95.9	36- 89.5	11- 96.8	16- 95.3	16- 95.3
C1	76	2- 97.4	2- 97.4	0-100.0	0-100.0	0-100.0	0-100.0	0-100.0
C2	77	0-100.0	0-100.0	0-100.0	8- 89.6	7- 90.9	0-100.0	12- 84.4
C3	747	0-100.0	4- 99.5	0-100.0	12- 98.4	1- 99.9	0-100.0	2- 99.7
C4	671	2- 99.7	4- 99.4	4- 99.4	0-100.0	3- 99.6	4- 99.4	4- 99.4
Total	1571	4- 99.7	10- 99.4	4- 99.7	20- 98.7	11- 99.3	4- 99.7	18- 98.9
D1	9	0-100.0	0-100.0	0-100.0	0-100.0	0-100.0	0-100.0	0-100.0
D2	2829	92- 96.7	91- 96.8	47- 98.3	293- 89.6	211- 92.5	109- 96.1	109- 96.1
D3	2822	131- 97.4	105- 96.3	67- 97.6	459- 83.7	189- 93.3	206- 92.7	202- 92.8
Total	5660	223- 96.1	196- 96.5	114- 98.0	752- 86.7	400- 92.9	315- 94.4	311- 94.5
E1	135	3- 97.8	0-100.0	0-100.0	36- 73.3	12- 91.1	13- 90.4	13- 90.4
E2	2140	24- 98.9	62- 97.1	57- 97.3	56- 97.4	11- 99.5	58- 97.3	45- 97.9
E3	617	0-100.0	6- 99.0	6- 99.0	8- 98.7	1- 99.8	9- 98.5	7- 98.9
E4	1025	11- 98.9	18- 98.2	16- 98.4	49- 95.2	17- 98.3	26- 97.5	22- 97.9
Total	3917	38- 99.0	86- 97.8	79- 98.0	149- 96.2	41- 99.0	106- 97.3	87- 97.8
TOTAL								
A-E: 11623		283- 97.6	312- 97.3	212- 98.2	1007-91.3	500- 95.7	443- 96.2	439- 96.2
F1	120	23- 80.8	31- 74.2	31- 74.2	58- 51.7	32- 73.3	23- 80.8	16- 86.7
F2	85	25- 70.6	9- 89.4	7- 91.8	36- 57.6	28- 67.1	13- 84.7	13- 84.7
F3	1507	239- 84.1	964- 36.0	839- 44.3	515- 65.8	228- 84.9	1077-28.5	1058-29.8
F4	1669	68- 95.9	426- 74.5	414- 75.2	94- 94.4	78- 95.3	1250-25.1	1246-25.3
Total	3381	355- 89.5	1430-57.7	1291-61.8	703- 79.2	366- 89.2	2363-30.1	2333-31.0
TOTAL								
A-F: 15004		638- 95.7	1742-88.4	1503-90.0	1710-88.6	866- 94.2	2806-81.3	2772-81.5

## #Errors - % Accuracy

	#Chars	Caere	Calera with lex	Kurzweil with lex	Toshiba with lex	Simple Voting
A1	48	6- 87.5	0-100.0	37- 22.9	5- 89.6	34- 29.2
A2	45	0-100.0	1- 97.8	0-100.0	0-100.0	0-100.0
A3	40	3- 92.5	0-100.0	0-100.0	2- 95.0	0-100.0
Total	133	9- 93.2	1- 99.2	37- 72.2	7- 94.7	34- 74.4
B1	66	9- 86.4	8- 87.9	7- 89.4	13- 80.3	8- 87.9
B2	65	0-100.0	0-100.0	0-100.0	0-100.0	0-100.0
B3	32	0-100.0	2- 93.8	0-100.0	0-100.0	0-100.0
B4	179	0-100.0	4- 97.8	4- 97.8	3- 98.3	0-100.0
Total	342	9- 97.4	14- 95.9	11- 96.8	16- 95.3	8- 87.7
C1	76	2- 97.4	0-100.0	0-100.0	0-100.0	0-100.0
C2	77	0-100.0	0-100.0	7- 90.9	12- 84.4	0-100.0
C3	747	0-100.0	0-100.0	1- 99.9	2- 99.7	0-100.0
C4	671	2- 99.7	4- 99.4	3- 99.6	4- 99.4	2- 99.7
Total	1571	4- 99.7	4- 99.7	11- 99.3	18- 98.9	2- 99.9
D1	9	0-100.0	0-100.0	0-100.0	0-100.0	0-100.0
D2	2829	92- 96.7	47- 98.3	211- 92.5	109- 96.1	44- 98.4
D3	2822	131- 95.4	67- 97.6	189- 93.3	202- 92.8	75- 97.3
Total	5660	223- 96.1	114- 98.0	400- 92.9	311- 94.5	119- 97.9
E1	135	3- 97.8	0-100.0	12- 91.1	13- 90.4	0-100.0
E2	2140	24- 98.9	57- 97.3	11- 99.5	45- 97.9	19- 99.1
E3	617	0-100.0	6- 99.0	1- 99.8	7- 98.9	0-100.0
E4	1025	11- 98.9	16- 98.4	17- 98.3	22- 97.9	4- 99.6
Total	3917	38- 99.0	79- 98.0	41- 99.0	87- 97.8	23- 99.4
TOTAL						
A-E: 11623		283- 97.6	212- 98.2	500- 95.7	439- 96.2	186- 98.4
F1	120	23- 80.8	31- 74.2	32- 73.3	16- 86.7	17- 85.8
F2	85	25- 70.6	7- 91.8	28- 67.1	13- 84.7	19- 77.6
F3	1507	239- 84.1	839- 44.3	228- 84.9	1058-29.8	230- 84.7
F4	1669	68- 95.9	414- 75.2	78- 95.3	1246-25.3	63- 96.2
Total	3381	355- 89.5	1291-61.8	366- 89.2	2333-31.0	329- 90.3
TOTAL						
A-F: 15004		638- 95.7	1503-90.0	866- 94.2	2772-81.5	515- 96.6

INTERNATIONAL HIGH LEVEL RADIOACTIVE WASTE  
MANAGEMENT PROGRAM

DEAN WM. WELLS

HOWARD R. HUGHES COLLEGE OF ENGINEERING  
OFFICE OF THE DEAN

UNIVERSITY OF NEVADA, LAS VEGAS  
4505 MARYLAND PARKWAY • LAS VEGAS, NEVADA 89154-4005 • (702) 739-3699 • FAX (702) 597-4059

Quarterly Performance Report  
DOE Cooperative Agreement  
Period 04/01/91 - 06/30/91

William R. Wells, Principal Investigator

1. Howard R. Hughes College of Engineering
2. International High Level Radioactive Waste Management Conference
- 3-5. The conference was held in Las Vegas, Nevada, April 28 - May 3, 1991. A copy of the report on the conference from the Conference Chairman to members of the Conference Steering Committee.

*William R. Wells*

---

William R. Wells  
Howard R. Hughes College of Engineering





**INTERNATIONAL HIGH LEVEL RADIOACTIVE WASTE MANAGEMENT CONFERENCE**  
**April 28-May 2, 1991 — CAESARS PALACE, LAS VEGAS**  
Hosted by Howard R. Hughes College of Engineering, University of Nevada, Las Vegas

---

June 11, 1991

Reply to

To: IHLRWM Steering Committee

I am writing to personally thank you for making the Second Annual International High Level Radioactive Waste Management (IHLRWM) Conference such a great event. The conference, which was held on April 28 - May 3, 1991 in Caesars Palace Hotel in Las Vegas, Nevada, drew 977 attendees from 16 countries.

From all perspectives, the conference was a paramount success. There were 53 technical sessions, over 200 papers presented, an exciting opening plenary session, two thought-provoking luncheon programs, and a full-day technical visit to the Yucca Mountain Project.

I am also writing to confirm your organization's status as a cooperating organization for the Third Annual IHLRWM Conference, which will be held on April 12-16, 1992 at the Mirage Hotel in Las Vegas. Attached for your information is the current Steering Committee and Technical Program Committee roster. Please advise us of any changes/corrections (e.g., change of representative, address, etc.) to your representation on these committees. Also, please advise us of the name of the organization you are officially representing on the Steering Committee, so we could update our records.

For your information and reference, some conference materials are enclosed: conference program, media information clips compiled from the conference, minutes of the May 1, 1991 Steering Committee Meeting, which was held at the conference. Also, we may have some extra copies of the 1990 and 1991 conference proceedings, which we could make available to you. Please advise us, should you wish a copy.

By now you should have received, for your distribution, the "Call for Papers" for the 1992 IHLRWM Conference. Should you require more, please contact: American Nuclear Society, 555 N. Kensington Avenue, La Grange Park, IL 60525, USA. Their fax number is: 708-352-0499.

Once again thank you for all your help.

Sincerely,

*William R. Wells*

William R. Wells  
Conference Chairman

INTERNATIONAL HIGH LEVEL RADIOACTIVE WASTE MANAGEMENT (IHLRWM) CONFERENCE

STEERING COMMITTEE MEETING

Wednesday, May 1, 1991 -- 7:30 p.m.

MINUTES

- 1.0 Welcome -- Dr. William (Bill) R. Wells, Chairman, Steering Committee (also, Dean, College of Engineering, University of Nevada) opened the dinner meeting at 7:30 p.m. (Attachment No. 1 is the agenda.)
- 2.0 Self-Introductions -- (Attachment No. 2 is the whole Steering Committee list -- those circled were in attendance.)
- 3.0 Brief Review of IHLRWMC Series -- Since all in attendance were familiar with the development of the IHLRWMC Series, such a review was not made.
- 4.0 Review of 1991 Conference -- Bill Wells gave some remarks as to the responsibilities of the Steering and Program Committees. He indicated that the Steering Committee is responsible for the general development of the conference (incl., policy issues, cooperating organizations, budget, guidance to Program Committee, development of Conference Opening Plenary Session, Conference Luncheons, et al.). The Technical Program Committee is responsible for the development of the technical program (incl., session development [session coordinators, chairpeople], "call for papers," abstract review, scheduling of sessions, technical content of preliminary and final programs, et al.).
  - A. Technical Program -- Committee Chairman Lloyd McClure briefly recapped the 1991 Technical Program. There were 53 sessions. Data on sessions (incl., session attendance, etc.) was not available yet. Commented on the problems with the lights at the sessions and with some audiovisual equipment. Noted lack of sufficient number of session assistants to assist with sessions. Introduced Technical Program Committee Chair for 1992 IHLRWMC: James S. Tulenko, University of Florida and Vice Chair Billy M. Cole, E.R. Johnson Associates, Inc.
- 5.0 Conference Management
  - A. Overall Logistics, etc. -- Dr. Edward O. Pfrang, Executive Director, American Society of Civil Engineers (ASCE), gave an overview of the ASCE responsibilities for the IHLRWMC Series: Serve as Conference Secretariat (staff support for Chairman Wells; correspondence with cooperating organizations; some distribution of "call for papers" [to cooperating organizations]; all logistics (incl., preparation of promotional mailings during the year; preliminary and final program preparation/distribution; prepare conference proceedings; hotel arrangements; public relations function (incl., press room, etc.)). Ed Pfrang reported the following statistics for the 1991 Conference:

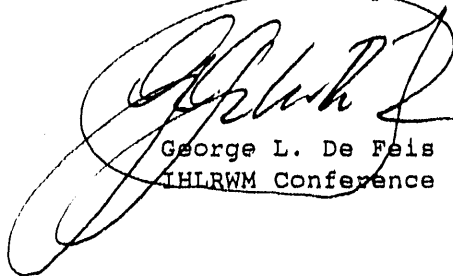
- Attendance -- Total 977 (1,004 at the 1990 IHLRWMC); 175+ from outside USA from 16 countries (incl. Japan [30], Canada [30], United Kingdom [25], France [20], Sweden [15], USSR [6], Korea [5], smaller delegations from Germany, Finland, Spain, Australia, Switzerland, Taiwan, Belgium, Austria)
  - Cooperating Organizations -- In 1991, there were 42 cooperating organizations, 22 from outside USA (In 1990, 18 total, 0 from outside USA)
  - Public Relations/Press Coverage -- All 3 local television stations covered the conference extensively, at least 8 stories were aired, 2 live in-studio interviews were conducted of John Bartlett and David Leroy. The Las Vegas Review Journal carried 1 or more stories every day. The Las Vegas Sun published a story on Nevada Governor Bob Miller's remarks. 6 trade press reporters attended the conference (incl., McGraw Hill's Nuclear Times, NSPE's Engineering Times, ASCE's Civil Engineering and ANS's Nuclear News).
  - Follow-ups -- Correspond with cooperating organizations: thanking (and congratulating) them for their support and effort in making the 1991 conference a success; report on 1991 conference; confirm support for 1992; confirm committee representatives; distribute 1992 "call for papers;" and seek additional appropriate cooperating organizations.
- B. Technical Program Support -- Dr. Joseph C. Braun, Executive Director, American Nuclear Society (ANS), gave an overview of the ANS responsibilities for the IHLRWMC Series: Serve as staff support for Technical Program Committee and Chairman; preparation/distribution of "call for papers;" technical content of program; compiling conference proceedings document.
- 6.0 1992 Conference -- The dates are April 12 - 16, 1992 at the Mirage Hotel in Las Vegas, Nevada.
- 7.0 Future Conferences -- Things to consider for future: spouses program (Since very few spouses participated in the 1990 program; a spouses program was not arranged for 1991); include poster sessions in exhibit area; daily conference newspaper; mailers for proceedings (or send directly to registrant -- do not distribute at conference).
- 8.0 Open Discussion -- Bill Wells moderated an open discussion. Some comments are included below with attributor's last name:
- Morrisette -- need to involve local sections more. Session assistant roles, etc.
- McCombie -- John Bartlett's follow-up (rebuttal) to Governor's remarks was good. Multiple plenary sessions is a good idea -- continue. Should have earlier notice for Steering Committee meetings.

Senator Hickey -- (Nevada State Senator Hickey attended briefly the dinner meeting.) Good conference, supports future such conferences, wants to help.

- 9.0 Next Meeting and Adjournment -- Bill Wells announced the next Steering Committee meeting for Wednesday, June 26, 1991 at the offices of the Edison Electric Institute in Washington, DC. An agenda will be distributed in early June 1991. Bill Wells adjourned the meeting at approximately 9:45 p.m.

\*\*\*\*\*

As recorded by:

A large, stylized handwritten signature in dark ink, likely belonging to George L. De Feis, is written over the typed name and title.

George L. De Feis  
IHLRWM Conference Secretariat

1991 International High Level Radioactive Waste Management Conference

Steering Committee Meeting

Wednesday, May 1, 1991 at 7:30 p.m.

Tiberius Room, Caesars Palace, Las Vegas, Nevada, USA

Agenda

- 1.0 Welcome -- Dr. William (Bill) R. Wells, Chairman, Conference Steering Committee, also Dean, Howard R. Hughes College of Engineering, University of Nevada, Las Vegas. (Attendance sheet will be circulated for signing.)
- 2.0 Self-Introductions -- Each attendee will give their name and affiliation (organization they are representing also) (Attendance sheet will be circulated for signing.)
- 3.0 Brief Review of IHLRWHC Series -- Dr. Wells
- 4.0 Review of 1991 Conference -- Dr. Wells
  - A. Technical Program -- Lloyd McClure, Chairman, 1991 Conference Program Committee
- 5.0 Conference Management
  - A. Overall Logistics and Steering Committee Support (incl. attendance figures, cooperating organizations status, press information) --  
  
Dr. Edward O. Pfrang, Executive Director, American Society of Civil Engineers (ASCE) / Maureen Rafferty, ASCE Convention Manager / George L. De Feis, ASCE Director of International Affairs / Tim Brown, ASCE Manager of Public Relations
  - B. Technical Program Support --  
  
Dr. Joseph C. Braun, Executive Director, American Nuclear Society
- 6.0 1992 Conference [REDACTED] -- Dr. Wells
  - A. Technical Program -- James Tulenko, Chairman, 1992 Conference Program Committee
  - B. Special Sessions -- Dr. Wells
- 7.0 Future Conferences -- Dr. Wells
- 8.0 Open Discussion Moderated by Dr. Wells
- 9.0 Adjournment

\*\*\*\*\*

"○" means present at  
May 1, 1991 Mtg.

Attachment No. 2

Mr. Joseph C. Braun  
American Nuclear Society  
555 North Kensington Avenue  
La Grange Park, IL 60525

Mr. Loring Mills  
Vice President of Nuclear Activities  
Edison Electric Institute  
701 Pennsylvania Avenue N.W.  
Washington, DC 20004-3691

Mr. James S. Tulenko  
University of Florida  
Dept. of Nuclear Engineering Sciences  
202 Nuclear Sciences Center  
Gainesville, FL 32611

Dr. William R. Wells  
Dean, College of Engineering  
University of Nevada  
4505 Maryland Parkway  
Las Vegas, NV 80154

+ Lloyd McClure  
1991 Tech. Prog. Comm. Chair

Dr. Edward O. Pfrang  
Executive Director  
American Society of Civil Engineers  
345 East 47th Street  
New York, NY 10017

Mr. Joe Youngblood  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

John Linehan  
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+ Nevada State Senator Hickey

**The Second Annual  
International**

# **HIGH LEVEL RADIOACTIVE WASTE MANAGEMENT**

**Conference & Exposition**

**April 28-May 3, 1991 at Caesars Palace, Las Vegas**





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### HOST, SPONSORS & COOPERATING ORGANIZATIONS

*Conference Host:* Howard R. Hughes College of Engineering, Univ. of Nevada, Las Vegas

*Sponsors:* American Society of Civil Engineers • American Nuclear Society

*Cooperating Organizations:* American Chemical Society • American Geophysical Union • American Institute of Chemical Engineers • American Medical Association • American Society for Testing and Materials • American Society for Quality Control • American Society of Mechanical Engineers • Center for Nuclear Waste Regulatory Analysis • Edison Electric Institute • Geological Society of America • Health Physics Society • Institute of Nuclear Materials Management • National Conference of State Legislatures • Society of Mining Engineers • U.S. Department of Energy • U.S. Nuclear Regulatory Commission • University of Nevada Medical School • Atomic Energy Council • Atomic Energy of Canada Ltd. • British Nuclear Fuels Ltd. • Chinese Institute of Civil and Hydraulic Engineering • Commission of the European Communities • Electric Power Research Institute • European Nuclear Commission • European Nuclear Society • Her Majesty's Inspectorate of Pollution • Institution of Civil Engineers • Institution of Engineers, Australia • Institution of Engineers of Ireland • Japan Society of Civil Engineers • Korea Advanced Energy Research Institute • Korean Society of Civil Engineers • National Society of Professional Engineers • Nationale Genossenschaft für die Lagerung Radioaktiver Abfälle (NAGRA) • Organization for Economic Cooperation and Development (OECD) — Nuclear Energy Agency • Power Reactor and Nuclear Fuel Development Corp. • Societe des Ingenieurs et Scientifiques de France • Swedish Nuclear Fuel and Waste Management Company • Swedish Nuclear Power Inspectorate • Swiss Society of Engineers and Architects • Verein Deutscher Ingenieure.

# GENERAL INFORMATION



## HOW TO REGISTER

You will save money by registering in advance. There is a Pre-Registration Form on page 21. The use of this form for advance Registration entitles you to lower registration fees and ensures tickets to the various activities. It will also save you time because your badge and tickets will be prepared in advance and there will be no waiting in line.

## REGISTRATION

1. Registration is required for all attendees and participants. Badges are required for admission to all events.
2. Full payment must accompany registration. For those wishing to pay by credit card, the registration form must indicate your credit card, number and expiration date.
3. The pre-registration deadline is April 1, 1991.
4. The registration includes admission to all sessions, the exhibition hall, the Icebreaker Party, UNLV Reception, Tuesday and Wednesday luncheons, and proceedings volumes.
5. Registration will begin on Sunday, April 28 from 3-7 p.m. and continues Monday, Tuesday and Wednesday beginning at 7:30 a.m.

## TECHNICAL FIELD TRIP

A trip will be offered to Yucca Mountain during the conference (see page 19 for details). Please indicate on the registration form if you plan to attend.

## SPECIAL EVENTS

These include the Icebreaker Party and the UNLV Reception, which are both included in the conference registration fee.

## CONFERENCE HEADQUARTERS/SPEAKERS' ROOM

A conference headquarters and speakers' room will be in operation for the duration of the conference to serve the needs of all participants. Speakers and Session Chairmen are requested to check in upon arrival. Arrangements for audiovisual aids or any other requirements can be confirmed at that time.

## INFORMATION — MESSAGE CENTER

Messages will be held for participants at the Conference Information Center at Caesars Palace. Announcements seeking individuals cannot be made during technical sessions.

## CONFERENCE PUBLICATIONS AND MATERIALS

The IHLRWM Conference registration kit will include:

- A roster of conference participants and exhibitors.
- Conference proceedings. Provided after the conference to all conference participants. Available to all others at the list price. Published by ASCE.

## REGISTRATION REFUNDS

ASCE will refund advance registration fees for all cancellations RECEIVED IN WRITING BY APRIL 1, 1991. NO REFUNDS WILL BE MADE ON CANCELLATIONS RECEIVED AFTER THIS DATE. There will be no refunds of on-site registration fees. Refunds will be mailed from ASCE after the Conference. All refunds are subject to a \$50.00 processing fee.

## HEADQUARTERS

Caesars Palace Hotel is Headquarters with all functions being held there.

## HOTEL RESERVATIONS

To ensure accommodations use the Hotel Reservation form on page 22 and mail direct to Caesars Palace.

# AT A GLANCE



## SUNDAY, APRIL 28, 1991

Early Registration  
Welcome Reception/Icebreaker Party  
(Exhibit Hall-Exhibits Open)

EXHIBITS OPEN 6:30 p.m. — 8:00 p.m.

3:00 p.m. — 7:00 p.m.

6:30 p.m. — 8:00 p.m.

## MONDAY, APRIL 29, 1991

Session Chairman/Authors Breakfast  
Registration  
Conference Conveners-Opening Plenary Session & Keynote  
Hospitality Room  
Lunch (Complimentary Beer) (Exhibit Hall)  
Natural Systems Plenary  
Topical Sessions  
Reception (UNLV) (Transportation from and to Hotel incl.)

EXHIBITS OPEN 10:00 a.m. — 2:00 p.m.  
& 4:00 p.m. — 6:00 p.m.

7:00 a.m. — 8:00 a.m.

7:30 a.m. — 4:30 p.m.

8:30 a.m. — 12:00 Noon

9:00 a.m. — 4:00 p.m.

12:00 Noon — 1:30 p.m.

1:30 p.m. — 2:30 p.m.

2:45 p.m. — 5:00 p.m.

6:00 p.m. — 7:30 p.m.

## TUESDAY, APRIL 30, 1991

Session Chairman/Authors Breakfast  
Registration  
Engineered Systems Plenary  
Hospitality Room  
Topical Sessions  
Conference Lunch (1)  
Integrated Systems Plenary  
Topical Sessions  
Wine & Cheese Reception (Exhibit Hall)

EXHIBITS OPEN 10:00 a.m. — 12:00 Noon  
& 4:00 p.m. — 6:00 p.m.

7:00 a.m. — 8:00 a.m.

7:30 a.m. — 1:30 p.m.

8:30 a.m. — 9:30 a.m.

9:00 a.m. — 4:00 p.m.

9:45 a.m. — 12:00 Noon

12:00 Noon — 1:30 p.m.

1:45 p.m. — 2:45 p.m.

3:00 p.m. — 5:15 p.m.

5:00 p.m. — 6:00 p.m.

\*

## WEDNESDAY, MAY 1, 1991

Session Chairman/Authors Breakfast  
Registration  
Social Systems Plenary  
Hospitality Room  
Topical Sessions  
Conference Lunch (2)  
Topical Sessions

EXHIBITS OPEN 10:00 a.m. — 12:00 Noon  
& 4:00 p.m. — 6:00 p.m.

7:00 a.m. — 8:00 a.m.

7:30 a.m. — 1:30 p.m.

8:30 a.m. — 9:30 a.m.

9:00 a.m. — 4:00 p.m.

9:45 a.m. — 12:00 Noon

12:00 Noon — 1:30 p.m.

1:45 p.m. — 5:00 p.m.

\*

## THURSDAY, MAY 2, 1991

Session Chairman/Authors Breakfast  
Topical Sessions  
Rapporteur Session  
Conference Adjourns

7:00 a.m. — 8:00 a.m.

8:30 a.m. — 10:45 a.m.

11:00 a.m. — 12:30 Noon

12:30 Noon

\*

## FRIDAY, MAY 3, 1991

Field Trip Yucca Mountain Project (Optional)

7:30 a.m. — 6:00 p.m.

\*Evening Free

# 1991 International High-Level Radioactive Waste Management Conference

April 28 - May 2, 1991 • Caesars Palace Hotel • Las Vegas, Nevada

Room	Monday, April 29		Tuesday, April 30		Wednesday, May 1		Thursday, May 2
	8:30 a.m.-12 noon Opening Plenary	1:30 p.m.-2:30 p.m. Natural Systems Plenary	8:30 a.m.-9:30 a.m. Engineered Systems Plenary	1:45 p.m.-2:45 p.m. Integrated Systems Plenary	8:30 a.m.-9:30 a.m. Social Systems Plenary	1:45 p.m.-5:00 p.m. Implementation of Selected Regulatory Processes	11:00 a.m.-12:30 p.m. Rapporteur Session
Colosseum V-VII							
Augustus Room		2:45 p.m.-5:00 p.m. Current Issues in U.S. and International HLW Regulations	9:45 a.m.-12 noon Aspects of Repository Performance Under EPA Regulations	3:00 p.m.-5:15 p.m. Utility Regulatory Experience Applied to the High Level Waste Repository Program	9:45 a.m.-12 noon Regulatory Aspects of Site Characterization		
Julius Room		2:45 p.m.-5:00 p.m. Transport Cask Systems Design and Technology	9:45 a.m.-12 noon Underground Facility Design	3:00 p.m.-5:15 p.m. Transportation Systems—I	9:45 p.m.-12 noon Waste-Package Materials	1:45 p.m.-5:00 p.m. Transport Cask Testing and Analyses	8:30 a.m.-10:45 a.m. Transportation Systems—II
Tiberius Room		2:45 p.m.-5:00 p.m. Seismotectonics and Volcanology	9:45 a.m.-12 noon At-Reactors Storage	3:00 p.m.-5:15 p.m. Monitored Retrievable Storage	9:45 a.m.-12 noon Unsaturated Zone Hydrologic Testing	1:45 p.m.-5:00 p.m. Saturated Zone Hydrology	
Galba Room		2:45 p.m.-5:00 p.m. Spent Fuel Characteristics	9:45 a.m.-12 noon Vitrified Waste Processing	3:00 p.m.-5:15 p.m. Vitrified Waste Forms Characteristics	9:45 a.m.-12 noon Intergovernmental Issues	1:45 p.m.-5:00 p.m. Institutional Approaches to Resolving Technical Issues	8:30 a.m.-10:45 a.m. Socioeconomic Impact Assessment
Cladius Room		2:45 p.m.-5:00 p.m. Science Education and Public Awareness	9:45 a.m.-12 noon International Panel on Public Education About High-Level Waste	3:00 p.m.-5:15 p.m. Risk Perception and Public Involvement	9:45 a.m.-12 noon Radionuclide Release from the Engineered Barrier System	1:45 p.m.-5:00 p.m. Near-Field Processes Affecting the Engineered Systems	8:30 a.m.-10:45 a.m. Thermal Considerations in Underground Design
Majestium Room		2:45 p.m.-5:00 p.m. Transport Processes	9:45 a.m.-12 noon Geochemistry—I	3:00 p.m.-5:15 p.m. Geotechnical Exploration	9:45 a.m.-12 noon Assessment and Evaluation of Underground Excavation Techniques	1:45 p.m.-5:00 p.m. Geochemistry—II	8:30 a.m.-10:45 a.m. Underground Mechanical Excavation Techniques and Technology
Regalium Room		2:45 p.m.-5:00 p.m. Design Control Methodology	9:45 a.m.-12 noon Unsaturated Zone Hydrology—I	3:00 p.m.-5:15 p.m. Unsaturated Zone Hydrology—II	9:45 a.m.-12 noon Waste Management System Development	1:45 p.m.-5:00 p.m. Environmental Resource Assessments and Modeling	8:30 a.m.-10:45 a.m. Interim Storage
Nero Room		2:45 p.m.-5:00 p.m. Geomechanics	9:45 a.m.-12 noon In-Situ and Laboratory Testing	3:00 p.m.-5:15 p.m. Performance Assessment Scientific Basis and Regulatory Needs	9:45 a.m.-12 noon Performance Assessment Case Studies	1:45 p.m.-5:00 p.m. Performance Assessment Scenarios and Uncertainties	8:30 a.m.-10:45 a.m. Performance Assessment System Analysis





# TECHNICAL SESSIONS Monday

Monday, April 29, 1991

8:30 a.m.-12 noon

## Opening Plenary

Colosseum V-VII

Session organizer and chairman: WILLIAM R. WELLS (UNLV)

Speakers: STEN BJURSTROM (Svensk Kärnbränslehantering)  
JOHN W. BARTLETT (DOE)  
JAMES R. CURTISS (USNRC)  
KUNIHICO UEMATSU (Nuclear Energy Agency)  
DON U. DEERE (US Nuclear Waste Technical Review Board)  
MICHAEL M. WILSON (Florida Public Services Commission) — tentative

Keynote Speaker: MARGARET MAXEY (Univ of Texas, Austin)

1:30 p.m.-2:30 p.m.

## Natural Systems Plenary

Colosseum V-VII

Session organizer and chairman: STEPHEN H. STOW (ORNL)

Development and Application of the Natural System Guidelines in 10 CFR Part 960, PAUL GNIRK (RE/SPEC)

2:45 p.m.-5:00 p.m.

## Current Issues in U.S. and International HLW Regulations

Augustus Room

(Presentations will be approximately 20 minutes each)

Session organizers: SCOTT DAM (Roy F. Weston), MICHAEL BAUSER (Newton & Holtzinger); Session chairmen: SCOTT DAM (Roy F. Weston), STEVEN BLOW (Nirex-UK)

EPA's Development of Environmental Standards for High-Level and Transuranic Wastes, FLOYD L. GALPIN, RAYMOND L. CLARK (EPA)

First Update of the Regulatory Strategy and Schedules for the High-Level Waste Repository Program, ROBERT L. JOHNSON, JOHN J. LINEHAN, B. J. YOUNGBLOOD (NRC)

Regulatory Issues Facing the U.S. High-Level Waste Program, GERALD J. PARKER (DOE), MIGUEL A. LUGO (WESTON)

Regulatory Framework and Essence of Nuclear Waste Management in Taiwan, Republic of China, SHANG-JHY LIU (INER-Taiwan)

Safety Assessment of Radioactive Waste Disposal: A Priority Area for International Co-Operation within the OECD/Nuclear Energy Agency, CLAES THEGERSTROM, JEAN-PIERRE OLIVIER, DANIEL A. GALSON (OECD-France)

Panel Discussion

2:45 p.m.-5:00 p.m.

## Transport Cask Systems Design and Technology

Julius Room

(Presentations will be approximately 20 minutes each)

Session organizers: WILLIAM H. LAKE (DOE), THOMAS L. SANDERS (SNL); Session chairmen: WILLIAM H. LAKE (DOE), DAVID G. ABBOTT (INEL, EG&G Idaho)

DOE Transportation Technical Activities for 1998, CHRISTOPHER KOUTS (DOE)

Development of the ASME/NUPACK Code, KURT GOLDMANN (Consultant)

Certifying the TN-BRP and TN-REG Transportable Storage Demonstration Casks, DAVID G. ABBOTT (INEL, EG&G Idaho), FRANCIS J. WILLIAMS, JR. (Transnuclear), H. RICHARD YOSHIMURA (SNL)

Development of the GA-4 and GA-9 Legal Weight Truck Spent Fuel Shipping Casks, RICHARD J. MEYER (General Atomics)

Innovative High-Capacity Trailer Design for the GA-4/GA-9 Casks, JOHN KISSINGER, N. DOUGLAS RICKARD, ALAN ZIMMER (General Atomics)

Approach for Implementing Burnup Credit in High-Capacity Truck Casks, J. BOSHOVEN, J. HOPF, S. SU (General Atomics)

2:45 p.m.-5:00 p.m.

## Selmsotectonics and Volcanology

Tiberius Room

(Presentations will be approximately 20 minutes each)

Session organizer and chairman: J. CARL STEPP (EPRI)

Tectonic Issues at Yucca Mountain, CLARENCE ALLEN (California Institute of Technology), LEON REITER (USNRB)

Volcanic Episodes Near Yucca Mountain Determined by Paleomagnetic Studies at Lathrop Wells, Crater Flat and Sleeping Butte, DUANE E. CHAMPION (USGS, Menlo Park)

<sup>40</sup>Ar/<sup>39</sup>Ar Laser Fusion and K-Ar Ages from the Quaternary Basaltic Volcanic Centers at Crater Flat, Nevada and Cima, California: Implications for the Age of the Youngest Volcanic Activity in the Yucca Mountain Area, BRENT D. TURRIN, DUANE CHAMPION (USGS, Menlo Park)

Multiple Event Considerations for Postclosure Seismic Hazard Evaluations at Yucca Mountain, Nevada, RICHARD C. LEE, JERRY L. KING, TERRY A. GRANT (SAIC, Las Vegas)

Weapons Test Seismic Investigations at Yucca Mountain, J. S. PHILLIPS, M. C. WALCK, L. E. SHEPHARD (SNL)



# TECHNICAL SESSIONS Monday

2:45 p.m.-5:00 p.m.

## Spent Fuel Characteristics

*Galba Room*

(Presentations will be approximately 20 minutes each)

*Session organizers:* BOB ZIMMERMAN (Fluor Daniel), CHUCK ALLEN (PNL); *Session chairman:* HERSH K. MANAKTALA (SwRI)

**A Comparison of High-Level Waste Form Characteristics,** ROYES SALMON, KARL J. NOTZ (ORNL)

**Oxidation Behavior of Spent Fuel at the Back End of the Fuel Cycle,** ROBERT E. EINZIGER (PNL)

**Dissolution of Spent Fuel under the Conditions of Wet Storage and Disposal,** K. S. CHUN, G. I. PARK, H. S. PARK, I. S. SUH (KAERI, Choongnam-Korea)

**An Overview of Spent Fuel Leaching and Radionuclide Release Behavior,** CHARLES N. WILSON (PNL)

**Statistical Dependence of Grain and Fragment Size Distributions on Spent Fuel Dissolution Release Rate and Oxidation Response,** R. B. STOUT, E. KANSA (LLNL), R. E. EINZIGER, H. C. BUCHANAN, L. E. THOMAS (PNL), H. LEIDER, H. WEED, S. NGUYEN, W. MCKENZIE (LLNL), C. WILSON (PNL), S. G. PRUSSIN (Univ of California, Berkeley)

2:45 p.m.-5:00 p.m.

## Science Education and Public Awareness

*Cladius Room*

(Presentations will be approximately 20 minutes each)

*Session organizer and chairman:* GINGER P. KING (DOE)

**Distinguishing Between Education and Indoctrination,** DALE G. ANDERSEN (UNLV)

**Energy Education in the Higher Education Systems of California,** YORK T. MANDRA (San Francisco State Univ)

**Radioactive Waste Management-An Educational Challenge,** JAMES S. TULENKO (Univ of Florida)

**Science Education: Critical Link to Nuclear Waste Disposal and Management,** JOHN R. VINCENTI (Penn State)

**Education-Path Towards Solution Regarding Disposal of Spent Nuclear Fuel,** DALE E. KLEIN (Univ of Texas, Austin)

**Scientific Literacy and Public Education about High-Level Radioactive Waste,** FRANK D. MEYERS (Univ of Nevada)

**BNFL and Education,** H. E. BOLTER (BNFL)

2:45 p.m.-5:00 p.m.

## Transport Processes

*Majestlum Room*

(Presentations will be approximately 20 minutes each)

*Session organizer and chairman:* J. C. LAUL (Rockwell Int)

**Determination of Diffusivities of Sorbing and Non-Sorbing Species in Rocks,** CHUNG KYUN PARK, KYONG WON HAN, HUN HWEE PARK, IN SUK SUH (KAERI, Daejeon-Korea)

**Effects of Heterogeneity on Actinide Diffusion Rates in Tuff Rock,** MARILYN BUCHHOLTZ TEN BRINK, DOUGLAS L. PHINNEY, DAVID K. SMITH (LLNL)

**Major and Trace Elements Regulation in Natural Granitic Waters Application to Deep Radioactive Waste Disposals,** G. MICHAUD (Univ of Paris-France), P. TOULHOAT (CEA/CEN-France), G. OUZOUNIAN (Andra-France), G. BEAUCAIRE, G. NEGREL (CEA/CEN-France)

**Migration Experiments at the Grimsel Test Site, Switzerland,** JOST EIKENBERG (Scherrer Inst-Switzerland), URS FRICK (NAGRA-Switzerland), EDUARD HOEHN (Scherrer Inst-Switzerland)

**Interpretative Modeling of Studies of Sorption of Radionuclides onto Geological Materials,** K. A. BOND, C. M. LINKLATER, S. M. SHARLAND (AEA Technol-UK)

**Radocolloid Transport in Saturated and Unsaturated Fractures,** H. E. NUTTALL, ROHIT JAIN, YASEMIN FERTELLI (Univ of New Mexico)

**Tracing Drilling Air in a Prototype Borehole using Sulfur Hexafluoride,** CHARLES A. PETERS, IN CHE YANG, EDWARD M. KWICKLIS, PETER STRIFFLER, JANINE FERARESE (USGS)

2:45 p.m.-5:00 p.m.

## Design Control Methodology

*Regallum Room*

(Presentations will be approximately 20 minutes each)

*Session organizer:* RICHARD DEKLEVER (Raytheon Svcs-Nevada); *Session chairmen:* RICHARD DEKLEVER (Raytheon Svcs-Nevada), EDGAR H. PETRIE (DOE, Las Vegas)

**Design Control Process Requirements for Geologic Repository Operations Area Design,** DINESH C. GUPTA, MYSORE S. NATARAJA, JAMES T. CONWAY (NRC)

**Design Control Overview for the Yucca Mountain Exploratory Shaft Facility,** EDWARD M. CIKANEK (Harza Eng), EDGAR H. PETRIE (DOE, Las Vegas)

**Performance Assessment in Early Phases of the Repository Design Process,** THOMAS E. BLEJWAS (SNL)



# TECHNICAL SESSIONS Monday-Tuesday

Design Considerations for the Yucca Mountain Project Exploratory Shaft Facility, RICHARD L. BULLOCK (Fenix & Selsson), JAMES D. GRENIA (PBQ&D)

Application of QA Grading to YMP Items and Activities, STEVEN C. SMITH (SAIC, Las Vegas)

Design Reviews from a Regulatory Perspective, BRUCE D. FOSTER (SAIC, Las Vegas)

Controlling the Description of a High-Level Radioactive Waste Isolation System, CHARLES F. ZUMBA (SAIC, San Diego), DILLARD B. SHIPPLER (PNL)

2:45 p.m.-5:00 p.m.

## Geomechanics

*Nero Room*

(Presentations will be approximately 20 minutes each)

Session organizer and chairman: JOHN GIBBONS (Applied Resch Assoc-Albuquerque)

Strain Distribution in Fault Zones and Fluid Flow, JOHN M. LOGAN (Texas A&M)

Analysis of Fault and Detachment Geometries Below Yucca Mountain, STEPHEN R. YOUNG, GERRY L. STIREWALT (CNWRA, San Antonio), ROBERT A. RATLIFF (Univ of Colorado)

Interpretation and Modeling Process of Bedrock Structures for Site Evaluation in Finland, PAULI SAKSA (SRCE-Finland), PEKKA ANTTILA (IVO-Finland)

Mechanical Analysis of the Yucca Mountain Tuffs, RONALD H. PRICE (SNL), P. J. BOYD, R. J. MARTIN III, R. W. HAUPT, J. S. NOEL (NER)

Application of Discrete Fracture Analysis to Site Characterization, W. DERSHOWITZ, W. ROBERDS (Golder Assoc), J. BLACK (Golder Assoc-UK)

Fractal Characteristics of Fracture Roughness and Aperture Data, SUNIL KUMAR, GUDMUNDUR BODVARSSON (LBL), EDWARD KWICKLIS, GARY SEVERSON, JIM BOERNGE (USGS)

Assessment of Fracture Sampling Techniques for Laboratory Tests on Core, G. SEVERSON (USGS), J. BOERNGE (USBR)

**Tuesday, April 30, 1991**

8:30 a.m.-9:30 a.m.

## Engineered Systems Plenary

*Colosseum V-VII*

(Presentations will be approximately 30 minutes each)

Session organizer and chairman: BOB ZIMMERMAN (Fluor Daniel)

How Much Must the Geologic Barrier Contribute to Safe HLW Disposal? C. MCCOMBIE, I. G. MCKINLEY, P. ZUIDEMA (Nagra-Switzerland)

Yucca Mountain Project Waste Package Plan, DIANE J. HARRISON-GIESLER (DOE, Las Vegas), LESLIE J. JARDINE (LLNL), RICHARD P. MORISSETTE (SAIC, Las Vegas)

9:45 a.m.-12 noon

## Aspects of Repository Performance Under EPA Regulations

*Augustus Room*

(Presentations will be approximately 30 minutes each)

Session organizers: SCOTT DAM (Roy F. Weston), MICHAEL BAUSER (Newman & Holtzinger); Session chairman: MICHAEL BAUSER (Newman & Holtzinger)

High Level Waste Regulation: Time for New Thinking? THOMAS A. COTTON (JK Resch Assoc)

Human Intrusion Scenarios in Nuclear Waste Repository Evaluations, JAMES K. CHANNELL, LOKESH CHATURVEDI, ROBERT H. NEILL (EEG)

Gaseous Release of Carbon-14: Why It Should be Exempt from the High Level Waste Regulations, R. A. VAN KONYNENBURG (LLNL)

Characterization of Spent Fuel and HLW Glass for Hazardous Components, STEVEN GOMBERG (DOE), WILLIAM VOCKE (Roy F. Weston, DC)

9:45 a.m.-12 noon

## Underground Facility Design

*Julius Room*

(Presentations will be approximately 25 minutes each)

Session organizer: BOB ZIMMERMAN (Fluor Daniel); Session chairman: HYWEL G. LEWIS (BNFL), BOB ZIMMERMAN (Fluor Daniel)

The Development Process for Unique Underground Equipment for Waste Handling, JOHN M. KARHNAK (UTD), NAIEM S. TANIOUS (NRC)

Design and Operating Criteria for the French Deep Repository of High-Level Radioactive Waste, JEAN-MICHEL HOORELBEKE, JAN-MARIE POTIER (ANDRA-France)

Disposal of Spent HTR Fuel Elements, HEINER BRUCHER, DIETER NIEPHAUS, EIKE BARNERT, KORNELIUS KROTH (KFA-FRG)

Conceptual Design of Geological Disposal System of High-Level Waste, K. HARA, T. FUJITA, N. SASAKI, J. OKAMOTO, M. UCHIDA (PNC-Japan)

Application of Microwave to TRU Waste Conditioning System, FUMIAKI KOMATSU, IKUO NAKAI, SATOSHI NAKASAKU, J. K. ASAHINA (Kobe Steel-Japan)



# TECHNICAL SESSIONS Tuesday

9:45 a.m.-12 noon

## At-Reactor Storage

*Tiberius Room*

(Presentations will be approximately 25 minutes each)

*Session organizer:* JEFF WILLIAMS (DOE); *Session chairman:* BILLY COLE (ER Johnson Assoc)

State Environmental Review of a Proposed Utility Independent Spent Fuel Storage Installation (ISFSI), CRETCHEN SABEL (Minnesota SPA), ROBERT HALSTEAD (Halstead Consult)

Standardized, Utility - DOE Compatible, Spent Fuel Storage-Transport Systems, MARVIN L. SMITH (Virginia Power)

Concept Development of Small Cask to Large Cask Transfer Systems, RAY W. LAMBERT (EPRI)

Design and Operational Experience of the NuHoms -24P Spent Fuel Storage System, WILLIAM J. MCCONAGHY, ROBERT A. LEHNERT (Pacific Nucl Fuel), ROBERT W. RASMUSSEN (Duke Power)

Rancho Seco Spent Fuel Disposition Strategy, HAROLD H. KLEPFER (S. Levy), RITA W. BOWSER (SMUD, Rancho Seco)

9:45 a.m.-12 noon

## Vitrified Waste Processing

*Galba Room*

(Presentations will be approximately 20 minutes each)

*Session organizer and chairman:* BRUCE KITCHEN (SRS)

Commissioning of High Level Liquid Waste Facilities, DAVID L. MARSH (BNFL-UK)

Formic Acid Requirement for SRC DWPF Melter Feed Preparation (U), S. W. HSU (SRC)

Removal of Dissolved and Suspended Radionuclides from HWVP Liquid Wastes, STEPHEN D. SHARP (Fluor Daniel), FERDOSH D. NANKANI (Westinghouse Hanford, Irvine)

Characterization of High Radioactive Waste in a Reprocessing Plant Using Passive and Active Neutronic Methods, G. BIGNAN, L. MARTIN-DEIDIER, J. ROMEYER-DHERBEY (CEA/CEN Cadarache-France), D. HUGELMAN, F. JUTEAU, J. PINEL (COGEMA-France)

Product Quality and Process Control in the Windscale Vitrification Plant, GEORGE D. BEVERIDGE (BNFL-UK)

The Demonstration of High Level Waste Vitrification Feed Preparation from Sludges Containing High Nitrite and Mercury Concentrations, N. D. HUTSON, J. R. ZAMECNIK, J. A. RITTER, J. T. CARTER (SRC)

Behavior of Plutonium, REE and Platinides in Vitreous Phosphate Composites During Liquid HLW Vitrification, A. S. NIKIFOROV, A. S. POLYAKOV, YU I. MATYUNIN, A. V. DEMIN, M. I. FEDOROVA (ALL-Union-Moscow)

9:45 a.m.-12 noon

## International Panel on Public Education About High-Level Waste

*Cladius Room*

(Presentations will be approximately 20 minutes each)

*Session organizer and chairman:* GINGER KING (DOE)

How Can We Deal with Nimby in Nuclear Waste Management? EGON R. FRECH (AECL Whiteshell-Canada)

Developing an Education Programme for Schools on Radioactive Waste Management, PETER J. CURD, JOHN S. HUTCHINS (Nirex-UK)

Curriculum and Instruction in Nuclear Waste Disposal, MIKE ROBINSON (UNR), BILL PANKRATIUS (UNLV), TOM LUGASKI (UNR)

Nagra's Public Acceptance Strategy 1991, RUDOLF MEIER, Nagra-Switzerland)

Communicating Confidence and Creating Credibility, SEVE UNGERMARK (SKB-Sweden)

Public Education, Public Confidence, and Public Acceptance of Radioactive Waste Management Facilities, GINGER KING (DOE), JOHN MUNRO, JONATHAN KATZ (WESTON TST)

Panel Discussion

9:45 a.m.-12 noon

## Geochemistry—I

*Majestium Room*

(Presentations will be approximately 20 minutes each)

*Session chairman:* PAUL CLOKE (SAIC)

Mineralogic Alteration History and Paleohydrology at Yucca Mountain, Nevada, SCHON S. LEVY (LANL)

Mineral Evolution in Yucca Mountain, Nevada, CLARENCE J. DUFFY (LANL)

Distribution of Fracture-Lining Minerals in the Topopah Spring Tuff at Yucca Mountain, BARBARA CARLOS, DAVID BISH, STEVE CHIPERA (LANL)

Radionuclide Migration as a Function of Mineralogy, INES R. TRIAY, ALAN J. MITCHELL, MARTIN A. OTT (LANL)

Compilation/Validation of Thermodynamic Data for Plutonium for Nuclear Waste Disposal, M. D. SIEGEL (SNL), S. L. PHILLIPS, H. NITSCHKE (Univ of California, Berkeley)

# TECHNICAL SESSIONS Tuesday



9:45 a.m.-12 noon

## Unsaturated Zone Hydrology—I

*Regallum Room*

(Presentations will be approximately 20 minutes each)

*Session chairman:* DWIGHT HOXIE (USGS)

**Flow and Transport Around a Noncontinuous Horizontal Layer at Yucca Mountain,** MAUREEN A. MCGRAW (PNL), DAVID W. LANGFORD (Westinghouse Hanford), TERRI B. MILEY (PNL)

**Geoscientific Information Systems (GSIS) and Three-Dimensional Ground-Water Flow Modeling, Yucca Mountain, Nevada,** A. KEITH TURNER, ELISABETH M. ERVIN, JOE S. DOWNEY (USGS)

**Effect of Material Heterogeneities on Flow Through Porous Media,** ROGER R. EATON (SNL)

**Permeability of Rough-Walled Fractures,** ROBERT W. ZIMMERMAN, SUNIL KUMAR, GUDMUNDUR S. BODVARSSON (Univ of California, Berkeley)

**Unsaturated Flow Through Variable Aperture Fractures in Topopah Spring Welded Tuff,** JOHN L. SMOOT, SIGNE K. WURSTNER, MARK FRESHLEY (PNL)

9:45 a.m.-12 noon

## In-Situ and Laboratory Testing

*Nero Room*

(Presentations will be approximately 20 minutes each)

*Session organizer:* JOHN GIBBONS (Applied Resch Assoc-Albuquerque); *Session chairman:* GEORGE DANKO (Univ of Nevada, Reno)

**Modeling of Hydro-Thermal-Mechanical Effects in a Fracture Intersecting a Nuclear Waste Deposition Hole,** JONNY RUTQVIST (Lulea UT-Sweden), JAHAN NOORISHAD (LBL, Berkeley), OVE STEPHANSSON (Lulea UT-Sweden), CHIN-FU TSANG (LBL, Berkeley)

**A Probe Method for In Situ Rock Thermophysical Properties Characterization,** GEORGE DANKO, PIERRE MOUSSET-JONES (Univ of Nevada, Reno)

**Predicted Thermal and Mechanical Environments in the Vicinity of Repository Openings,** STEPHEN J. BAUER (SNL), MICHAEL HARDY (Agapito Assoc)

**Correlation of Hydraulic Conductivity and Sonic Velocity in Water-Saturated Tuff,** MICHITO SHIMO (Taisei Corp)

**Microwave Measurements of the Water Content of Bentonite,** VICTOR R. LATORRE, H. DAVID GLENN (LLNL)

**Laboratory Determined Suction Potential of Topopah Spring Tuff at High Temperatures,** WILLIAM DAILY, WUNAN LIN (LLNL)

12 noon-1:30 p.m.

## Tuesday Luncheon

*Circus Maximum*

*Speaker:* HONORABLE DAVID H. LEROY (Negotiator, Office of the United States Nuclear Waste Negotiator)

1:45 p.m.-2:45 p.m.

## Integrated Systems Plenary

*Colosseum V-VII*

(Presentations will be approximately 30 minutes each)

*Session organizer:* ABRAHAM VAN LUIK (PNL); *Session chairman:* ABRAHAM VAN LUIK (PNL), ALAN CROFF (ORNL)

**Perspectives on Integrating the U.S. Radioactive Waste Disposal System,** FLOYD L. CULLER (EPRI), ALLEN G. CROFF (ORNL)

**Management Systems Improvement Strategy for the Office of Civilian Radioactive Waste Management,** DWIGHT E. SHELOR, H. JACKSON HALE (DOE)

3:00 p.m.-5:15 p.m.

## Utility Regulatory Experience Applied to the High Level Waste Repository Program

*Augustus Room*

(Presentations will be approximately 20 minutes each)

*Session organizers:* SCOTT DAM (Roy F. Weston), MICHAEL BAUSER (Newton & Holtzinger); *Session chairman:* LOUIS B. LONG (Southern Co Svcs), CHRIS J. HENKEL (BEI)

**Licensing Requirements,** WILLIAM C. COUNCIL (TU Electric)

**A Case History of Successful Nuclear Power Plant Licensing,** EDWIN E. VAN BRUNT, JR., JAY L. SMITH (Consultant)

**How Can The St. Lucie 2 Licensing Experience Benefit the Licensing of a Nuclear Fuel Repository,** JOHN A. DEMASTRY (FP&L, Juno Beach)

Panel Discussion

3:00 p.m.-5:15 p.m.

## Transportation Systems—I

*Julius Room*

(Presentations will be approximately 20 minutes each)

*Session organizers:* MARIA ARDILA-COULSON (Univ of Nevada), RUTH WEINER (Western Washington State Univ); *Session chairman:* MARIA ARDILA-COULSON (Univ of Nevada), BILL ANDREWS (SAIC, Las Vegas)

# TECHNICAL SESSIONS Tuesday



Development of Preliminary Nevada Transportation Accident Characteristics, J. J. TAPPEN (Westinghouse, Las Vegas), C. V. HILL, A. HEITZMAN (SAIC, Oak Ridge)

Unintentional Stoppages of High-Level Radioactive Waste Trucks in Nevada, THEODORE S. GLICKMAN (Resources for the Future)

Transportation of Radioactive Materials Routing Analysis: The Nevada Experience, MARIA V. ARDILA-COULSON (Univ of Nevada, Reno)

Development of Rail Access to the Proposed Repository Site at Yucca Mountain, PAUL N. STANDISH (Westinghouse, Las Vegas), PAUL E. SEIDLER (SAIC, Las Vegas), GUI SHEARIN (DeLeuw, Cather)

An Approach to Evaluate the Sufficiency of Highway Bridges for Nuclear Spent Fuel Transportation, M. SAIDI, E. MARAGAKIS, Y. JIANG (Univ of Nevada, Reno)

Transportation Access to Yucca Mountain: Critical Issues, ROBERT J. HALSTEAD (NANP), REGINALD R. SOULEYRETTE, RUSSELL DI BARTOLO (UNLV)

00 p.m.-5:15 p.m.

## Monitored Retrievable Storage

*Tiberius Room*

(Presentations will be approximately 20 minutes each)

*Session organizer and chairman:* JEFF WILLIAMS (DOE)

Rethinking the Economics of Centralized Spent Fuel Storage, THOMAS W. WOOD (PNL), DAVID G. DIPPOLD (Battelle Memorial Inst), SAMUEL R. ROD, S. M. SHORT, J. W. WILLIAMS (PNL)

Preliminary Feasibility Assessment of Several Spent Fuel Transfer Options Suitable for Early Deployment at an MRS, JOHN RICHARDSON, TODD HULL, DAVID BORCHARDT (Roy F. Weston, DC)

MRS Transfer Facility Feasibility Study, ANITA JOWDY (Ralph M. Parsons), RICHARD I. SMITH (PNL)

Industry Experience and Programs that Benefit the MRS Design, IVAN F. STUART, PHIL A. BLEISTINE (Nuclear Assurance Corp)

Early Deployment of the MRS: The Modular Vault Dry Store, ROBERT J. BOSCH, JR. (Foster Wheeler), COLIN C. BOWER (GEC Alsthom-UK)

Design and Operation of a Monitored Retrievable Storage Facility Using Nuhoms Technology, W. J. MCCONAGHY, R. A. LEHNERT, J. M. ROSA (Pacific Nucl Fuel)

3:00 p.m.-5:15 p.m.

## Vitrified Waste Forms Characteristics

*Galba Room*

(Presentations will be approximately 20 minutes each)

*Session organizer:* BOB ZIMMERMAN (Fluor Daniel), CHUCK ALLEN (PNL); *Session chairman:* HERSH K. MANAKTALA (SwRI)

Disposal of Vitrified Waste in an Unsaturated Environment, JOHN K. BATES (ANL)

Durability, Mechanical, and Thermal Properties of Experimental Glass-Ceramic Forms for Immobilizing ICPP High Level Waste, KRISHNA VINJAMURI (WINCO)

Effect of HNO<sub>3</sub>-Cerium (IV) Decontamination on Stainless Steel Canister Materials, R. E. WESTERMAN (PNL)

Mechanistic Interpretation of Glass Reaction: Input to Kinetic Model Development, J. BATES, W. EBERT, J. BRADLEY, W. BOURCIER (ANL)

Exclusion of Foreign Materials in SRS Canistered Waste Forms: Characterization of the Gas within the Free Volume, JOHN R. HARBOUR, THOMAS J. MILLER, MICHAEL J. WHITAKER (Westinghouse SRC)

Economic and Technical Advantages of High-Temperature Processes in High-Level Radioactive Waste Management, ANTOINE JOUAN, NOEL JACQUET-FRANCILLON, MIREILLE CLER (CEA, Bagnols-France)

Properties of Solidified HLW and Their Changes Under Storage and Disposal Conditions, A.S. NIKIFOROV, A.S. POLYAKOV, N.V. KRYLOVA R.N. SALAMATINA, V.I. VLASOV (ALL-Union-Moscow)

3:00 p.m.-5:15 p.m.

## Risk Perception and Public Involvement

*Cladius Room*

(Presentations will be approximately 20 minutes each)

*Session organizers:* MICHAEL LINDELL (Michigan State Univ), JOHN MUNRO (WESTON); *Session chairman:* JOHN MUNRO (WESTON)

The Oregon Experiment: Public Information and Involvement, STEPHEN E. BINNEY, BRIAN DODD (Oregon State Univ), ROBERT W. ROBISON, MARY L. BLAZEK, JANET E. FRANCO (Oregon DOE)

Political Trust's Role in Explaining Nevada Urban Residents' Perceptions of the Proposed Yucca Mountain Repository, MARILYN DANTICO, ALVIN MUSHKATEL, K. DAVID PIJAWKA (Arizona State Univ)

Perceived Risk, Real Risk: Scientific Inquiry and Public Concerns about Nuclear Waste Disposal, WILLIAM R. FREUDENBURG (Univ of Wisconsin, Madison)

Risk Communication: Translating Technically Complex Information to Facilitate Informed Decision-Making, WILLIAM M. SPRECHER (DOE), ELISSA TURNER, MARY U. KRUGER (WESTON TST)

A Structural Model of Public Risk Perception and Public Policy, JAMES FLYNN, WILLIAM BURNS, PAUL SLOVIC (Decision Rsch)

# TECHNICAL SESSIONS Tuesday-Wednesday



**Perceived Risk, Trust in Government, and Response to Repository Siting**, MICHAEL E. KRAFT (Univ of Wisconsin, Green Bay)

3:00 p.m.-5:15 p.m.

## Geotechnical Exploration

*Majestium Room*

(Presentations will be approximately 20 minutes each)

*Session organizer and chairman:* PHILLIP JUSTUS (NRC)

**Major Results of Gravity and Magnetic Studies at Yucca Mountain, Nevada**, H. W. OLIVER, D. A. PONCE, R. F. SIKORA (USGS)

**Geophysical Borehole Logging in the Unsaturated Zone, Yucca Mountain, Nevada**, ULRICH SCHIMSCHAL, PHILIP H. NELSON (USGS)

**Nondestructive Testing Using Spectral Analysis of Surface Waves to Evaluate Rock Mass Damage Zones**, PRISCILLA P. NELSON, KENNETH H. STOKOE II (Univ of Texas, Austin)

**Dry Drilling and Coring Development for Unsaturated Zone Studies**, ROY C. LONG (DOE, Las Vegas), EDDIE L. WRIGHT (Fenix & Scisson), DAVID M. WONDERLY (Reynolds Elect)

**Sample Handling at Apache Leap, Arizona**, JOHN H. DAVIS (SAIC, Las Vegas), JOHN A. HARTLEY (HARZA, Las Vegas), JIM L. MOYER (Westinghouse, Las Vegas), DONNA SINKS (SAIC, Las Vegas)

**Field Investigations for Seismic Effects on Mechanical and Geohydrologic Response of Underground Structures in Jointed Rocks**, S. M. HSIUNG (CNWRA, San Antonio), S. D. MCKINNON (It. Consult), A. H. CHOWDHURY (CNWRA, San Antonio), B. W. VANZANT (Southwest Rsch), J. PHILIP (NRC)

**Geology in the Search for a Disposal Vault Site**, ANTON BROWN, D. CHOUDARI KAMINENI, GLEN MCCRANK (AECL Whiteshell-Canada)

3:00 p.m.-5:15 p.m.

## Unsaturated Zone Hydrology—II

*Regalium Room*

(Presentations will be approximately 25 minutes each)

*Session chairman:* BUDHI SAGAR (CNWRA, San Antonio)

**Boundary Integral Methods for Unsaturated Flow**, M. J. MARTINEZ, D. F. MCTIGUE (SNL)

**Analysis of Solute Transport in an Intermediate-Scale Unsaturated Flow Experiment**, GEDEON DAGAN (Tel Aviv Univ-Israel), EVERETT P. SPRINGER (LANL), VIETCHAU V. NGUYEN (EWA)

**Theory of Fracture-Matrix Flow Regimes in Unsaturated Porous Media**, JOHN J. NITAO (LLNL)

**Effect of a Low-Permeability Layer on Calculated Gas Flow at Yucca Mountain**, N'NG LU, STEVEN AMETER, BENJAMIN ROSS (Disposit Safety)

**Barometric Pumping of Contaminated Gases through Fractured Permeable Media**, ROBERT H. NILSON, EDWARD W. PETERSON, K. H. LIE (S-Cubed, La Jolla)

3:00 p.m.-5:15 p.m.

## Performance Assessment-Scientific Basis and Regulatory Needs

*Nero Room*

(Presentations will be approximately 20 minutes each)

*Session organizer and chairman:* KJELL ANDERSSON (SKI)

**Performance Assessment: The Bridge Between Regulatory Decision-Making and Scientific Uncertainties**, ROBERT M. BERNERO (NRC)

**Key Scientific Issues for Near-Field Performance Assessment**, DAVID P. HODGKINSON, MICHAEL J. APTED (Intera Sciences)

**Advances in the Study of Far-Field Phenomena Affecting Repository Performance**, CHIN-FU TSANG (LBL)

**Process and Criteria for Validation of the Ground-Water Flow Models in the OECD/NEA Stripa Project**, PAUL GNIRK (RE/SPEC)

**Some Conclusions from a Biospheric Model Validation Study**, GUNNAR JOHANSSON, CONNY HAGG (Swedish Radiation Protection Institute), KRISTINA SKAGIUS (Kemakta Consults)

**Development of a Repository Performance Assessment Capability at the U.S. Nuclear Regulatory Commission**, RICHARD CODELL, NORMAN EISENBERG, TIM MCCARTIN (NRC)

Wednesday, May 1, 1991

8:30 a.m.-9:30 a.m.

## Social Systems Plenary

*Colosseum V-VII*

(Presentations will be approximately 30 minutes each)

*Session organizer:* MICHAEL LINDELL (Michigan State Univ); *Session chairman:* SCOTT DAM (Roy F. Weston)

*Speakers:* ELIZABETH PEELE (ORNL)  
PAUL SLOVIC (Decision Rsch)

9:45 a.m.-12 noon

## Regulatory Aspects of Site Characterization

*Augustus Room*

(Presentations will be approximately 30 minutes each)

*Session organizers:* SCOTT DAM (Roy F. Weston), MICHAEL BAUSER (Newton & Holtzinger); *Session chairman:* JOHN LINEHAN (NRC)

# TECHNICAL SESSIONS Wednesday



**Monitoring Compliance with Nuclear Regulatory Commission Requirements during Site Characterization**, D. C. DOBSON (DOE, Las Vegas), C. C. HERRINGTON (SAIC, Las Vegas) A. R. JENNETTA (Westinghouse, Las Vegas)

**Regulatory Requirements and Long-Term Repository Host Rock Performance**, MICHAEL D. VOEGELE (SAIC, Las Vegas), DAVID C. DOBSON, MAXWELL B. BLANCHARD (DOE, Las Vegas)

**Test and Evaluation of Natural Barriers at Yucca Mountain, Nevada: Management of the Site Characterization Program**, MAXWELL B. BLANCHARD, SUSAN B. JONES (DOE, Las Vegas), MICHAEL D. VOEGELE, JEAN L. YOUNKER (SAIC, Las Vegas)

**Analysis of Natural Resources for a Repository License Application**, ROBERT J. WRIGHT (Consultant)

9:45 a.m.-12 noon

## Waste-Package Materials

*Julius Room*

(Presentations, included question and answer periods will be approximately 20 minutes each)

*Session organizer:* BOB ZIMMERMAN (Fluor Daniel);  
*Session chairman:* ROBERT FISH (B&W)

**Degradation Mode Surveys of High Performance Candidate Container Materials**, G. E. GDOWSKI, R. D. MCCRIGHT (LLNL)

**An Electrochemical Approach to Predicting Corrosion Performance of Container Materials**, R. DANIEL MCCRIGHT, JOSEPH C. FARMER, DENNIS L. FLEMING (LLNL)

**Potential Uses of Lead in Nuclear Waste Disposal**, F. E. GOODWIN, S. G. PITMAN, K. H. POOL (PNL)

**Modeling Studies for the Assessment of the Advanced Cold Process Canister**, S. M. SHARLAND, J. HENSHAW, A. R. HOCH (AEA Technol-UK)

**Activities Aimed at Qualification of a HLW Disposal Container**, BERNARD TEPPER (Ontario Hydro-Canada)

**Future Supply of, and demand for, Titanium, Copper, and Lead**, L. K. GROVER (AECL Whiteshell-Canada)

9:45 a.m.-12 noon

## Unsaturated Zone Hydrologic Testing

*Tiberius Room*

(Presentations will be approximately 25 minutes each)

*Session chairman:* KEITH M. KERSCH (SAIC)

**Fracture Flow and Transport Models**, ROBERT J. GLASS, VINCENT C. TIDWELL, L. E. SHEPHARD, M. D. SIEGEL (SNL)

**Variation of Permeability with Temperature in Fractured Topopah Spring Tuff Samples**, WUNAN LIN, WILLIAM D. DAILY (LLNL)

**Alternative Method to Mariotte Reservoir for Maintaining Constant Hydraulic Pressure**, FALAH THAMIR (USGS)

**Pore-Water Extraction from Unsaturated Tuffs Using One-Dimensional Compression**, T. E. MOWER (PRC EM), J. D. HIGGINS (CSM), I. C. YANG (USGS)

9:45 a.m.-12 noon

## Intergovernmental Issues

*Galba Room*

(Presentations will be approximately 20 minutes each)

*Session organizer:* KRISTI BRANCH (Battelle HARC);  
*Session chairman:* K. DAVID PIJAWKA (Arizona State Univ)

**Solving the High-Level (and Low-Level) Radioactive Waste Puzzle**, HERBERT INHABER (Ecol and Environ)

**The Chemical Stockpile Intergovernmental Consultation Program: Lessons for HLW Public Involvement**, DAVID LEWIS FELDMAN (ORNL)

**Effective Intergovernmental Planning to Manage Impacts from Large Scale Projects**, RICHARD C. MOORE (Consultant)

**Opting for Cooperation: A Case Study in Siting a Low Level Radioactive Waste Management Facility**, AUDREY ARMOUR (York Univ-Canada)

**The CVSA Pilot Study of Highway Vehicle Inspections Procedures for the Transportation of Radioactive Materials: Observations About the Institutional Aspects of a CVSA-USDOE Cooperative Effort**, JUDITH HOLM (DOE, Argonne), GARY CURTIS (CVSA), KRISTI BRANCH (Battelle HARC), NANCY L. COBURN (Battelle Columbus Operations), JOSEPH T. HAUTH (Battelle HARC)

**A Consensus Approach to Siting HLW Disposal Facilities**, ROBERT PHILPOTT (DOE), JOHN MUNRO, JONATHAN KATZ, JEFFREY GIBSON (WESTON TST)

9:45 a.m.-12 noon

## Radionuclide Release from the Engineered Barrier System

*Cladius Room*

(Presentations will be approximately 20 minutes each)

*Session organizer and chairman:* WILLIAM W.-L. LEE (Univ of California, Berkeley)

**Source Term Model for Radioactive Waste Repository**, CHANG-LAK KIM, JHINWUNG KIM, IN-SUK SUH (KAERI, Korea)

**Near-field Transport of Radioactive Chains**, C.-H. KANG (KAERI, Choongnam-Korea), P. L. CHAMBRÉ, T. H. PIGFORD, W. W.-L. LEE (Univ of California, Berkeley)

**Validation of Source-term Models Using Natural Analogues**, M. J. APTED (Intera Sciences), D. W. ENGEL (PNL)



# TECHNICAL SESSIONS Wednesday



Potential <sup>14</sup>CO<sub>2</sub> Releases from Spent Fuel Containers at Yucca Mountain, C. PESCATORE, T. M. SULLIVAN (BNL)

MARNIE-A Near Field Transport Model for Radioactive Waste Repositories, H. UHLENBRUCK, B. BALTES, K. -H MARTENS, P. ROMSTEDT (GRS-FRG)

Preliminary Calculations of Release Rates From Spent Fuel in a Tuff Repository, M. J. APTED (Intera Sciences), W. J. O'CONNELL, K. H. LEE, A. T. MACINTYRE, T.-S. UENG (LLNL), T. H. PIGFORD (Univ of California, Berkeley, W. W.-L. LEE (Univ of California, Berkeley)

9:45 a.m.-12 noon

## Assessment and Evaluation of Underground Excavation Techniques

*Majestium Room*

(Presentations will be approximately 20 minutes each)

*Session organizer and chairman:* PIERRE MOUSSET-JONES (Mackay School of Mines)

Laboratory Evaluations of Mechanical Excavator Performance in Yucca Mountain Tuffs, LEVENT OZDEMIR (CSM), F. D. HANSEN (SNL)

The Adoption of Mechanized Excavation Techniques for the Superconducting Super Collider (SSC) Laboratory Facilities, CHRISTOPHER LAUGHTON, PRISCILLA P. NELSON, TRACY K. LUNDIN (SSC)

Principles of the NATM and Other Uses of the Geologic Monitoring Techniques, JOHN D. JENKINS, H. J. SANDER (ILF Consults)

Geological Mapping of Bored Excavations, HARVEY PARKER, GERRY MILLER (Shannon & Wilson), JAMES FRIENT (Robbins Co)

Risk Assessments for the Design of Sub-Surface Openings, DAE S. YOUNG (Michigan Tech Univ)

9:45 a.m.-12 noon

## Waste Management System Development

*Regalium Room*

(Presentations will be approximately 20 minutes each)

*Session organizers:* GORDON BEEMAN (PNL), BARRIE MCLEOD (ER Johnson & Assoc); *Session chairmen:* BARRIE MCLEOD (ER Johnson & Assoc), GORDON BEEMAN (PNL)

The Delivery Commitment Schedule Process, SCOTT A. VANCE (PNL)

Tools for LWR Spent Fuel Characterization: Assembly Classes and Fuel Designs, R. SCOTT MOORE, KARL J. NOTZ (ORNL)

Effects of Spent Fuel Aging on Repository Disposal Requirements, ROBERT W. MCKEE, KENNETH I. JOHNSON, HARLAN D. HUBER, MARK C. BIRSCHBACH (PNL)

Evaluation of Alternative MGDS Development Strategies, W. ROBERDS, I. MILLER, D. CALDWELL (Golder Assoc)

System Selection of Concepts for Direct Disposal of Spent Fuel, K. EINFELD (Consultant), K. D. CLOSS, U. KNAPP (KfK-FRG)

Determination of Cost Effective Waste Management System Receipt Rates, ROBERT W. MCKEE, HARLAN A. HUBER (PNL)

9:45 a.m.-12 noon

## Performance Assessment - Case Studies

*Nero Room*

(Presentations will be approximately 20 minutes each)

*Session organizer and chairman:* ALBIN BRANDSTETTER (SAIC)

Conclusions from Project-90 With Regard to a Regulatory Framework, KJELL ANDERSSON (SKI-Sweden)

The Integrated Performance Assessment in SKI Project-90, JOHAN ANDERSSON, KJELL ANDERSSON, TORBJORN CARLSSON, FRITZ KAUTSKY, SOREN NORRBY, BENNY SUNDSTROM, STIG WINGEFORS (SKI-Sweden)

CALIBRE-A Near-Field Model For Project-90, PETER C. ROBINSON, KAREN J. WORGAN (Intera Sciences), STIG WINGEFORS (SKI-Sweden)

Status of WIPP Compliance with EPA 40 CFR 191, December 1990, MEL G. MARIETTA, S. G. BERTRAM-HOWERY, R. P. RECHARD, D. R. ANDERSON (SNL)

Performance Assessment Computational Exercises PACE-90: Overview and Summary, RALSTON W. BARNARD, HOLLY A. DOCKERY (SNL)

Preliminary Performance Assessment of a Nevada Test Site Waste Disposal Facility, LAURA L. PRICE, NATALIE E. OLAGUE (SNL), D. A. ZIMMERMAN (GRAM)

12 noon-1:30 p.m.

## Wednesday Luncheon

*Maximum*

*Speaker:* DR. E. LINN DRAPER, JR. (Chairman, President and CEO, Gulf States Utilities Company) — tentative

1:45 p.m.-5:00 p.m.

## Implementation of Selected Regulatory Processes

*Augustus Room*

(Presentations will be approximately 20 minutes each)

*Session organizers:* SCOTT DAM (Roy F. Weston), MICHAEL BAUSER (Newton & Holtzinger); *Session chairman:* GERALD J. PARKER (DOE)

# TECHNICAL SESSIONS Wednesday



**Regulatory Systems-Based Licensing Guidance Documentation, MARK STEPHEN DELLIGATTI (NRC)**

**The Licensing Support System: Institutional Challenges and Opportunities, FRANCIS X. CAMERON (NRC)**

**The Licensing Support System (LSS): Who Should Operate it and Will It Work? MARY L. MACNABB (UNLV), CHRIS PFLUM (SAIC, Las Vegas)**

**Application of QA Program for YMP Geologic Investigations, RAM B. MURTHY (DOE, Las Vegas), STEVEN C. SMITH (SAIC, Las Vegas)**

**Application of TQM to the Waste Management QA Regulatory Arena, TOM COLANDREA, CAROL GREEBLER (Adtech)**

**1:45 p.m.-5:00 p.m.**

## Transport Cask Testing and Analyses

*Julius Room*

(Presentations will be approximately 25 minutes each)

*Session organizers: WILLIAM LAKE (DOE), THOMAS L. SANDERS (SNL); Session chairmen: THOMAS L. SANDERS (SNL), WALTER MINGS (DOE, Idaho)*

**Drafting of an International Standard on Leak Tests of Packagings Intended for the Transport of Radioactive Materials, LOUIS TANGUY (CEA-France)**

**Cask System Development Program Seal Technology, MARCELLA M. MADSEN, DAVID L. HUMPHREYS, KEN R. EDWARDS (SNL)**

**Scoping Experimental Analysis of Factors Affecting Cask Contamination Weeping, P. C. BENNETT (SNL), J. F. KUNZE (Univ of Missouri-Columbia), B. M. RUTHERFORD (SNL)**

**Testing of Materials and Scale Models for Impact Limiters, ARUP K. MAJI, D. SATPATI, H. L. SCHREYER (Univ of New Mexico)**

**GA-4/GA-9 Honeycomb Impact Limiters Tests and Analytical Model, MARIA A. KOPLOY, CHARLES S. TAYLOR (General Atomics)**

**Comparison of Elastic with Inelastic Analysis Results for the Defense High Level Waste Shipping Cask, A. ZIMMER, M. KOPLOY (General Atomics), M. M. MADSEN (SNL)**

**1:45 p.m.-5:00 p.m.**

## Saturated Zone Hydrology

*Tiberius Room*

(Presentations will be approximately 25 minutes each)

*Session organizer and chairman: DON CHERY (NRC)*

**Location and Assessment of Groundwater Discharge, DAVID ROBERT LEE, GWEN M. MILTON, R. JACK CORNETT, STEPHEN J. WELCH (AECL Chalk River-Canada)**

**An Empirical Data Base for the Investigation of Earthquake-Related Changes in Crustal Hydrology, ROBERT MUIR WOOD (YARD-United Kingdom)**

**Shaft Excavation Effect Experiment, Y. YANAGISAWA, H. IMAI, M. YAMAKAWA (PNC, Gifu-Japan), H. SAKUMA, H. KAWAMURA (PNC-Japan)**

**Three-Dimensional Groundwater Flow Modeling for a Potential Repository Site, KURT MELING, VEIKKO TAIVASSALO (Tech Rsch Ctr-Finland)**

**Two Double Porosity Models for Groundwater Radioactive Contamination, P. J. PAES-LEME (IPRJ-Brazil), C. MALAMUT, A. S. PASCHOA, E. PONTEDEIRO, S. SAAD (CNEN-Brazil)**

**Flow Heterogeneity and Site Evaluation: Conclusions from an OECD/Nea Workshop, DANIEL A. GALSON (OECD-France)**

**1:45 p.m.-5:00 p.m.**

## Institutional Approaches to Resolving Technical Issues

*Galba Room*

(Presentations will be approximately 20 minutes each)

*Session organizer and chairman: KRISTI BRANCH (Battelle HARC)*

**The Last 12 Months at Yucca Mountain, CARL P. GERTZ (DOE, Las Vegas)**

**Perils of Project Development on Public Land Open to Mining, WILLIAM R. JACOBS (SAIC, Las Vegas)**

**Being Responsive and Getting the Job Done Right, PAUL E. SEIDLER, WILLIAM B. ANDREWS (SAIC, Las Vegas), PAUL N. STANDISH (Westinghouse, Las Vegas), KATHLEEN F. GRASSMEIER (DOE, Las Vegas)**

**Seeking Common Ground: Western Governors' and the WIPP Transport Campaign, ROBERT W. ROBISON (Oregon DOE)**

**Impact of External Comments on DOE's Site Characterization Plan (SCP) and Integration with the Planned Geotechnical Program, THOMAS W. BJERSTEDT (DOE, Las Vegas), APRIL V. GIL, FRANK J. JORD (SAIC, Las Vegas)**

**Recent Case Studies in Cooperation with External Groups, J. BENNETT EASTERLING (DOE), MILLARD PECK III, MARY U. KRUGER (WESTON TST)**

**An Integrated Systems Approach to Institutional/Technical Program Milestone Planning and Implementation, ROBERT E. PHILPOTT (DOE), PAT VAN NELSON, TODD HANSEN (WESTON)**

**OCRWM'S Strategic Planning Process and the 1990 Plan, WILLIAM M. SPRECHER (DOE), JOHN F. MUNRO, DONALD L. CHAMPAGNE (WESTON TST)**

# TECHNICAL SESSIONS Wednesday



The Federal Disposal System: The Program May Succeed But The Ratepayers Have and Will Pay, MICHAEL WILSON (Florida Public Svcs)

1:45 p.m.-5:00 p.m.

## Near-Field Processes Affecting the Engineered Systems

*Claudis Room*

(Presentations will be approximately 20 minutes each)

*Session organizer:* WILLIAM W.-L. LEE (Univ of California, Berkeley); *Session chairman:* MICHAEL O. CLONINGER (DOE, Las Vegas)

Near Field Environment Characteristics, DALE G. WILDER (LLNL)

Modeling of Excavation, Thermal Loading and Bentonite Swelling Pressure of a Radioactive Waste Repository, OVE STEPHANSSON, BAOTANG SHEN (Lulea UT-Sweden), JOSE LEMOS (Itasca Geomekanik-Sweden)

Apparent and Simple Diffusion Coefficients in Compacted Bentonite, J. L. CONCA (Washington State Univ Tri-Cities, Richland), T. ASHIDA, H. SATO (PNC-Japan)

An Analysis of Buffering in Bentonite-Groundwater Systems, R. C. ARTHUR, M. J. APTED (Intera Sciences), H. UMEKI, H. TAKASE, M. YUI (PNC-Japan)

Diffusive Barrier Simplified Analysis: Design and Sensitivity Applications, W. J. O'CONNELL, T.-S. UENG (LLNL)

Effect of Ionizing Radiation on the Waste Package Environment, D. T. REED (ANL), R. A. VAN KONYNENBURG (LLNL)

Estimation of Geochemical Behavior of Concretes Placed at Yucca Mountain, THOMAS E. HINKEBEIN (SNL), A. GARDINER (IT Corp, Albuquerque)

Theory and Methods of Design of Underground Structures, NIKOLAY S. BULYCHEV, NINA N. FOTIEVA (Tual Polytechnical Inst-USSR)

1:45 p.m.-5:00 p.m.

## Geochemistry—II

*Majestium Room*

(Presentations will be approximately 20 minutes each)

*Session organizer and chairman:* DONALD E. LIVINGSTON (DOE, Las Vegas)

Preliminary Isotopic Data on Unsaturated-Zone Flows at Yucca Mountain, Nevada, IN CHE YANG (USGS)

Natural Radionuclides in Groundwater from J-12 Well Near Yucca Mountain, Nevada, J. C. LAUL (Rockwell Int), D. E. LIVINGSTON (DOE, Las Vegas)

Isotopic Discontinuities in Ground Water Beneath Yucca Mountain, Nevada, J. S. STUCKLESS, J. F. WHELAN, W. C. STEINKAMPF (USGS)

Distribution of Rubidium, Strontium, and Zirconium in Tuffs from Two Deep Coreholes at Yucca Mountain, Nevada, R. W. SPENGLER, Z. E. PETERMAN (USGS)

Strontium Isotopes in Carbonate Deposits at Crater Flat, Nevada, BRIAN D. MARSHALL, ZELL E. PETERMAN, KIYOTO FUTA, JOHN S. STUCKLESS (USGS)

An Evaluation of Evidence Pertaining to the Origin of Vein Deposits Exposed in Trench 14, Nevada Test Site, Nevada, J. S. STUCKLESS (USGS)

1:45 p.m.-5:00 p.m.

## Environmental Resource Assessments and Modeling

*Regalium Room*

(Presentations will be approximately 20 minutes each)

*Session organizer and chairman:* GREGORY A. FASANO (SAIC)

General Circulation Models: Applications for Nuclear Waste Repositories, WAYNE M. WENDLAND (Illinois SWS)

Archaeological Program for the Yucca Mountain Site, LONNIE C. PIPPIN, DAVID E. RHODE (Desert Rsch Inst)

Management and Research of Dessert Tortoises for the Yucca Mountain Project, KURT R. RAUTENSTRAUCH, MIKE K. COX, TED B. DOERR, RON A. GREEN, TOM P. O'FARRELL, DANNY L. RAKESTRAW (EG&G Energy, Las Vegas)

Assessing Impacts of Site Characterization Activities on the Biological Resources at Yucca Mountain, Nevada, RON A. GREEN, TED B. DOERR, TOM P. O'FARRELL, W. KENT OSTLER, KURT R. RAUTENSTRAUCH, MIKE K. COX, CATHY A. WILLS (EG&G Energy, Las Vegas)

The Reclamation Program for the Yucca Mountain Project, W. KENT OSTLER, TOM P. O'FARRELL, BRAD W. SCHULTZ (EG&G Energy, Las Vegas)

The Geomorphic Stability of Yucca Mountain, JOHN W. WHITNEY (USGS), CHARLES D. HARRINGTON (LANL)

1:45 p.m.-5:00 p.m.

## Performance Assessment-Scenarios and Uncertainties

*Nero Room*

(Presentations will be approximately 30 minutes each)

*Session chairman:* HARALD AHAGEN (Consultant)

Preliminary Assessment of the Impact of Conceptual Model Uncertainty on Site Performance, D. P. GALLEGOS, P. I. POHL, N. E. OLAGUE (SNL), R. G. KNOWLTON, C. D. UPDEGRAFF (GRAM)

Scenarios and Performance Assessment Exercises: Details of the Big Picture, GEORGE E. BARR, RALSTON W. BARNARD, HOLLY A. DOCKERY, ELLEN DUNN (SNL), ANNETTE T. MACINTYRE (LLNL)

# TECHNICAL SESSIONS Wednesday-Thursday



**Disruptive Scenario Aspects Important to Source Term Performance**, A. T. MACINTYRE, D. CHESNUT, K. H. LEE, W. J. O'CONNELL (LLNL)

**Sensitivity and Uncertainty Analysis of EBS System Performance**, R. M. THATCHER, K. H. LEE, W. J. O'CONNELL, T.-S. UENG (LLNL)

**A Formalism to Generate Probability Distributions for Performance-Assessment Modeling**, PAUL G. KAPLAN (SNL)

**Characterization Uncertainty and Its Effects on Models and Performance**, C. A. RAUTMAN, A. H. TREADWAY (SNL)

**Thursday, May 2, 1991**

**8:30 a.m.-10:45 a.m.**

## Transportation Systems—II

*Julius Room*

(Presentations will be approximately 20 minutes each)

*Session organizers:* MARIA ARDILA-COULSON (Univ of Nevada), RUTH WEINER (Western Washington State Univ);  
*Session chairman:* RUTH WEINER (Western Washington State Univ)

**Site and Facility Waste Transportation Services Planning Documents SPD's**, LARRY DANESE, STEVE SCHMID (SAIC, Oak Ridge), J. E. RATLEDGE (ORNL)

**Historical Overview of Domestic Spent Fuel Shipments--An Update**, R. B. POPE, M. W. WANKERL (ORNL), CHERYL HAMBURGER, S. SCHMID, SUSAN ARMSTRONG (SAIC, Oak Ridge)

**An Approach to Assessing the Impacts of Incident-Free Air and Highway Transportation of Radioactive Materials**, RUTH F. WEINER (Western Washington Univ), PATRICK A. LAPLANTE, JOHN P. HAGEMAN (SwRL)

**Transportation Capabilities of the Existing Cask Fleet**, P. E. JOHNSON, D. S. JOY, M. W. WANKERL (ORNL)

**A Preliminary Evaluation of the Ability of From-Reactor Casks to Accommodate Commercial LWR Spent Nuclear Fuel**, D. ANDRESS (Andress & Assoc), D. S. JOY (ORNL), N. B. MCLEOD (Johnson Assoc), R. W. PETERSON (SAIC, Oak Ridge), M. RAHIMI (Roy F. Weston, DC)

**The Radiological Capacity of Transport Casks Loaded in a 2-Region Non-Uniform Pattern**, N. BARRIE MCLEOD (Johnson Assoc)

**8:30 a.m.-10:45 a.m.**

## Socioeconomic Impact Assessment

*Galba Room*

(Presentations will be approximately 20 minutes each)

*Session organizers:* ELIZABETH PEELE (ORNL), K. DAVID PIJAWKA (Arizona State Univ); *Session chairman:* ELIZABETH PEELE (ORNL)

**Toward Linking Demographic and Economic Models for Impact Assessment**, CHRISTOPHER A. WILLIAMS, CHRISTOPHER D. MEENAN (SAIC, Las Vegas)

**Forecasting Behavioral Response to be Repository from Stated Intent Data**, DOUGLAS EASTERLING, HOWARD KUNREUTHER, VICKI MORWITZ (Univ of Pennsylvania)

**Circuitous Routings: Integration of Public Acceptability with Technical & Economic Feasibility**, MIKE L. BAUGHMAN (Intertech), GLENN VAN ROEKEL (City of Caliente)

**Payments-Equal-To-Taxes (PETT): The Department of Energy's Response to Sections 116 (c) (3) and 118 (d) (4) of the Nuclear Waste Policy Act, as Amended**, ALLEN BENSON (DOE), ROBERT LESKI, ERIC MOORE (Deloitte & Touche)

**Some Political Logistics of Nuclear Waste**, ALLAN G. PULSIPHER (Louisiana State Univ)

**8:30 a.m.-10:45 a.m.**

## Thermal Considerations in Underground Design

*Cladius Room*

(Presentations will be approximately 20 minutes each)

*Session organizer:* BOB ZIMMERMAN (Fluor Daniel);  
*Session chairman:* HYWELL G. LEWIS (BNFL)

**The MD Design-A Cool Concept for HLW Storage and Disposal**, LEIF G. ERIKSSON (Golder Assoc)

**Emplacement Drift Temperature Reduction by Cooling Enhancement and Ventilation**, GEORGE DANKO (Univ of Nevada, Reno)

**Three-Dimensional Thermal Analysis**, AHMAD BADIE (United Soil), M. C. WANG (Penn State)

**The Constructive Use of Heat in an Unsaturated Tuff Repository**, LAWRENCE D. RAMSPOTT (LLNL)

**System Analysis Dual-Purpose Repository: New Results of Temperature Calculations**, ENRIQUE ADOLFO BIURRUN, JURGEN PETER LEMPERT, HANS-JURGEN ENGELMANN (DBE-FRG)

**8:30 a.m.-10:45 a.m.**

## Underground Mechanical Excavation Techniques and Technology

*Majestium Room*

(Presentations will be approximately 20 minutes each)

*Session organizer:* PIERRE MOUSSET-JONES (Mackay School of Mines); *Session chairman:* JAAX DAEMEN (Mackay School of Mines)

**The Technical Challenge of Mechanized Excavation for Nuclear Waste Repositories**, ANTHONY IVAN SMITH (Tunnelling Tech Corp)



# TECHNICAL SESSIONS Thursday

Recent Development in the Design of Hard Rock Tunnel Boring Machines for the Mining Industry, LARRY SNYDER (Snyder Eng), RICK LOVAT (ITE-Canada) ROBERT WILLIAMS (ITE, Lakewood)

Shaft Boring Machine (SBM) Operation, THOMAS M. GOODELL (Redpath Eng)

Mechanical Tunnel Excavation in Welded Tuff, P. E. SPERRY (Sperry Consult)

Construction and Estimating Techniques for Development and Production Using Roadheaders, DAVID M. NEIL (Neil Assoc), DAN TAYLOR (Mackay School of Mines)

Design, Selection and Application of Disc Cutters in Hard and Abrasive Rock, ING W. WEBER (WIRTH)

8:30 a.m.-10:45 a.m.

## Interim Storage

*Regalium Room*

(Presentations will be approximately 20 minutes each)

*Session organizer and chairman:* ALAN G. CROFF (ORNL)

Dry Spent Fuel Storage in the 1990s, JOHN P. ROBERTS (NRC)

A Proposed Regulatory Guide Basis for Spent-Fuel Decay Heat, O. W. HERMANN, C. V. PARKS, J. P. RENIER (ORNL)

Evaluation of Storage/Transport Options to Support Criteria Development for the Phase I MRS, K. B. SORENSON, N. N. BROWN, P. C. BENNETT (SNL), WILLIAM H. LAKE (DOE)

Spent Fuel Storage Cask Testing at the Idaho National Engineering Laboratory, L. E. ESLINGER, R. C. SCHMITT (EG&G Idaho)

Interim Storage of Solidified High Level Wastes, P. D. OZARDE, D. S. RANA, S. D. MISRA, M. S. KUMRA (BARC-India)

Interim Waste Storage for the Integral Fast Reactor Fuel Cycle Demonstration, ROBERT W. BENEDICT, DUANE W. CONDIFF, ROBERT D. PHIPPS (ANL)

8:30 a.m.-10:45 a.m.

## Performance Assessment-System Analysis

*Nero Room*

(Presentations will be approximately 20 minutes each)

*Session organizer and chairman:* J. R. DYER (DOE, Las Vegas)

Uncertainty Analysis of Preclosure Accident Doses for the Yucca Mountain Repository, C. W. MA, D. D. MILLER (Bechtel National, San Francisco), L. J. JARDINE (LLNL)

A Decision Support System for Performance-Based Site Characterization, TIMOTHY G. BARBOUR, M. JOSEPH LOCKERD (SAIC, Golden)

A High-Level Waste Repository Performance Assessment Methodology, ROBERT A. SHAW (EPRI), ROBIN MCGUIRE (Risk Eng), J. CARL STEPP, ROBERT F. WILLIAMS (EPRI)

Site-Generie Approach for Performance Assessment of HLW Disposal System in Japan, H. UMEKI (PNC-Japan), K. ISHIGURO, H. TAKASE (PNC R&D-Japan), N. SASAKI (PNC-Japan), SUMIO MASUDA (PNC R&D-Japan)

Total-System Analyzer for Performance Assessment of Yucca Mountain, J. C. CUMMINGS, M. L. WILSON, F. C. LAUFFER (SNL), N. B. ZIEMAN (Spectra Rsch)

A Parametric Model for Total-System Performance Assessment, MICHAEL L. WILSON (SNL)

11:00 a.m.-12:30 p.m.

## Rapporteur Session

*Colosseum V-VII*

*Session organizer and chairman:* Lloyd W. McClure (WINCO)

Panel Discussion

# FIELD TRIP



**FRIDAY, MAY 3, 1991 7:30 a.m.-6:00 p.m.**

## **YUCCA MOUNTAIN PROJECT**

An all-day trip to Yucca Mountain in the Nevada desert.

If you intend to take this special trip, for security reasons you **MUST** supply the information required below and mail, with your registration form, by **MARCH 20, 1991**.

☐ Male  
☐ Female

Last Name \_\_\_\_\_ First Name \_\_\_\_\_ Middle Initial (If no MI write NMI) \_\_\_\_\_

Social Security No. \_\_\_\_\_ Date of Birth \_\_\_\_\_

Job Title \_\_\_\_\_ Company Name \_\_\_\_\_

Company Address \_\_\_\_\_

Telephone No. \_\_\_\_\_

Home Address \_\_\_\_\_

Telephone No. \_\_\_\_\_

Citizenship \_\_\_\_\_

For Non U.S. Citizens, the Additional Information Is Required

Passport No. \_\_\_\_\_ Date of Issue \_\_\_\_\_ Date of Expiration \_\_\_\_\_

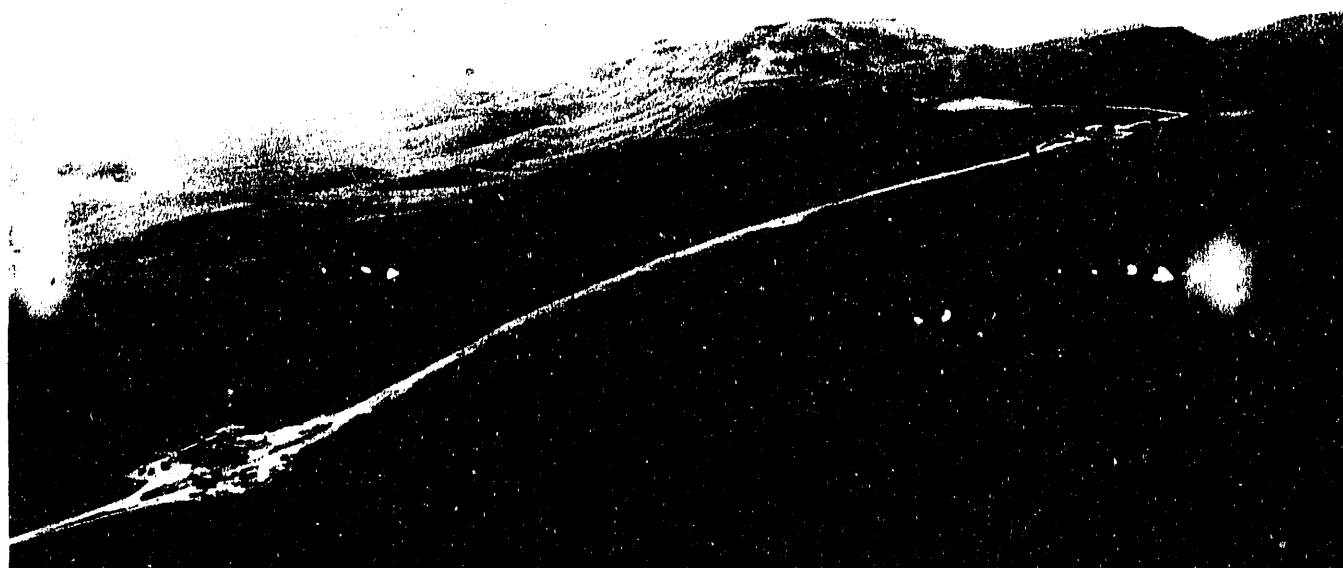
Visa Issued at \_\_\_\_\_ Date of Issue \_\_\_\_\_

Port of Entry to U.S. \_\_\_\_\_ Date of Entry \_\_\_\_\_ Place of Birth \_\_\_\_\_

Mail with your registration form to: ASCE, 345 E. 47th Street, New York, N.Y. 10017 - FAX # 1-212-421-1826

*THIS PAGE MAY BE REPRODUCED*

**NOTE: MARCH 20, 1991 IS THE DEADLINE FOR RECEIPT OF THIS FORM ONLY.**



*Yucca Mountain*

# SPECIAL EVENTS

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## **WELCOME RECEPTION/ICEBREAKER PARTY**

**SUNDAY, APRIL 28, 1991, 6:30 P.M. - 8:00 P.M.**

"Getting to know you" might be another name for this happy event. Breaking the ice will be the order of the day, both literally and figuratively, as you get a chance to meet with old friends and make new acquaintances in a relaxed, convivial atmosphere. It's a great way to kick off your participation in the conference.

Price \$25.00 (extra tickets only)

No charge to conference registrants.

## **RECEPTION — UNIVERSITY OF NEVADA AT LAS VEGAS**

**MONDAY, APRIL 29, 1991, 6:00 P.M. - 7:30 P.M.**

Air conditioned motorcoaches will begin departure at 6:00 p.m. for the University of Nevada at Las Vegas Campus. Enjoy cocktails and hors d'oeuvres with your friends and associates in these wonderful surroundings.

Price \$30.00 (extra tickets only)

Included in Registration fee for all registrants.

# EXHIBITION

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One of the highlights of the International High Level Radioactive Waste Conference will be an exhibition of the latest state-of-the-art equipment products and services. Over 50 leading companies serving or related to high level radioactive waste management will be on hand when the industry's decision makers, specifiers and buyers gather at Caesars Palace.

### **EXHIBIT HOURS**

**Sunday, April 28**  
(Includes Icebreaker Party)

**6:30 p.m. — 8:00 p.m.**

**Monday, April 29**

**10:00 a.m. — 2:00 p.m.**

**4:00 p.m. — 6:00 p.m.**

**Tuesday, April 30**

**10:00 a.m. — 12 Noon &**

**4:00 p.m. — 6:00 p.m.**

**Wednesday, May 1**

**10:00 a.m. — 12 Noon**

**4:00 p.m. — 6:00 p.m.**

For further information, contact IHLRWM Exhibit Management, American Society of Civil Engineers, 345 E. 47th Street, New York, New York 10017 -- Tel: 1 (212) 705-7543.



## SECOND INTERNATIONAL HIGH LEVEL RADIOACTIVE WASTE MANAGEMENT CONFERENCE REGISTRATION FORM

Fill In Completely Please Print Clearly

First Name	Last Name
Title	
Company	
Address	
City/State	Zip Code
Tel. No.	

Address While Attending Convention  
(Hotel, Home, etc.)

Spouse First Name (If attending)  
(Telephone)

### REGISTRATION FEES

	PRE REG before March 23	ON SITE after March 23	AMOUNT
<b>Reg. 1 Conference Weekly Registration</b> (Includes Icebreaker, Two Luncheons, UNLV Reception, Yucca Mountain Project, Conf. Proceedings)	\$370.00	\$420.00	\$
<b>Reg. 2 Conference Daily Registration</b> ONE DAY Circle Day: Mon. Tue. Wed. Thurs.	\$100.00 Per Day	\$150.00 Per Day	\$

### ACTIVITIES

	Price	No. Req.	Amount
<b>Sunday, April 28, 1991</b>			
A. Icebreaker Party (Extra Tickets).....	\$25.00		\$
<b>Monday, April 9, 1990</b>			
B. UNLV Reception (Extra Tickets).....	\$30.00		\$
<b>Tuesday, April 30, 1991</b>			
C. Conference Opening Luncheon (Extra Tickets)	\$25.00		\$
<b>Wednesday, May 1, 1991</b>			
D. Conference Luncheon (Extra Tickets)	\$25.00		\$
<b>Friday, May 3, 1991</b>			
E. Yucca Mountain Project (If attending this function please indicate) CONFERENCE REGISTRANTS ONLY * Restrictions Apply — See Page 19	NC		NC

NOTE: All of the above items are included in the Weekly Registration Fees as indicated above. PLEASE CHECK ONLY IF YOU ARE PURCHASING EXTRA TICKETS FOR ANY GIVEN FUNCTION.

Total \$

Please complete if paying by Credit Card: Payment Assured by my Credit Card  
(☐ American Express ☐ Visa ☐ MasterCard ☐ Diners Club)

Credit Card Number \_\_\_\_\_ Expiration Date \_\_\_\_\_

Make checks payable to ASCE and send to: Convention Department, ASCE, 345 East 47th Street, New York, New York 10017.  
All checks should be in U.S. Dollars and drawn on U.S. Banks.



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# HOTEL RESERVATION FORM

## IHLRWM Conference & Exhibit

### April 28-May 2, 1991

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ATTACHMENT A

Information Clips for the International  
High Level Radioactive Waste Management Conference

NOTE: Copies of a videotape containing all television news broadcasts about the Conference are available from Beatrice Reilly, Deputy Manager, Office of Institutional & External Affairs, SAIC, 702-794-7761

# Yucca Mountain chief criticizes Miller

By Keith Rogers  
Review-Journal

The federal government's Yucca Mountain Project manager retaliated Wednesday against what he described as Gov. Bob Miller's "harsh assessment" of the Department of Energy's effort to design and locate a high-level nuclear waste repository in Nevada.

Yucca Mountain chief Carl Gertz, speaking to a room full of scientists attending a conference at Caesars Palace, said he was offended by Miller's reference to the Energy Department's "Keystone cop scientists," who are trying to determine if Yucca Mountain, 100 miles northwest of Las Vegas, is suitable to safely store nuclear waste for 10,000 years.

"I take pride in working with scientists on the Yucca Mountain Project who are world-class scientists and engineers, highly skilled, extremely competent, and conscientious. They are not 'inept Keystone cops,' and as a Nevadan myself, I apologize to them for the insult hurled at them by my governor on Monday," Gertz said.

On Monday, at the opening session of the second annual International High Level Radioactive

Waste Management Conference, Miller accused the Energy Department and its scientists of mismanagement and lying about their readiness to study the proposed repository.

In his speech, Gertz raised a question about whether Miller would feel differently toward the Interior Department if it were running the Yucca Mountain project instead of the Energy Department.

Miller, in a telephone interview, said Gertz's point is moot.

"They (Energy Department officials), in fact, do have the policy and they have made the mistakes outlined by the General Accounting Office," Miller said.

The GAO, a non-partisan congressional agency that conducts federal audits, issued a report last month that concluded Nevada's refusal to provide permits for the Energy Department to study Yucca Mountain did not affect the studies until February this year because the Energy Department was not ready to begin work until then.

The GAO also reported that \$48 million spent on obtaining rock samples from bore holes and

trenches for the Yucca Mountain study was mismanaged because custody of the samples was not properly documented.

"I laugh when they try and consistently say the Screw Nevada Amendment (to the Nuclear Waste Policy Act) was totally beyond their control. As far as I'm concerned, they weren't lobbying against this process that comes down to a single (repository) site," Miller said. "Perhaps we've touched a nerve."

Gertz said, "The issue is not the Department of Energy, it is not a recent GAO report, it is not the competence of scientists or bureaucrats. Rather, it is contrary to the governor's assertion, precisely a 'not-in-my-backyard' reaction."

Gertz went on to outline the accomplishments of the Yucca Mountain Project during the last 12 months.

The "challenges" that Gertz listed, included "adamant state opposition, intense media attention, complex science and an uncertain budget."

He said he believes it will take litigation and probably legislation to bypass Nevada's reluctance

to act on permit applications that the Energy Department needs to conduct scientific studies at Yucca Mountain. In addition, the Bush administration needs support to obtain financial resources for the project, which means Congress will have to provide funds.

"Without these, the repository program will become stalled and the nuclear power option will become less viable as part of the national energy strategy," Gertz said.

Andrew Kadak, president and chief executive officer of Yankee Atomic Electric Co., which owns the oldest operating U.S. nuclear reactor, a 30-year-old plant in Massachusetts, agreed.

"We really can't sit idly by and hope that something happens," Kadak told a luncheon gathering at the conference Wednesday.

Without a dump for high-level waste by 1988, between 20 and 25 operating reactors will be out of space to store spent nuclear fuel rods, he said. And by 2010, the target date for opening Yucca Mountain for deep geological disposal of spent fuel rods, 66 reactors will be out of space to store them, Kadak said.

# Anybody want a nuke waste dump?

Governors will get an invitation in the mail

## ASSOCIATED PRESS

The nation's governors will find something in their mailboxes next week most would probably rather not see — a how-to kit on making their state the site of the nation's high-level nuclear waste dump.

The man whose job it is to sell some state, territory or Indian reservation on the benefits of storing highly radioactive waste from nuclear power plants begins his unenviable task in earnest Friday with a mailing of informational material to governors across the country.

David Leroy has 20 months to accomplish what most would think is "mission impossible" — come up with someone, somewhere, who thinks the benefits of hosting a nuclear waste dump outweigh the

dump site at Yucca Mountain, about 90 miles from Las Vegas.

"I'm very encouraged by what I've seen in the last seven months," Leroy said. "I'm optimistic we will be able to begin some preliminary dialogues, perhaps as early as the end of this year."

Among those wishing him well is Nevada Gov. Bob Miller, who has vigorously fought the Department of Energy's plans to put the dump at Yucca Mountain.

"We're gladly willing to relinquish our place at the head of the line," Miller said. "I wish him all the luck in the world."

Leroy, here to speak before the International High-Level Radioactive Waste Management Conference at Caesar's Palace, said he plans to follow up on the mailing of information

packet with formal invitations in October for governors to discuss the benefits of hosting the waste dump.

Leroy said he will target Indian reservations as well as states and territories, although he said earlier that the dump would not be put on an Indian reservation if the state it is located within objects to it.

As an enticement, Leroy said his office will announce later this month that federal money will be available for any state that wants to study the feasibility of hosting the waste dump. Money and other inducements are expected to eventually be offered to any state willing to host the dump.

Leroy said he has already had inquiries from several dozen organizations or contractors suggesting possible sites, but

admits he has not had any discussions with any political leaders in those states.

"That would be premature to what we're doing now," he said. "Certainly, when the time comes, I would hope that we could have some meaningful discussions with these governors."

Still, Leroy admits, the stigma of hosting a nuclear waste dump is one hard to overcome.

"We have to realize that we exist in a time where environmental concerns have greatly reduced the ease of siting landfills or anything else in America with a waste connotation," he said. "To pretend that high-level nuclear waste is not among the most sensitive of those types of facilities is not to be in touch with reality."

Las Vegas Review-Journal/Wednesday, May 1, 1991

## Non-Nevadans interested in nuke dump

□ Individuals outside the state say they might like to host the repository under consideration in Nevada.

By Keith Rogers  
Review-Journal

Private parties outside Nevada have expressed interest in housing a high level nuclear waste dump, the U.S. nuclear waste negotiator said Tuesday.

"We're not engaged in any official dialogue with any state. There's been merely preliminary inquiries from persons outside Nevada," David Leroy said during an interview following a speech before scientists at a radioactive waste management conference at Caesars Palace.

"We have had other jurisdictions inquire about being a host repository," he said.

Leroy declined to elaborate on his comments or discuss locations the parties were considering.

The news was welcomed by Gov. Bob Miller, who on Monday castigated the Department of Energy for "trying to force the nuclear waste repository on Nevada."

"We'll gladly relinquish our dubious distinction as being the only one in line. We're glad there's another line forming," Miller said Tuesday.

"If they have a state or other location that's readily willing to take the site, I hope that happens. It's great news for the state of Nevada if that was to become a reality. I wish them the greatest success."

Leroy, 43, who was appointed by President Bush in February 1990 and confirmed by the Senate in August, is charged with finding states or Indian tribes that will volunteer to host a

repository for the nation's high-level nuclear waste.

Yucca Mountain, 100 miles northwest of Las Vegas, is the only site the Energy Department has studied for a nuclear waste repository since Congress rewrote the Nuclear Waste Policy Act in 1987, eliminating potential sites in Hanford, Wash., and Deaf Smith County, Texas.

Leroy said his office has received "about four to five dozen" inquiries from consultants, government officials, land owners and developers, but only a few of them have expressed an interest in hosting a nuclear waste repository. Among the 50 or 60 general information requests, "only three or four have had relationships with Native Americans."

"We've had no contact, direct or indirect, with Nevada tribes," said Leroy, a



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former Idaho lieutenant governor and attorney general.

He said his office, which is independent of the Energy Department, will send out letters Friday to all state governors and some 500 tribal leaders, announcing his office is open for business to find hosts for a permanent nuclear waste repository and one or more temporary storage sites, where nuclear waste could be retrieved for disposal.

Carl Gertz, the Energy Department's Yucca Mountain Project manager, said even if a state volunteers to host a repository and Congress accepts the conditions, "it very well may benefit scientific studies at Yucca Mountain, (because) Nevada's criticism of Nevada being the only state being studied would be blunted."

Leroy said the only legal requirement for Congress is the agreement with a volunteer state or tribe be "reasonable" in that it meets safety requirements, applies proven technology and spells out terms for closing the facility.

"The 'reasonableness' will be determined at different points along the process," Leroy said.

Under existing law, a nuclear waste repository could not be located in a state that also has a



**DAVID LEROY**  
Nuclear waste negotiator

temporary storage facility, known as a "monitored retrievable storage" facility.

A state or tribe that volunteers for a repository could reap billions of federal dollars. Already the Department of Energy has spent \$1.2 billion studying Yucca Mountain, and it has estimated it will cost between \$30 billion and \$50 billion to finish studying and building a repository where some 77,000 tons of high-level radioactive

waste from U.S. nuclear reactors can be safely stored for 10,000 years.

Leroy said any jurisdiction could seek grants to assist in determining if it is a viable host for a repository. Feasibility would hinge on potential economic impacts and public acceptance.

"I would expect that over the next few weeks these regulations will be flushed out. My preference is that they be flexible," he said.

In his speech, Leroy said, "The question — presumption if you will — that somebody has to 'want' nuclear waste is almost always followed by the next tough interrogatory: 'Mr. Leroy, you mentioned benefits. How much is the government willing to pay?'"

"When I speak of benefits, I am not talking about traveling from airport to airport with a bag of money. The American people are not and will not be motivated by fiscal bribery," Leroy said.

During the interview, he said, "I'm not looking for a governor to say, 'Yea.' I just want one to say, 'Maybe.'"

Leroy said the letter that will go out to governors and tribal leaders on Friday will contain "a potpourri of intriguing thoughts" about the U.S. nuclear waste program.

# Federal geologist questions theories on Yucca Mountain volcanic history

By Keith Rogers  
Review-Journal

A federal geologist has found evidence that ancient volcanoes within 20 miles of Yucca Mountain erupted in single events, not multiple events, casting doubt that a new eruption would occur in an old crater.

Duane Champion, a geologist with the U.S. Geological Survey in Menlo Park, Calif., told colleagues at a nuclear waste conference this week in Las Vegas that multiple, or polycyclic, volcanic eruptions historically have not occurred near Yucca Mountain as some geologists have theorized.

Instead, he said, evidence shows one cinder cone erupted 3.8 million years ago, a second erupted 1.04 million years ago and the Lathrop Wells cone erupted about 130,000 years ago, all in single events.

This means a slight possibility exists that the next eruption could occur at or near the site of

the proposed Yucca Mountain high-level nuclear waste repository, 100 miles northwest of Las Vegas, instead of at one of the surrounding cinder cones, which Champion said do not have a history of multiple eruptions.

Champion said his assumption is based on volcanic, magnetite minerals contained in 938 core samples he collected from 71 sites near Yucca Mountain in the past three years.

"There aren't many basaltic eruptions near Yucca Mountain, and they seem to occur at 1-million-year intervals, which makes predictions about the time and location of the next eruption difficult," Champion said.

He likened the problem to throwing three darts, each of which land at different sectors on a dart board. To predict where a fourth dart will land is much more difficult than predicting where the 40th dart will land if

39 landed in the same sector.

Bruce Crowe, a volcanologist from the Los Alamos national laboratory in New Mexico who works on the Yucca Mountain Project, said the chances are very slim a volcano will erupt in the next 10,000 years and penetrate the site of the proposed repository.

In fact, the chances are 1 in 100 million that an eruption will occur at Yucca Mountain, and 1 in 10 billion that it will penetrate the repository site, Crowe said during an interview Tuesday.

Nevertheless, he said, Yucca Mountain scientists are studying models based on both multiple-event and single-event scenarios.

Crowe said while Champion had collected many samples, "he has not drilled all field sites at Lathrop Wells."

"I think Duane is trying to make a problem when there isn't one," Crowe said.

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Las Vegas Review-Journal/Tuesday, April 30, 1991

## Governor rips DOE, scientists over nuke dump site issues

□ The governor says the federal agency is lying by saying Nevada has prevented Yucca studies.

By Keith Rogers  
Review-Journal

Gov. Bob Miller delivered a tongue-lashing speech Monday to some 1,000 scientists, accusing them and the Department of Energy of mismanaging their efforts and lying about their readiness to study a proposed high-level nuclear waste repository at Yucca Mountain.

It was the second time Miller has made a critical speech to the International Atomic Energy Agency's Working

grouping of all, exposed a misrepresentation — a lie — told most often by the department."

The "big lie," he said, is that the Energy Department for years has told its scientists, the courts, Congress and the White House that Nevada has prevented studies of Yucca Mountain, 100 miles northwest of Las Vegas, "because we refused to issue certain permits."

The department "blamed expensive delays, not on their own incompetence, but on Nevada's stubbornness," Miller said.

But, he said, the GAO report said Nevada's refusal to provide permits did not affect on-site studies of Yucca Mountain until February, because the



From 1B

Freshman year at college, were violated. As a result, DOE is back to square one, needing to drill and take new samples," Miller said.

Energy Department scientist Jeremy Boak, who confronted the governor as he left the speaker's platform, said the core samples are still useful to scientists even though conclusions derived from them about the mountain's suitability to safely store nuclear waste for 10,000 years could not be used to back any legal arguments raised in court.

Nevertheless, Boak said later that Miller "shouldn't be roasting the scientists."

At the time the samples were taken, the Nuclear Waste Policy Act did not exist, and the scientists were not bound by law to document a chain of custody of the samples, Boak said.

"It's a matter of scientific mis-

takes, not scientific incompetence," Boak said.

Carl Gertz, the Energy Department's Yucca Mountain project manager, also criticized Miller's speech, saying the report by the GAO, a non-partisan congressional agency that conducts federal audits, did not describe as "excessive" the \$480 million that has been spent so far to administer the Yucca Mountain studies.

"GAO didn't view it that way," Gertz said, noting that 100 of the 236 bore holes that have been drilled are still being used.

Gertz said he "absolutely disagrees" with Miller's characterization that the Energy Department lied when it blamed Nevada's stubbornness in acting on permits for delaying the studies.

"While we were not ready officially until 1991, we believe we could have done limited testing a year ago, but the Secretary (of

Energy James Watkins) decided to wait until we got everything in place," Gertz said.

Gertz said a crucial point in licensing Yucca Mountain will come when regulatory agencies debate whether "reasonable assurance" that the repository will not leak radioactive materials is acceptable instead of "absolute assurance."

"Absolute assurance," Gertz said, "might not be achievable" for the required, 10,000-year life of the repository, even though 10,000 years is relatively short in terms of geologic time.

Even to obtain "reasonable assurance," Environmental Protection Agency standards for disposal of high-level radioactive materials might need to be adjusted to fit the licensing system for deep, geologic disposal, Gertz said.

# Radioactive standards not negotiable

By Keith Rogers  
Review-Journal

Compromises in emission standards for radioactive releases from the proposed Yucca Mountain nuclear waste repository that would decrease public safety are not on the bargaining table, an Environmental Protection Agency official said Monday.

While acknowledging that Department of Energy concerns about air and water standards for the proposed repository, 100 miles northwest of Las Vegas, are "legitimate" the official, Ralph Galpin, an EPA engineer from Washington, D.C., said the "general level of protection is not negotiable."

Galpin made his comments after a session on environmental standards at the second annual International High Level Radioactive Waste Management Conference.

During the session, Energy Department official Gerald J. Parker, said the EPA and the Nuclear Regulatory Commission should revise their standards for air emissions of carbon-14, a radioactive isotope that in the dry setting of an underground repository for nuclear waste could escape through fractures and pores in the ground.

Upgrades of the repository design that would keep it within air emission standards would cost an additional \$2.4 billion "with negligible protection for the public," Parker said.

"We believe the EPA and NRC regulators have a handle on the situation and a near-term solution will evolve," he said.

Galpin agreed that radioactive releases to the air and water "don't need to have the same kind of requirements" because of the lesser impacts on humans from

air emissions from a repository. But he emphasized that the EPA is not willing to bend its standards to fit the Energy Department's repository design.

"We're not at all willing to do that. That's like throwing the basketball up in the air and moving the hoop toward it," Galpin said.

EPA standards for radioactive emissions that were developed in 1985, were challenged in court by the Natural Resources Defense Fund, and sent back to the EPA for revision.

The standards created questions about whether storage of radioactive waste in a repository constitutes underground injection, which is governed by a different set of rules. And, there were questions about whether the standards provided adequate protection of the public for 1,000 years, according to Galpin.

# Miller steps up fight against waste at Yucca

By Mary Manning  
LAS VEGAS SUN

The Department of Energy's environmental and safety failures at its nationwide nuclear weapons complex have boosted Nevada's opposition to burying high-level nuclear waste at Yucca Mountain, Gov. Bob Miller said today.

"DOE lied to the public, Congress and even the White House about the true reason for their delays," Miller said, referring to the Energy Department's insistence that the state's refusal to issue environmental permits delayed the Yucca Mountain project.

The governor spoke at the second annual International High Level Radioactive Waste Management conference and exposition in Las Vegas, hosted by UNLV's Howard R. Hughes College of Engineering.

Miller called the recent General Accounting Office report, which concluded the DOE has spent \$480 million without results, "only the tip of the iceberg."

Sen. Bob Graham, D-Fla., has launched a congressional investigation into the DOE's activities as more problems at the government's 124 nuclear weapons sites around the country from Rocky Flats near Denver to the Waste Isolation Pilot Project near Carlsbad, N.M., fail to meet minimum environmental standards.

The GAO report blamed DOE's failure to meet quality assurance standards and sloppy scientific data gathering for the snags in the Yucca Mountain program's progress.

GAO, the investigating arm of Congress, discovered that another \$48 million in scientific experiments resulted in worthless data at Yucca Mountain, 90

miles northwest of Las Vegas.

Reports that Energy Secretary James D. Watkins would resign July 1 have been squelched by DOE staff, but Miller said if current leaders leave, it is another indication of "continuing internal decay" at DOE.

"We are being asked to allow DOE to transport and store 70,000 metric tons of the most dangerous, highly radioactive by products of the nuclear power industry," Miller said.

"Ten truckloads a day ... every day ... for 30 years ... 140,000 truck shipments carried through our cities and towns, on the highways where we drive to work and our school buses travel," he said.

Miller compared the DOE's "Keystone Cop scientists and equally inept spend-happy bureaucrats" to the excesses that led to the savings and loan industry scandal.

In a recent poll, more than 80 percent of Nevada residents opposed the dump at Yucca Mountain, Miller said. That figure is up from 69 percent only 18 months ago, he said.

Although Nevada was first offered \$50 million, then \$100 million from the federal government to accept the dump, state officials have continued to oppose it, Miller said.

"We have been asked to hand over our future to a department that has taken every step to demonstrate they do not care about us, won't be honest with us, and in fact, by their incompetence and willingness to mislead, are a direct threat to us," Miller said.

The waste management conference at Caesars Palace is sponsored by the American Society of Civil Engineers and the American Nuclear Society.

## DOE responds to Miller's 1989 letter

By Keith Rogers  
Review-Journal

The U.S. Department of Energy wants state scientists studying the proposed Yucca Mountain nuclear waste repository to work with federal scientists on problems concerning the site, but the state can't afford it, an official said Friday.

Bob Loux, executive director of the state Nuclear Projects Agency, said it is difficult for his scientists to travel to workshops in light of the "minuscule money" the Energy Department provides to oversee the project.

"If they really want our involvement, why aren't they advocating resources that would get our involvement? It's lip service," Loux said, noting his \$3 million budget from the Energy Department is \$1.1 million less than last year's.

Loux's comment came in response to a letter Friday to Gov. Bob Miller from Carl Gertz, the Energy Department's Yucca Mountain Project chief.

In the letter, Gertz said there is "at present, no evidence to support a finding that the (Yucca Mountain) site should be disqualified" as a location for deep geologic disposal of high-level radioactive waste, as state scientists have said.

Gertz was responding formally to a 1989 letter from Miller.

Miller said he finds it "very interesting" that Gertz took 18 months to respond to his letter. He said he was also intrigued that Gertz's response was the first letter concerning Yucca Mountain that does not blame the state for not acting on permit applications to access the site.

"It's clear there are significant

differences of opinions in the scientific community" about the mountain's suitability to safely store nuclear waste, Miller said. "And they (Energy Department officials) only choose opinions that stand for the proposition that the mountain is suitable."

Miller said he intends to emphasize his stance at a nuclear waste conference in Las Vegas on Monday that the proposed repository is "fatally flawed. The biggest flaw is that it is being driven by politics, not science."

Responding to Miller and Loux, Gertz said many of the answers sought by Miller in his 1989 letter "have already been provided in one form or another.

"We continue to maintain that we must get on site to determine whether or not Yucca Mountain is suitable," Gertz said.

## **Conference set on high-level nuke waste**

Scientists and engineers will converge on Caesars Palace next week for a five-day international conference on managing high-level radioactive waste.

The conference, organized by the American Society of Civil Engineers and American Nuclear Society, and hosted by the University of Nevada, Las Vegas, will focus on the proposed Yucca Mountain nuclear waste repository, 100 miles northwest of Las Vegas.

Hundreds of researchers studying the problem of disposing of nuclear waste are expected to attend the conference, which includes 45 technical sessions not open to the public.



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