PNL-8967
UC-510

Combined Trip Report

1993 International Conference on
Nuclear Waste Management and
Environmental Remediation

Prague, Czech Republic

September 5-11, 1993

Compiled by
Steven C. Slate

Edited by
Robert E. Allen

December 1993

Prepared for
the U.S. Department of Energy
under Contract DE-AC06-76RLO 1830

Pacific Northwest Laboratory
Richland, Washington 99352

MASTER

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

js

SUMMARY

This joint trip report covers travel by the following:

Christopher C. Chapman	Thomas M. Crandall	Michael C. Hagood
Lawrence H. Harmon	Paul Hart	Pavel R. Hrma
Wayne L. Johnson	John C. Lehr	Inga W. Leigh
Johnny Moore	Calvin B. Ozaki	James M. Peterson
Lester K. Price	Brent A. Pulsipher	Norbert T. Rempe
Randal J. Roberts	Nancy Rothermich	Steven C. Slate
LeAnne W. Smith	John Tixier	Roger P. Whitfield
Donald E. Wood	John Zamecnik	

Travelers attended the full conference, September 5-11, 1993, with round trip travel to Prague, Czech Republic, from their home station immediately before and after the conference. Any exceptions are noted in Appendix A.

The purpose of the trip was to attend the 1993 International Conference on Nuclear Waste Management and Environmental Remediation. The principal objective of this conference was to facilitate a truly international exchange of information on the management of nuclear wastes as well as contaminated facilities and sites emanating from nuclear operations.

The conference was sponsored by the American Society of Mechanical Engineers, the Czech and Slovak Mechanical Engineering Societies, and the Czech and Slovak Nuclear Societies in cooperation with the Commission of the European Communities, the International Atomic Energy Agency, and the OECD Nuclear Agency. The conference was cosponsored by the American Nuclear Society, the Atomic Energy Society of Japan, the Canadian Nuclear Society, the (former USSR) Nuclear Society, and the Japan Society of Mechanical Engineers. This was the fourth in a series of biennial conferences, which started in Hong Kong, in 1987.

This report summarizes shared aspects of the trip; however, each traveler's observations and recommendations are reported separately. Foreign contacts are consolidated in Appendix B; literature acquired is reported in Appendix C. The agenda of the conference is in Appendix D. Action items reported by individuals are summarized in Appendix E.

The total travel expenses were \$76,142. A detailed breakout of costs are presented in Appendix A.

CONTENTS

SUMMARY	iii
PURPOSE	1
ACTIVITIES, OBSERVATIONS, RECOMMENDATIONS	5
SECURITY CONCERNS	27
APPENDIX A: ITINERARIES	A.1
APPENDIX B: CONTACTS	B.1
APPENDIX C: LITERATURE ACQUIRED	C.1
APPENDIX D: AGENDA	D.1
APPENDIX E: ACTION ITEMS	E.1

TABLES

1. Attendees	2
2. Attendees by Country	4

PURPOSE

The 1993 International Conference on Nuclear Waste Management and Environmental Remediation was held to facilitate the international exchange of information on managing nuclear wastes and the contaminated facilities and sites that were involved in nuclear operations. This years conference was held in the Czech Republic to encourage attendance by representatives from former Eastern Bloc countries. The integration of these countries into the international effort to remediate nuclear waste is timely and important, as those countries have had virtually no participation in previous Western events of this type. This year, a new topic was added to the permanent agenda of the conference series, environmental restoration. The addition was in response to the concerns expressed by the nuclear community, public groups, and many governments. The purpose of this addition was to focus attention on the ultimate goal of a healthy environment rather than just meeting short-term goals.

A significant amount of technical information was provided in this conference. Efforts to disseminate the information across DOE programs will include wider distribution of this consolidate trip report, presentation of the summary of this conference at the ER '93 meeting scheduled for October 1993 in Augusta, and direct distribution of key technical papers to DOE program managers.

The conference is directly related to the mission of the Office of Environmental Restoration and Waste Management, DOE-EM. Individual technical sessions were categorized as addressing low level waste, high level waste, environmental restoration, or joint topics. Along with the techical sessions, the conference included workshops on special topics, a short course on waste management and environmental remediation, technical tours, and an industrial exhibition. In addition to the formal exchange of information in the technical sessions, DOE and contractor staff made personal contact with their peers from other countries.

The full identity of DOE sponsored attendees is given in Table 1. A summary of attendees by country is given in Table 2.

Table 1. Attendees

NAME, FTMS	ORGANIZATION	OFFICE PHONE	POSITION TITLE
Christopher C. Chapman, PNL	Waste Technology Center	509-376-6576	Section Manager for Applied Melter Technology
Thomas M. Crandall, DOE-HQ	Offsite Program Division Office of Southwestern Area Programs EM-451	301-903-7454	Chief, Mill Tailings Branch
Michael C. Hagood, WHC	200 Area Remediation Section	509-376-9664	Manager
Lawrence H. Harmon, DOE-HQ	Office of Waste Management Environmental Restoration and Waste Management	301-903-7105	Acting Director EM-32, Office of Waste Operations
Paul Hart, DOE-HQ	Waste Management Operations Research and Development Division	301-903-7915	Program Manager
Pavel R. Hrma, PNL	Material Application Section Materials Sciences Dept. Materials and Chemical Sciences Center	509-376-5092	Senior Research Scientist in Glass Laboratory
Wayne L. Johnson, WHC	Environmental Remedial Action Group	509-376-1721	Manager
John C. Lehr, DOE-HQ	Office of Northwestern Area Programs	301-903-8161	Deputy Director
Inga W. Leigh, PNL	Waste Systems Department	509-375-6475	Senior International Coordinator
Johnny Moore, DOE	Oak Ridge Operations	615-576-3536	Technology Development Program Manager
Calvin B. Ozaki, EG&G	Technical Support and Program Management	208-526-0004	Manager

James M. Peterson, DOE-RL	Office of Planning and Integration	509-376-6731	5-Year Plan Program Manager
Lester K. Price, DOE-OR	Former Sites Restoration Division	615-576-0956	Director
Brent A. Pulsipher, PNL	Analytical Sciences Dept., Statistical Design and Analysis Group	509-375-3989	Acting Technical Group Leader/Staff Scientist
Norbert T. Rempe, WIPP	Westinghouse Waste Isolation Division	505-234-8346	Senior Engineer
Randal J. Roberts, WHC	Restoration and Upgrade Program, Solid Waste Disposal	509-376-5896	Manager
Nancy Rothermich, MMES	Hazardous Waste Remedial Actions Program	615-435-3122	Program Manager
Steven C. Slate, PNL	Environmental Restoration and Waste Management, Technology Development Program	509-375-3903	Technical Program Manager
LeAnne W. Smith, DOE-HQ	Office of Site and Facility Transfer, EM-64	301-586-4288	Acting Director
John Tixier, PNL	Waste Treatment Technology	509-376-8732	Acting Group Leader for ISV
Roger P. Whitfield, DOE-HQ	Office of Environmental Restoration, EM-40	202-586-6331	Deputy Assistant Secretary for Environmental Restoration
Donald E. Wood, WHC	Technology Development	509-376-7832	Advisory Scientist
John R. Zamecnik, SRTC	Savannah River Technology Center	803-725-6271	Senior Engineer

Table 2. Attendees by Country

Region	Country	Sub-Total	Total
North America	Canada	21	110
	USA	88	
	Mexico	1	
South America	Brazil	7	7
Western Europe	Austria	6	263
	Belgium	11	
	England	42	
	Finland	5	
	France	68	
	Germany	71	
	Italy	10	
	Luxembourg	1	
	Netherlands	5	
	Norway	3	
	Spain	16	
	Sweden	17	
	Switzerland	8	
Central Europe	Bulgaria	1	133
	Croatia	2	
	Czech Republic	75	
	Hungary	7	
	Poland	1	
	Romania	8	
	Serbia	1	
	Slovakia	31	
	Slovenia	7	

Region	Country	Sub-Total	Total
Eastern Europe	Belarus	8	57
	Russia	44	
	Ukraine	5	
Asia	China	10	106
	India	1	
	Japan	94	
	South Korea	1	
Middle East	Israel	1	1
Africa	South Africa	2	2
Oceania	Australia	1	1
TOTAL			680

ACTIVITIES, OBSERVATIONS, RECOMMENDATIONS

Travelers participated in the opening session plus a maximum of seven of the fifty technical sessions. In addition to attendance, sessions were chaired as indicated in the following:

C.C. Chapman	Technical Program Chairman, High-Level Waste and Spent Fuel Management
	Session Chairman, Recent Advances in HLW Treatment
	Workshop Leader, High-Level Liquid Waste Treatment
T.M. Crandall	Session Co-chair, Remediation of Obsolete Sites from Uranium Mining and Milling
M.C. Hagood	Session Co-chair, Environmental Remediation Site Characterization and Monitoring
P.R. Hrma	Session Chairman, Qualification Methods for HLW
L.H. Harmon	Session Chairman, National Programs for High-Level Waste and Spent Fuel Management
	Session Chairman, Radioactive Transportation and Related Issues

	Panel participant, Workshop on High Level Waste Repository Siting
J.C. Lehr	Co-chair, Management of Complex Environmental Clean-Up Projects
J. Moore	Session Co-chair, Treatment of Wastes from Decontamination and Decommissioning Operations
C.B. Ozaki	Session Co-chair, National Programs for L/ILW Management
L.K. Price	Session Co-chair, Experience in Actual Cleanup Actions
N. Rothermich	Session Co-chair, Management of Complex Environmental Clean-up Projects
	Session Organizer, Experiences in Actual Clean-up Actions
S.C. Slate	Technical Program Chairman, Environmental Remediation and Joint Technical Issues
	Session Chairman, Recent Developments in Environmental Remediation
	Workshop Leader, Environmental Remediation Technologies
R.P. Whitfield	Session Chairman, Significant Issues and Strategies in Environmental Management
D. E. Wood	Session Co-Chair, National Environmental Management Regulations: Issues and Assessment

The following papers were presented:

C.C. Chapman	Preliminary Estimates of Cost Savings for Defense High-Level Waste Vitrification Options
T.M. Crandall	UMTRA Project
M.C. Hagood	Combining Innovative Technology Demonstrations with Dense Nonaqueous Phase Liquids Cleanup
	Investigation of the Feasibility of an International Integrated Demonstration
P. Hart	US Department of Energy, Office of Technology Development, Mixed Waste Treatment Research, Development, Demonstration, Testing and Evaluation Program

	Immobilization/Stabilization of Low Level and Mixed Low Level Waste
P.R. Hrma	Processing Constraints on High-Level Nuclear Waste Glasses for HWVP
W.L. Johnson	Vadose Zone Characterization of Highly Contaminated Soils at Hanford
	Environmental Remediation of Contaminated Sites at the Hanford Site
J.C. Lehr	The Remediation Process: Approach and Elements of the Department of Energy's Environmental Restoration Program in a Superfund World
J. Moore	Treatment of Waste by Molten Salt Oxidation Process at the Oak Ridge National Laboratory
C.B. Ozaki	Public Acceptance Activities for the Development of New Commercial Low-Level Radioactive Waste Disposal Capacity in the United States of America.
J.M. Peterson	Total Quality Applications for Hanford's Five-Year Plan and Public Outreach
L.K. Price	Update on Lessons Learned from Cleanup Projects at Oak Ridge
B.A. Pulsipher	High-Level Waste Qualification: Managing Uncertainty
N.T. Rempe	Deep Geological Disposal of Mixed Waste in Bedded Salt: The Waste Isolation Pilot Plan
R.J. Roberts	Radioactive Mixed Waste Disposal
	Mobile Inspection and Re-Packaging Unit
	Non-Destructive Assay of Boxed Waste
S.C. Slate	Technology Development Program for Idaho Chemical Processing Plant (paper prepared by L.F. Ermold and D.A. Knecht, WINCO.)
L.W. Smith	Managing the Transfer of Surplus Contaminated Facilities: Emphasis Areas and Issues
J. Tixier	In Situ Vitrification: Providing a Comprehensive Solution for Remediation of Contaminated Soils

D.E. Wood The U.S. Department of Energy Process for Performance Assessments for Disposal of Low-Level Radioactive Waste

J.R. Zamecnik Measurement of Cesium and Mercury Emissions from the Vitrification of Simulated High Level Radioactive Waste

Tours

DIAMO Uranium Mines

T.M. Crandall
L.K. Price
N.T. Rempe
R.J. Roberts
D.E. Wood

Dukovany Nuclear Power Station

C.B. Ozaki

The following sections summarize comments made by individual travelers.

Christopher C. Chapman, Pacific Northwest Laboratory

This conference provided a unique opportunity to meet and relate to the broadest range of international participants, totaling about 680 from countries. The former Eastern Bloc countries were well represented, particularly Russia. The *Conference Proceedings* contains the contributed papers and has nearly 2500 pages.

Dr. I.A. Sobolev, General Director of the RADON firm gave me the results of their chemical analyses of a Hanford Waste Vitrification Plant glass sample. Dr. Sobolev was given this sample during a visit to Hanford in the summer of 1993. The analysis was very thorough.

The technology development being pursued by RADON (slagging incineration, cold crucible melter, and several others) suggests this Russian organization may be one which DOE could benefit by technology exchanges, collaboration, or other relationships.

Thomas M. Crandall, Headquarters, Department of Energy

The session which I co-chaired, Remediation of Obsolete Sites from Uranium Mining and Milling, was well attended (60-70 people) and required the full 3 1/2 hours for presentations and questions. The session began with a summary of international developments, followed by detailed presentations of mature

programs in the US, Sweden, and China. Three papers were presented on initiatives being pursued by Germany.

Two Canadian government participants asked about touring US mill tailing sites later this year. A consultant from Oxfordshire, UK, asked for information on US hydrologic modeling and contaminant transport used to assure compliance for 200 to 1000 years at UMTRA sites.

Michael C. Hagood, Westinghouse Hanford Company
Wayne L. Johnson, Westinghouse Hanford Company (joint submittal)

We co-instructed the class "Environmental Investigation and Characterization Techniques" at the American Society of Mechanical Engineers short course, "Radioactive Waste Management and Environmental Restoration," at Prague University, just before the conference. Course work presented on characterization was well received. Mr. Hagood has since had discussions with the Ministry of Atomic Energy Russian Federation representative Dr. Kudriavtsev regarding "lessons learned." A proposed presentation of a modified version of this presentation to be held at Mayak was discussed as well. Meeting minutes have been provided to Rebecca Keen of EM-50.

Conference attendees showed a great deal of interest in Hanford cleanup activities. Representatives from the Ukraine and Russia were interested in our characterization and remediation techniques, particularly for soils contaminated with radioactives. Transuranic contaminants generated the most attention.

Numerous papers were given on various aspects of environmental remediation. Three particularly relevant presentations were given in the "Experiences in Actual Clean Up Actions" session. These included a discussion of the soils rehabilitation program in the Chernobyl control zone. By using a technique where sod is rolled up (using equipment similar to the U.S. sod farms) significant decontamination efficiencies (>80%) could be realized. A second relevant paper was given on the remediation of Canada's historic low-level radioactive contaminated sites. This program provided valuable insights into field screening techniques, cleanup levels, and public involvement. A third paper in this session dealt with lessons learned from fixed priced contractors (Rust International) conducting remediation tests for various DOE projects. This presentation provided valuable information that would directly benefit the Hanford site as we move into more comprehensive cleanup actions.

Lawrence H. Harmon, Headquarters, Department of Energy

I presented a session at the American Society of Mechanical Engineers short course at the Vysoka Skola Chemicko-Technologicka (Institute of Chemical Technology), Prague, just before the conference.

The session I chaired on radioactive transport included two papers of interest to EM-37. These papers and others on spent fuel storage were sent to John Jicha.

I sat on a panel of representatives of major nuclear power nations to enlighten Czech stakeholders. France, Germany, OECD, Sweden, and the Czech Republic were also represented on the panel. The four Czech nuclear power plants were built by the USSR; spent fuel was to be returned to the USSR. Now, both the Czech and Slovak Republics have to develop repository programs.

Paul Hart, Headquarters, Department of Energy

The quality and quantity of work being performed outside the US was an eye-opener for me. The three-volume conference proceedings contain a wealth of information about state-of-the-art work being performed around the world.

Highlights of sessions I attended:

- Thermal Treatment of Organic Radioactive Waste (Germany). This covered incineration and pyrolysis; lots of data was presented on metal volatilities.
- Molten Salt Oxidation of Mixed Wastes (two US presentations). This presented a good overview of the current status of this technology.
- Volume Reduction and Vitrification of Nuclear Waste with Thermal Plasma (Switzerland). This described the plasma technology being developed by Moser-Glaser & Co. in concert with Retech. They are working on projects in France, Germany, and Switzerland; the first one is about 18 months away from the first hot test.
- Vitrification of Accident Wastes from the Nuclear Power Plant A-1 in Slovakia (Czech Republic). The author described the work being performed at Nuclear Research Institute (NRI) in Rez (near Prague). This is similar to the MWIP work by the Westinghouse Savannah River-Clemson team.
- Composite Ion-Exchangers and Their Possible Use in Treatment of Low/Intermediate Level Liquid Radioactive Wastes (Czech Republic). This described a family of resin-bound ion exchangers with high metal loading capability and fast complexation kinetics.

At the request of Teresa Fryeberger, I met with Dr. Dyrs and other staffers of NRI. They are further developing the cobalt dicarbollide technology, which they invented, with the goal of immobilizing this complexing agent on a solid support. Their progress in a short time with modest funding is impressive. At their invitation, I spent a full day at NRI. In addition to detailed discussions on this work, I also spent considerable time discussing their

vitrification work. NRI is a goal-oriented RDDTE center with impressive staffers and good facilities. Consideration should be given to working jointly with them on EM problems.

Pavel R. Hrma, Pacific Northwest Laboratory

I met Dr. Amal De, the manager of glass laboratory in Wiederaufarbeitungsanlage Karlsruhe (WAK). Dr. De develops glasses for the Pamela plant. He mentioned several problems he faced when radioactive glass was produced in the Pamela melter.

Major problems in Pamela melter resulted from the differences in the liquidus temperature between the simulated and the radioactive glass. For the simulated glass, the liquidus temperature was about 800°C with rutile (TiO_2) being the primary phase. In the melter processing radioactive glass, rutile precipitated at temperatures above 1050°C and clogged the bottom drain. When a frit containing TiO_2 was used for high alumina waste, massive precipitation of rutile occurred.

High alumina wastes caused another serious melting problem. High density alumina-rich melt was sinking to the melter bottom without being properly homogenized with the frit. The dense bottom glass crystallized. I believe that this could happen only because waste and frit are charged into Pamela melter separately. With a pre-mixed feed used in Hanford, a good homogenization of melt can be expected.

The problem of homogeneity was solved by Dr. De in an ingenious manner. Since mechanical stirring was not acceptable and air bubbling was not effective, chemical mixing, which is nothing but the classical fining process, was employed. It was achieved by adding antimony to the feed. As is well known, Sb^{3+} is oxidized by molten nitrates to Sb^{5+} , which is reduced at higher temperatures (above 1000°C). The reduction process is accompanied by oxygen evolution. Oxygen bubbles have a strong homogenization effect on the melt, surpassing mechanical bubbling or stirring.

At the conference, my main goal was to get information about the capabilities of the Nuclear Research Institute (NRI), Rez, the Glass Research Institute (GRI), Hradec Kralove, and the Institute of Silicates (IS), Prague, all of which have been involved with nuclear waste vitrification.

I met several people from the NRI at the conference. Only briefly I spoke with Dr. Lumir Nachmilner, who is a head of the Fuel Cycle Chemistry Division. The Waste Solidification Department in this division is developing vitrification process under the management of Josef Sussmilch. Of his staff, I met three people (Hana Haklova, Ivana Davidova, and Jiri Stejskal) at the conference. Hana Haklova made a good impression on me, being an ambitious, competent, and knowledgeable young scientist. With Ela Vackova, who had been responsible for the glass development at NRI for fifteen years, I spoke on the

telephone only. Ela has recently retired and is no longer involved in glass development work. However, she gave me some independent insight regarding the overall situation in the glass development research at NRI.

NRI was developing a liquid fed ceramic melter (LFCM) at GRI. This work was conducted by Tomas Zizka in GRI. They were trying, without success, to replace Inconel, a material subjected to embargo, by a local product. Therefore, NRI abandoned LFCM in favor of the French system, which is based on a periodically charged and discharged metallic melting pot heated by high or middle (300-500 KHz) frequency induction. Cooperation between Cogema and NRI continues even after the embargo has been lifted. The results of Czech-French cooperation are classified, only data older than two years are released.

Two other NRI scientists I met at the conference were Dr. Vladimir Balek and Dr. Stanislav Hermanek. The first developed a radon emanation method. This approach he applied to glass dissolution study. He claims that unique information can be gained about the early stages of dissolution (see his paper in the conference proceedings for details). Dr. Hermanek was for many years involved in the development of borohydride fuels for rocket engines.

I also had a brief conversation with Sergey Stefanovsky, a Russian scientist from Radon Association, Moscow. He mentioned a simple but ingenious method of vitrifying waste with a high level of sulphur. The sulfate layer is first allowed to separate on top of molten glass and then dispersed within the melt by vigorous mechanical stirring. The solidified product has acceptable durability. This method is used only for low level waste.

Unfortunately, I was unable to spend time with Dr. B. Luckscheiter from KfK, Germany. He presented an interesting paper about glass development, in which he claimed that viscosity of the melt should be between 4.5 and 5.5 Pa and electrical conductivity should not exceed 15 S/m. While the viscosity value is similar to that used for HWVP melter, the electrical conductivity is below the lower limit accepted for HWVP (18 S/m). I did not have a chance to discuss this with Dr. Luckscheiter, but I believe that this discrepancy is due to the method of measurement rather than the difference in the actual conductivity of melt.

On Friday, September 10, I visited Dr. Milan Drabek at the Czech Geological institute. Dr. Drabek studies phase equilibria in aqueous media under high pressure. Most recently, he concentrated on the microscopic study of the alteration layers that form on glass during its dissolution in water. He is using an analytical microscope to identify minerals formed or precipitated on the glass-solution interface.

Dr. Drabek gave me some useful advice regarding the measurement of the liquidus temperature of glasses. He uses small platinum or golden capsules with about 1 g of the material, seals and welds them, and heats them for 2 to 5 days in a uniform temperature furnace. The capsules are quickly cooled by dropping them from the furnace on water or mercury pool.

The week following the conference I spent in NRI, SI, and GRI to identify the capabilities of these laboratories regarding the development of glasses for high chromium waste. Some of Hanford wastes have a high chromium content which would make their vitrification difficult. I was trying to identify the state of knowledge and experience with regard to high chromium high level waste with respect to its vitrification and the availability of facilities and personnel for such a study. I had in mind a possibility of a future contract in this area and so I wished to identify universities and research institutes for sending there a request for proposal. However, I have been out of touch with research institutes in Czech republic for more than a decade. Thus I needed an update.

I had learned at the waste management conference in Tucson (March 1993) about a large volume of high chromium high level waste in Jaslovske Bohunice, Slovakia. To vitrify this waste, a special "acid" frit was developed jointly by NRI and GRI. A manuscript was sent to me later by Dr. Nachmilner describing this effort. Its author was Josef Sussmilch, who also reported about the chromium problem at the conference. Therefore, my first journey was to NRI. This institute is located in Rez, a small town north from Prague.

In NRI, I was not shown the laboratories (I was told that their rather common equipment would be waste of time to show), was not scheduled to talk with other people, and was not shown any report or other materials that could demonstrate the capabilities of NRI to perform first class work (I was told that these reports are either classified or not worthy of showing). I am not sure whether this was caused by lack of confidence or by modesty or by different customs. I was told that the lab is equipped with furnaces up to 1500°C, one of which is capable of controlled atmosphere.

Mr. Sussmilch only recently completed his thesis, of which he gave me a copy only after I "twisted his arm." I eventually got a glimpse of his staff when I suggested to arrange a meeting on which I would explain the approach to glass development at PNL and clarify our needs regarding high chromium glasses. The meeting was promptly arranged and the discussion was lively. I had a brief chance to meet Ivana Davidova (who I already met at the conference), who specializes at glass property measurements, and Maruska Santarova, who performs laboratory testing. Despite the difficulties caused by recent political and economic changes, it is obvious that NRI retained some of its capacity to build on eight years experience in the investigation of vitrification of high chromium high level wastes.

Some of the laboratory work for high chromium wastes was conducted at the Institute of Silicates under the leadership of Prof. Jan Hlavac. To this Institute was my next trip. I was pleased to meet Prof. Hlavac, one of my teachers. He has done an impressive body of work for nuclear waste glass development and durability testing. He showed me two M.S. theses focusing on high chromium wastes. I was given time to read them and take notes. These theses were

Petr Pazdera. *Fixation of Radioactive Wastes Containing Chromium* (in Czech). Institute of Chemistry, Departments of Silicates, 1984.

Petr Pilar. *Chemical Stability of Glasses Containing Chromium*. Institute of Chemistry, Department of Silicates, 1987.

Pazdera used a borosilicate frit containing lead and potassium to vitrify high chromium waste containing a mixture of chromium oxide and potassium chromate. He prepared glasses and tested them using DTA, XRD, SEM, and optical microscopy. He used metallic Zn as a reducing agent. Microscopy revealed small amounts of crystalline Cr_2O_3 and MgCr_2O_4 (about 20 μm crystals) in the product along with large quantity of 1.5 μm undissolved particles. In the literature review, Pazdera pointed out that Cr^{6+} is also reduced to Cr^{3+} by As_2O_3 . Another reducing agent is uranium, which is oxidized to U^{6+} , whereas iron has no effect on the chromium redox state. Titanium is recommended in the frit because it stabilizes uranium as U^{4+} , thus making it available for reduction of chromates. A large quantity of undissolved solid is not considered a problem for melting in crucibles by inductive heat.

Pilar mentioned phosphate glasses that dissolve high concentrations of chromium, but these glasses are not recommended for their high corrosivity. Lead glasses, used by Pazdera, appeared to be sensitive to the redox conditions and tend to precipitate metallic lead. He discussed As_2O_3 , graphite, silicon, and formic acid as possible reductants and decided to use formic acid, arsenic, and a combination of arsenic and phosphoric acid. The result was that arsenic was the best, leaving no chromates after 30 minutes at 1050°C. He identified crystalline Cr_2O_3 , CaCrO_4 , and TiO_2 by XRD in the product.

Prof. Hlavac and Dr. Bartuska, who is the editor of *Silikaty*, a journal publishing scientific papers on glass, ceramics, and cement, asked me whether I would agree to be on the scientific board for the journal. I gladly agreed and offered to be their contact point for the American continent. They were pleased and gave me the 1992 and 1993 issues of the journal. All papers in *Silikaty* are published in English.

Before the end of my visit, Prof. Hlavac talked about his retirement next year and difficulties finding a successor. Unfortunately, he would not be able to investigate high chromium products, but he suggested Dr. Jiri Matej. I was pleased to hear that, Jiri being a good friend of mine. However, Jiri was not as pleased because he is too busy at the moment and the situation of the Laboratory of Silicates, where he is currently working, could be closed down by the Czech Academy of Sciences by the end of the year. Although experience and expertise exist at the University, the actual commitment to high chromium study may be a problem.

My third visit was to Glass Research Institute (GRI) in Hradec Kralove. The institute shrank recently from approximately 300 to 80 people. It still offers a wide array of services, waste vitrification among them. I met with a new manager, Dr. Jan Kafka. Later we were joined by Mr. Tomas Zizka and

Zdenek Baloun. They quickly understood the problem of high chromium and suggested approaches, including melting techniques, microscopy examination, etc. We went easily into technical details and our communication was professional and smooth. The people I was talking with showed interest and were eager to solve the problem either by themselves or in cooperation with other institutes.

John C. Lehr, Headquarters, Department of Energy

Nancy Rothermich from Oak Ridge (MMES) and I co-chaired a session on managing complex clean-up projects. Five of the nine papers were written by DOE or DOE contractors. Other presentations covered decision criteria used in Spain for restoration of sites affected by uranium mines and decision making technologies used in Canada for environmental remediation.

Inga W. Leigh, Pacific Northwest Laboratory

Discussions with contacts focused on the general status of their countries' waste management activities, specifically on current regulatory requirements, technology developments, and recent organizational changes in the responsibility and oversight structure. I also obtained contacts' consent to respond to future information requests to be used in the *International Nuclear Waste Management Fact Book*, prepared annually in support of EM-35 programs. The names and organizations of 29 officials were gathered for use in support of International Programs.

Johnny Moore, Department of Energy, Oak Ridge

I presented a discussion on decontamination technologies at the American Society of Mechanical Engineers short course, "Environmental Restoration of Nuclear Facilities and Properties," at the Vysoka Skola Chemicko-Technologicka (Institute of Chemical Technology), Prague, just before the conference.

At the session on mixed waste treatment and disposal, a British regulator expressed interest in waste treatment technologies that do not require burning, such as plasma and molten salt. He felt that attendance by regulators broadens their perspective and enhances the acceptance of innovative technologies.

Professors at the Technical University of Prague described a composite inorganic-organic ion-exchanger using modified polyacrylonitrile as a binding composite for the inorganic component for the treatment of liquid organic wastes. The material is being tested by Dr. Marsh, LANL, and Professor Hooper, Novel Absorber Evaluation Club, UK. The material has been used to separate strontium, cesium, and cobalt. For cesium separation, 3-5 liters of material can treat up to 250,000 liters of contaminated water. They have separated 3 Ci of cesium from that amount of water. When used, the absorber can be vitrified or melted; currently, testing is evaluating incorporation in

cement. The material is not suitable for $>1M$ NaOH, but has been successfully tested in pH up to 10. It is stable in radiation fields up to 10^7 rad. The material behaves as an ion-exchange media and chemical and molecular absorber. Inorganics bind so well they cannot be washed out. A colleague, Alexis Motl, will be on a fellowship to Oak Ridge with Dr. Campbell for year. The professors are working with a Canadian team, but do not have a commercial partner. Current manufacturing cost is \$100 per liter. Continued research is dependent of funding; government funding is disappearing. A researcher could be fully funded at the university for development and testing of materials for less than \$10K per year.

In the session on treatment of wastes from D&D, G. Panciatici, Centro Recerche Esperienze Studi Applicazioni Militari, Italy, presented information on attapulgate as an effective decontamination method. The clay was mixed with water or other chemicals to form a paste, then applied in a 10 mm layer. When hard, the layer is removed. It exhibited a DF of 10 to 100, and works well with strontium, cesium, and cobalt; it does not work well with uranium or thorium. I will follow up on this to obtain more information.

At the same session, Dazou Fujiki, Japan Atomic Energy Research Institute, discussed recycling metals recovered from nuclear power plants. Metals with less than 0.37 Bq/gram will have unrestricted use; some restrictions will apply to metals between 37 and 0.37 Bq/gram. Using the figures presented, recycling was cost effective compared to alternative disposal costs. I will obtain additional information about the assumptions on recycling, dose calculations, and bench scale metal melt laboratory results.

An Italian effort has successfully used microwave energy to remove contaminated concrete surfaces. With a flexible triple waveguide system, removal rates of 5 to 12 cm^3/sec were attained; by contrast, an Oak Ridge single waveguide system at a much higher frequency is attaining 6 cm^3/sec . The Italian system makes the cost of the Oak Ridge system a major concern.

Calvin B. Ozaki, Idaho National Engineering Laboratory

I presented a lecture titled "Sources and Types of Radioactive Waste" at the American Society of Mechanical Engineers short course, "Radioactive Waste Management and Environmental Restoration," at Prague University, just before the conference.

The updates on national low-level waste (LLW) programs all had one of two common threads: either they were succeeding in developing and operating new LLW disposal sites, or they were pursuing long-term interim storage until public consensus could be developed to support a permanent disposal decision. This is in marked contrast to the US commercial LLW disposal system, which has been unsuccessfully pursuing new disposal sites for the past ten years and not pursuing a long-term interim storage strategy.

Canada, for instance, met immediate and pronounced public opposition to their initial attempt to "decide, announce, and defend" the decision to build a new LLW disposal site. They abandoned that strategy and entered into an open-ended public consensus process which has been ongoing for approximately ten years. They are presently placing their LLW in indefinite long-term storage while awaiting the fruition of this process.

On the other hand, France and Japan have successfully completed development and begun operations of new LLW disposal sites within the past two years. Both of these countries have strong national policies which support nuclear energy, and effective and synergistic working relationships between government and private industry. Comparatively, the US approach is fragmented, in that 12 separate entities (states and/or compacts) are independently and simultaneously attempting to develop new LLW disposal sites. The US may wish to reevaluate its strategy in light of similar international experiences.

France's old Centre de la Manche LLW disposal facility is undergoing closure, being replaced by the new operational Centre de l'Aube. This is a second generation disposal facility, and incorporates all the lessons learned from the Centre de la Manche. DOE and US industry could benefit from design and engineering information from the Centre de la Manche facility; a contract vehicle presently exists between DOE-OR and NUMATEC, the US subsidiary of the French Agence Nationale pour la Gestion des Dechets Radioactifs (ANDRA).

A paper by Torsten Eng, Sweden, discussed the permanence of records concerning waste repositories. The selection of storage media (paper, magnetic, optical) presents concerns for the ability of future technologies to retrieve the stored information.

I presented a lecture at the ASME short course, and I have participated in the short course held in Japan. The anticipated attendance was 40 people; actual attendance ranged from six to twenty per session. Twenty-four instructors were involved, all preparing and presenting at least one 50-minute lecture. The attendees were enthusiastic about the value of the courses; future courses would benefit from more publicity to encourage wider attendance.

The technical tour to the Dukovany Nuclear Power Plant was interesting and uneventful. The plant contains four Soviet designed and built VVER 440 V 213 nuclear reactors, with a total output of 1760 MW. The first unit began commercial operation in November 1985; the last unit came on line in January 1988. The waste management facilities include a spent fuel storage pool, a LLW bituminization facility, and above-ground concrete vaults for long term storage of LLW. Only the spent fuel storage pool is currently operating; the bituminization and the LLW storage facilities are not operational yet. Presently all LLW is stored in the plant and awaiting treatment in the bituminization facility. We were only allowed to view the turbine hall and the LLW above-ground concrete vaults. There appeared to be a reluctance of the staff to openly and freely provide operational or technical information.

The US is still viewed as a leader in the areas of waste management and environmental restoration. However, it appeared to me that in the area of waste management, other countries were much more successful in implementing long term solutions. Also, one of the keys to success may be that these countries have well-defined national energy strategies and well-integrated and comprehensive programs for managing their waste. It also appeared to me that there is an opportunity for DOE contractors and the US commercial nuclear industry to minimize the cost of developing new waste management facilities. This can be accomplished by more aggressively contracting with international companies who have already developed and implemented successful facility designs and technology, as opposed to reinventing the existing foreign design and technology here in the US. This would require a paradigm shift from the "not invented here" and "buy American" syndromes.

James M. Peterson, Department of Energy, Richland

The conference was the most informative and valuable conference I ever attended. I feel up to date on what is going on in the world in our industry. The primary purpose for my attending this conference was to present my paper, *Total Quality Applications for Hanford's Five-Year Plan and Public Outreach*. The paper was well received. I was asked for and gave my permission to Japanese and Taiwanese requests to translate my paper into Japanese and Chinese. I was also asked several questions by French, Czech and United Kingdom representatives concerning Total Quality Management applications both internally and externally. There appeared to be sincere interest on the part of the former Soviet Bloc nations about how the US is conducting public involvement programs.

Relative to technology, I have shared information with OTD's Leo Guillen concerning dry storage techniques presently being used in the United Kingdom. Surprisingly, at this conference, held halfway around the world, I learned about new robotic and environmental surveillance technologies being worked on here at Hanford.

Concerning outreach techniques, it appears that the nations with successful public involvement programs are following philosophies that are very similar to our own. However, the US must learn from these other nations the ability to reach a point where debate is cut off and work proceeds.

The most intellectually interesting parts of the conference concerned learning how the former Soviet Bloc countries are dealing with the new openness and the continuing after effects of Chernobyl. It was quite moving to listen to representatives from Croatia and Slovenia discuss how they are dealing with radioactive waste management while their nations are in the midst of continued fighting in the former Yugoslavia. At least Hanford workers don't have to worry about being shot by opposing armies on their way to work.

Lester K. Price, Department of Energy, Oak Ridge

The European Community effort to set new standards related to cleanup seem coherent and relevant to similar (but disjointed) US efforts.

The post-Chernobyl cleanup challenge is well known, but the magnitude of the contamination from the uranium mining in the Ronneburg area of the former East Germany is staggering. The problems here are directly relevant to the US UMTRA and FUSRAP programs.

The Canadian practice of using color codes to define levels of contamination to aid in communications with their public stakeholders seem to be a simple but effective technique. It may be useful in programs like FUSRAP that deal with radiological contamination in publicly accessible areas.

The UK experience in D&D of the Capenhurst Gaseous Diffusion Plant is directly relevant to, and much more advanced than, the US effort. Their successful recycling of materials is particularly noteworthy. They claim that when completed in 1994, they will have recycled 98% of the mass of the plant into the economy.

Brent A. Pulsipher, Pacific Northwest Laboratory

I presented a paper during the session on Qualification Methods for High Level Waste. The presentation was favorably received with several comments and questions. Two key comments were received:

- West Valley should attempt to quantitatively take credit for the process control efforts when demonstrating a high level of confidence in the quality of the waste form. Currently, the plan for demonstrating compliance with WAPS 1.3 relies solely on samples obtained from the product and does not take credit for demonstrated control of the process or the feed into the melter.
- John D. Psaras, DOE Division of Risk and Policy Analysis in the Office of Nuclear Safety (EH-10), stated that the statistical approach was the best approach and that we were definitely taking the right strategy. He stated that he would like all DOE sites to adopt more rigorous statistical approaches in their waste management and environmental remediation applications.

Other papers presented at that session were directly applicable to activities the I am involved with relative to DOE's West Valley Demonstration Plant (WVDP), Hanford Waste Vittrification Plant (HWVP), and Defense Waste Processing Facility (DWPF). Several of the statisticians I manage are working on these DOE vittrification projects. Statistical quality control methods are being developed and applied at each of these DOE vittrification facilities. Several papers were applicable to quality control and performance assessment.

- The description of controlled parameters and process functions as outlined in the papers entitled *Qualification Methods and Quality Control of Vitrified HLW in France* and *Principles of Qualification of the Pamela Process for the Vitrification of HLLW of the Karlsruhe Reprocessing Plant (WAK)* provided information on the key control points in a vitrification process. Similar control points are being considered in the US facilities but control strategies are not as mature as those presented in these papers.
- Several papers were directed at performance assessment issues. Discussions with Simon J. Wisbey, UK, focused on the MASCOT code for performance assessment. The comparison between MASCOT and AREST was of primary interest. The treatment of uncertainty in the input parameters of these performance assessment codes was also discussed.

Environmental Remediation was also a key topic area at this conference. I also manage statisticians who work on environmental characterization and evaluation tasks. Numerous papers outlined the environmental contamination problems that the Eastern European countries are facing. Of primary interest to me were discussions relating to site characterization and statistical treatment of uncertainties. Although most discussions focused on technologies and apparatus for characterization, it was apparent that statistical sampling and evaluation methods were not extensively applied. Application of the Data Quality Objectives (DQO) process would appear to provide significant benefit to many of the European and US environmental characterization applications.

Norbert T. Rempe, Westinghouse, WIPP

Before the conference, I visited four deep geologic disposal sites in Germany, and established contacts for further information exchange and cooperation.

I presented a paper on WIPP. During that session, I had a spirited exchange with L. Chaturvedi concerning his written and oral assertions about WIPP which I felt were in error. I also answered questions about D.W. Powers' paper on WIPP as he was unable to attend.

Randal J. Roberts, Westinghouse Hanford Company

Several papers were presented on the operational experience of super compaction. These lessons learned will be applied to the start-up of the Low Level Waste Compactor to be installed in the Waste Receiving and Processing (WRAP) Module 1. Specific areas of concern were the liquid collection system.

One major philosophy difference between US and foreign waste disposal is the extensive pre-disposal verification checks. In several countries 100% of the waste undergoes x-ray and compression tests. This is in contrast to the U.S. where approximately 1% to 5% gets these extra checks. This appears to

increase the overall confidence level the foreign stakeholders have in disposal activities.

The use of grout is still the primary stabilization process used for the bulk of the solid low level waste. The Commissariat Energie Atomique (CEA) in Marcoule, France, is doing some pilot scale testing of vitrification of solid waste, and this work should be followed in concert with the US program headed by the Mixed Waste Integrated Program (the contact at CEA is Antoine Joun). The CEA has also conducted testing of low level wastes using polymer resins for ion exchange and evaporator bottoms. Several units are in operation in Japan. This information and experience is directly applicable to the WRAP Module 2A treatment process demonstration and will be factored into the testing process.

The Hanford Site has a significant quantity of contaminated sodium which may require treatment and disposal. Framatome has significant experience in this area which is directly transferable to U.S. activities. They have processed over 31 tons of contaminated sodium in the last two years.

Metal melting is gathering momentum in Europe as well as the US. Besides the volume reduction achieved, it is also serving as a mechanism for release of potentially contaminated materials. This was specifically used in the decontamination and decommissioning of a uranium enrichment plant in the United Kingdom, resulting in 95% of the material being released for re-use.

Automated drum handling facilities were in use in Japan and France. A similar system is scheduled for the Hanford Phase V storage facilities. Efforts will be pursued to obtain operating history data for use by Hanford design activities.

A tour of a uranium mine using acid leach techniques showed little concern for environmental damage. Much of the uranium extracted was shipped to fuel Russian reactors. Concerns for the pollution control techniques are just beginning to be recognized. The uranium production has been reduced by over 75%, as it now only supplies Czech Republic reactors.

Nancy Rothermich, Martin Marietta Energy Systems, Oak Ridge

I presented "Mixed Waste Management" at the American Society of Mechanical Engineers short course, "Environmental Restoration of Nuclear Facilities and Properties," at the Vysoka Skola Chemicko-Technologicka (Institute of Chemical Technology), Prague, just before the conference.

I listened to several presentations on uranium mill tailings remediation. It is apparent that other countries could learn lessons from mistakes that we have already made and that their programs are several years behind ours.

Several technology papers on the cleanup of Chernobyl were interesting, but have little application to DOE sites. The technologies were versions of the "dig it up and dispose somewhere else" strategy.

Steven C. Slate, Pacific Northwest Laboratory

The conference was projected to have 750 attendees from approximately 40 different countries; the actual count was 680 from 36 countries. I have the prepaid the attendance list; I will take an action to contact Leslie Friedman to get the list of onsite registration folks.

I met with Leo Buckley of Atomic Energy Canada, Ltd. (AECL). He has developed a method to remove heavy metals from water using a physical separations technique. There is a good general description of his technology in the paper in the proceedings. His work has been funded by OTD to a small extent to date, and he is pursuing additional funding to possibly apply the technology to the waste at the Berkeley pit and to Fernald. This technology may have some application at the Hanford site and perhaps could benefit from some of the separations agents that are being developed in the Efficient Separations program. AECL is also looking at building a chemically enhanced barrier to isolate a contamination site at their Trock River facility. This is an actual remediation action that may have some use or benefit to the current ISRIP task.

Linda Lehman (L. Lehman & Associate, Inc., Ground Water & Nuclear Waste Specialists, Minneapolis) has an office in Moscow. She has several funded programs to develop information regarding the new Russian radiation and environmental laws and to develop a bibliography of all information associated with the Arctic dumping activities. Follow-up action is to obtain copies of these documents for use in DOE programs. This will be coordinated with ITEP.

The session I co-chaired, "Recent Developments in Environmental Remediation Technologies," was well attended with up to approximately 60 people at one point. Attendees from developing countries were particularly interested in the US technologies.

The paper by Ed Bramlitt of the Defense Nuclear Agency, *Experience in Mining Plutonium in Soil Clean-up*, described his soil cleaning activities being done on the Johnson Atoll. The basic approach being used to remove plutonium from the soil is a series of conveyor belts, screens, rock crushers and so forth. The basic technology being used is not terribly sophisticated; however the approach to basic material handling has application to DOE sites. They use a series of sodium iodide detectors to detect the presence of plutonium. When plutonium exceeds certain levels, collection devices are inserted into the conveyor belt stream to remove the contaminated material. They are looking at extending this basic approach to other detectors so other contaminated soils can be processed. This work has potential direct and significant benefit to

the Hanford cleanup program. Action is to follow-up with Dr. Bramlitt to get more details on the detection systems being used.

AECL apparently has some tritium problems and has apparently done some work with spiral wound membranes. There may be some benefit in partnering with AECL in the new tritium treatment concept being developed at PNL.

The Czech republic is looking at a 0.081 kroner (US\$0.0028 at 10/21 exchange rate) per kilowatt hour disposal fee for their waste. This is ten percent of their nuclear energy cost or three percent of their total electricity cost. This money will be spent between now and the year 2050.

I participated in a press meeting on the conference on Tuesday, September 7. The meeting included twelve Czech press agencies, including radio stations, newspapers, and television. They interviewed Radovan Kohout, conference general chairman; Vladimir Talasek, conference general co-chair; David Rossin, on the ASME International Program Advisory Committee, and me. Focus of the questions was on the safety of nuclear waste disposal, issues related to protests from other countries, and questions about the unanimity of scientific opinion about how waste should be disposed.

I attended a meeting of the conference's International Program Advisory Committee (IPAC) meeting. Most of the IPAC members attended to review the conference. There were 680 attendees from 36 countries. Approximately 350 papers were presented. Involvement in the sessions was fairly high, ranging from 30 to 60 for most. Some of the key sessions, such as High Level Waste, National Programs, Experience with Actual Cleanups, and ER Technologies, had attendance levels approaching 60-70. The IPAC discussed several issues facing the conference. Principle issues identified include the relationship of this conference with other conferences that may be held simultaneously, the location of the conference, the possibility that there were too many technical sessions, and the fact that the proceeding were quite large. Several options were considered on how to modify the conference. Actions were assigned and the General Chair for the next meeting will follow up.

JDC corporation in Japan is conducting R&D on a barrier system similar to that being developed at Hanford. They have quite an amount of data on water infiltration, and are planning future tests on bio-intrusion, erosion, etc. They have prepared a large scale mock-up of a barrier cross section. It is approximately 5 meters wide, 3 1/2 meters thick, and 20 meters long. There appears to be a substantial opportunity for information exchange. I will follow-up with the direct communication to the JDC contacts.

Dr. Werner Knoch of KEWA, Hannover, Germany, spoke to me after the presentation of the ICPP paper. KEWA is apparently the engineering source behind the Pamela Project. They are very interested in identifying a mechanism to work with the DOE High-Level Waste Project. I will contact D.W. Knecht, WINCO, to discuss this interest and to identify possible opportunities for collaboration.

I met with E. G. Koudriavtsev, who is with MINATOM in Russia. Mr. Koudriavtsev was the leader of the Russian delegation that was made up of 44 attendees. In addition to these Russians there were an additional 13 attendees from other former Soviet Union Republics. He reported that this conference was extremely valuable and beneficial to the Russian delegation. Opportunities for technical contacts of the type available at this meeting are usually very rare and are frequently only available to four or five visiting Russians at any one time. He particularly sited the environmental remediation technical program being beneficial and encouraged me to maintain or even expand this program for future meetings. His delegation had some difficulties in their participation in the conference: writing the papers and turing them in on time, overall quality, and the presenters' ability to communicate. He suggested that we work in advance through a central point, such as himself, to establish communication links with all participants and that younger Russian scientists (under 35) should be encouraged to come to the meeting. Their English is better and they are more directly involved in the technical activities being conducted. It was my observation that the Russians participated very aggressively in the conference.

A short course was held in conjunction with the conference. The course, Management of Radioactive Waste and Environmental Remediation, was held over two and a half days. The course outline is included in Appendix D. The purpose of the course was to provide an overview of Western environmental technology and management approaches to students from countries with less mature nuclear programs. The course was coordinated by Alan Moghissi, Temple University; Gary Benda, RUST/WMI; and Steven Slate, PNL. The course consisted of 20 technical presentations covering most aspects of environmental management. Presenters were from the U.S.DOE, CEA/CEN (France), Nuclear Electric plc (U.K.), SKB (Sweden), and several other countries. All were attending the conference for other reasons. Course attendance varied from a low of six to a high of 20. The low attendance was on Thursday when technical sessions were still underway. The vast majority of students were from the former Soviet Union (FSU) and were able to attend at low or no cost due to cosponsorship by DOE. Dr. Koudriavtsev, the Russian delegation leader, provided very positive feedback on the course. He felt that it was very beneficial to his colleagues, and would be especially beneficial if the course could be held at key Russian sites such as Mayak.

Twenty-one industrial exhibitors participated in the Conference. The French firms were Cogema, SGN, Transnucleaire, ANDRA, Aries, and Framatome. The U.S. firms were EG&G Pentek, Skolnik, NUS, Canberra, Parker Metals, and Quadrex. JGC and Kobe Steel were the two Japanese exhibitors. The U.K. exhibitors included NIREX, GEC-Alsthom, BNFL, and AEA. The other exhibitors were AECL, NUKEM, IAEA, and several Czech firms.

The FSU papers on contamination and ecological impact at various FSU sites were general but indicative of an extensive amount of information that could be used by DOE programs in validating performance models and determining ecological impact factors that are needed in estimating health effects. Some

DOE program are making use of some of this data, but additional reviews should be made to see if additional collaboration would be fruitful.

I met with EW Hooper, of AEA Technology, UK. He is coordinator of the Novel Absorber Evaluation Club. This is a loose organization of organizations with an interest in new technologies that can separate chemicals from various waste streams. The group consist of British Nuclear Fuels plc, Nuclear Electric plc, Ministry of Defence, and AEA Technology. JNFS, Japan, and Ontario Hydro have indicated and interest in joining. Some initial contacts have been made by staff from LANL. These should be followed up by staff in the ESP IP to determine the benefit of membership by DOE. The club performs tests on new absorbers and shares the information with all members. Details on this club were provided by Dr. Hooper, and they will be forwarded to the ESP IP HQ program manager.

It was clear from conversations with attendees from developing countries that they are looking to the U.S. and other western countries for leadership on how to regulate, manage, assess, and act on their environmental problems. There is a significant need and opportunity for DOE to provide leadership and technical information to assist many of these countries.

Leanne W. Smith, Headquarters Department of Energy

I benefited from lessons learned reported by other countries concerning deactivating nuclear facilities.

John Tixier, Pacific Northwest Laboratory

Most of the technology sessions were oriented toward HLW, nuclear fuel cycle, and weapons disposal. Hopefully, future sessions will focus more on environmental restoration. Most of the environmental restoration information at the conference came from the West and covered items familiar to DOE audiences.

Italy, Germany, and Japan reported on recycling radioactive scrap metal. DOE has 1.5 million tons in storage; recycling is not considered viable because of cost and product quality. Papers appeared to favorably address these concerns. Results could also apply to the Terra-Vit process which produces a metal product.

Japan reported on a proprietary ceramic filter that captures volatilized cesium from a thermal treatment process. This may benefit PNL's ISV work at ORNL which produces volatilized cesium from contaminated soil.

A report from Russia described soil remediation in the Chernobyl zone. A sod harvester removed the top 5 cm. of soil, which contains most of the fallout. The sod is rolled and stored in a simple barrier system while the radionuclides decay. Funding problems prevent further stabilization of the

radionuclides. Several DOE technologies could be applied to provide further stabilization of this recovered material.

Roger P. (Pat) Whitfield, Headquarters, Department of Energy

The sessions I chaired dealt primarily with the disposition of plutonium. Russia proposes to burn it in mixed oxide reactors as a disposal method. Japan is also proposing a mixed oxide fuel cycle to supplement energy sources. Applicable papers will be forwarded to appropriate DOE programs.

Donald E. Wood, Westinghouse Hanford Company

In Vienna I discussed waste disposal criteria and standards at the International Atomic Energy Agency. They are developing international standards which may be useful to DOE as support to the standards in DOE Order 5820.2A, currently under revision.

Several countries are having some success in setting lower limits for radioactivity, below which material may be considered "below regulatory concern," exempt from regulation or suitable for recycle (steel for rebar or casks). This is in sharp contrast to the situation in the US, where both NRC and DOE have had little success in establishing such criteria. The basis is generally an individual dose limit of 1 mrem/yr and a collective dose limit of 100 rem/yr. I forwarded papers from the conference relating to this to Marc Wood, Solid Waste Management, Westinghouse Hanford Company.

The IAEA has an informal forum for developing concepts for disposal performance assessments. For long-term (tens of thousands of years) analysis, they are proposing that future uncertainties be addressed by defining a "reference biosphere," which would be a reasonable approximation to a future state, but clearly hypothetical, thus not requiring justification for predictions so far in the future as to lose credibility. I retained conference papers on this, and asked Gordon Linsley (IAEA) to provide copies of any future information on this program, for use by the DOE Performance Assessment Task Team.

Switzerland has selected a site near Lucerne for disposal of low and intermediate level waste. The dedication ceremony was held August 29, 1993. This will initiate a 4-year licensing process. The Swiss are also proceeding toward a repository for disposal of high-level waste (HLW), although they hope that in the future a regional repository may become an accepted approach. They have only about 1% of European HLW, so a separate repository makes little sense.

John R. Zamecnik, Savannah River Technology Center

The session on recent advances in HLW treatment contained an interesting summary of recent work in Germany on new melter designs and on work done for the Pacific Northwest Laboratory and the Westinghouse Hanford Company.

Two papers presented at the session on qualification methods for HLW were relevant to the Savannah River Site (SRS). One covered processing constraints for high-level nuclear waste glasses for the Hanford Waste Vitrification Plant (HWVP). The author proposed waste loadings much higher than current HWVP or SRS levels. The second paper, *Glass Products for the Vitrification of HLLW in a Joule-Heated Ceramic Melter and the Effects of Planinoids on the Glass Properties*, contained interesting information on the effect of redox on RuO_2 crystallization. I will send copies of the associated papers to interested parties at SRTC.

A poster session on liquid waste treatment described a cesium separation system developed by the Finnish company IVO Ltd. I collected their literature and will send it to appropriate SRTC staff.

The session on mixed waste treatment and disposal included a discussion of an EnVitCo stirred melter for mixed waste. No mention of this melter was contained in the paper in the proceedings. I have an action item to pass this information to the DWPT section at SRTC for follow-up.

SECURITY CONCERNS

L.W. Smith reported that she was unable to discuss the details of safeguards and security issues related to plutonium management because some of that information is classified.

Several attendees had problems with pick-pockets in crowded areas. Future travelers should be made aware of this problem.

APPENDIX A

ITINERARIES

Travelers attended the full conference, September 5-11, 1993, with round trip travel to Prague, Czech Republic, from their home station immediately before and after the conference. The following participants traveled to destinations in addition to Prague or took personal leave in Prague:

M.C. Hagood	Sightseeing in Hungary and Austria, and enroute to Munich, Sept 11-15.
P.R. Hrma	Czech Geological Institute, Prague (discussions with Dr.Milan Drabek), Sept 10. Nuclear Research Institute, Rez (Discussions with Josef Sussmilch), Sept 13. Institute of Silicate, Prague (Discussions with Prof. Jan Hlavac), Sept 14. Glass Research Institute, Hradec Kralove (Discussions with Jan Kavka), Sept 15 & 16. Personal vacation, Zdar nad Sazavon, Czech Republic, Sept. 19-23.
W.L. Johnson	Sightseeing in Hungary and Austria, and enroute to Munich, Sept 11-15.
C.B. Ozaki	Aug 29-Sept 4, vacation in Austria.
L.K. Price	1 week leave after the conference.
N.T. Rempe	Aug 31-Sept 3, visit four deep geologic disposal projects in Germany: Morsleben, Konrad, Gorleben, Herfa UTD.
N. Rothermich	Aug 28-Sept 4, vacation in Vienna and Salzburg.
J. Tixier	Sept 10, met with developers of microtechnology at KfK in Karlsruhe, Germany.
D.E. Wood	Vacation in Switzerland, August 26-September 1. IAEA, Vienna, Austria, September 3.

Costs

C.C. Chapman	\$ 3,769
T.M. Crandall	4,526
M.C. Hagood	2,290
L.H. Harmon	[3,457]*
P. Hart	[3,457]*
P.R. Hrma	3,285
W.L. Johnson	2,284
J.C. Lehr	[3,457]*
I.W. Leigh	3,758
J. Moore	3,791
C.B. Ozaki	2,126
J.M. Peterson	3,200
L.K. Price	4,000
B.A. Pulsipher	1,469
N.T. Rempe	[2,500 personal funds, not included in total]
R. J. Roberts	7,518
N. Rothermich	4,907
S.C. Slate	2,031
L.W. Smith	1,600
J. Tixier	4,580
R.P. Whitfield	2,865
D.E. Wood	4,315
J.R. Zamecnik	<u>[3,457]*</u>
TOTAL	\$76,142

* Amount not reported, average for other travelers used

APPENDIX B

CONTACTS

CONTACTS

Contact	Organization	Topic	Reported by
Dr. Frantisek Kepak	Nuclear Research Institute 250 68 Rez, Czech Republic or Czech Academy of Sciences 182 23 Praha 8 Dolejskova 3, Czech Republic	Removal of ruthenium and other radioactive materials from waste vitrification systems, and the potential for collaboration.	C.C. Chapman
Dr. Sergey V. Stefanovsky	RADON 2/14, The 7th Rostovsky Lane 119121 Moscow, Russia	Chemical analysis of the Hanford glass sample completed by RADON	C.C. Chapman
C.A. (Sandy) McDowell, Principal Engineer	AECL Research Whiteshell Laboratories Pinawa, Manitoba, Canada	Interested in collaborating with Hanford on packaging, transportation, and disposal of radioactive wastes.	C.C. Chapman
Dr. Amal K. De Manager	PAMELA Glass Laboratory WAK Wiederaufarbeitungsanlage Karlsruhe, Germany	Leads KfK's glass development and qualification effort and was a major contributor in the PAMELA plant work.	C.C. Chapman
Werner Knoch Senior Project Manager	KEWA Kernbrennstoff Wiederaufarbeitungstechnik GmbH Baringstrasse 6 D-3000 Hannover 1 Germany	His organization was responsible for design of the PAMELA plant. They are interested in working on HWVP and the transfer of their technology.	C.C. Chapman
V.I. Vlasov	A.A. Bochvar Institute of Inorganic Materials Rogov Street 5 123060 Moscow, Russia	Mastering the process of model HLW solidification to produce different materials and testing major apparatus prototypes of two-stage HLW vitrification plant.	C.C. Chapman

Sergey A. Dmitriev, Deputy General Director	RADON 2/14, The 7th Rostovsky Lane 119121 Moscow, Russia	A lead manager for the RADON firm. They are pursuing several technologies for treatment of radioactive wastes, including cold crucible, slagging incineration, other vitrification, concrete, and other LLW waste forms.	C.C. Chapman
Leo P. Buckley Manager	AECL Waste Processing Technology Chalk River Laboratories Chalk River, Ontario Canada K0J 1J0	Interested in DOE's vitrification of their waste streams. (Chapman will send him information on PNL's general activities.)	C.C. Chapman,
Lutz Ebermann Physicist	BfS Solzgitte, Germany	Deep geologic disposal of radioactive, mixed, and chemically hazardous waste.	N.T. Rempe
Dr. Klaus Ebel Director	DBE Morsleben, Germany	Deep geologic disposal of radioactive, mixed, and chemically hazardous waste.	N.T. Rempe
Hartmut Schulze Physicist	DBE Morsleben, Germany	Deep geologic disposal of radioactive, mixed, and chemically hazardous waste.	N.T. Rempe
Werner Muschalla Manager	DBE Konrad, Germany	Deep geologic disposal of radioactive, mixed, and chemically hazardous waste.	N.T. Rempe
Manfred Weg Manager	DBE Gorleben, Germany	Deep geologic disposal of radioactive, mixed, and chemically hazardous waste.	N.T. Rempe
Jorg Glienka Manager	Kali & Salz Herfa, Germany	Deep geologic disposal of radioactive, mixed, and chemically hazardous waste.	N.T. Rempe
Dr. J. Mohr	KfK Karlsruhe, Germany	Past, current, and future applications of microtechnology at KfK.	J. Tixier
Dr. Ron Webster	International Decommissioning United Kingdom	Key ER contact in the UK. Familiar with ISV technology.	J. Tixier
Dr. Chao-Ming Tsai	Atomic Energy Council Republic of China (Taiwan)	Discussed ISV. No current need for environmental restoration but may have need for related technologies such as Terra-Vit.	J. Tixier

Dr. Albert Aloy	V.G. Khlopin Radium Institute Russia	Unofficial leader of the CIS delegation. Key contact for future discussions. Interested in ISV for multiple sites, but little money available for technology development or application.	J. Tixier
Josef Süßmilch	Nuclear Research Institute Rez 250 68 Rez, Czech Republic	Interested in future ISV needs of Czech and Slovak Republics, but no immediate need.	J. Tixier
Richard Barrett	<i>Nuclear Engineering International</i> United Kingdom	Would like to include an article on ISV in a future issue of the monthly publication.	J. Tixier
E. Kowalski Director, Repository Projects	NAGRA Switzerland	Swiss company for waste disposal.	D.E. Wood
L. Nachmilner	Nuclear Research Institute Rez 250 68 Rez, Czech Republic	Developing disposal systems and criteria.	D.E. Wood
Dr. J.D. Marshall	Her Majesty's Inspectorate of Pollution, UK	Treatment technologies other than incineration (plasma, molten salt).	J. Moore
Jan John & Ferdinand Sebasta	Technical University of Prague Czech Republic	Composite inorganic-organic ion-exchange using polyacrylonitrile for Cs separation.	J. Moore
Denis Alexandre Scientific Advisor	Waste Management and Disposal Division Commissariat A L'Energie Atomique France	Centre de lab LLW disposal facility.	C.B. Ozaki
Gilles Chevrier	Agence Nationale pour la Gestion des Dechets Radioactifs (ANDRA) France	Centre de lab LLW disposal facility.	C.B. Ozaki

Candace Chan	Division of Nuclear Fuel Cycle and Waste Management International Atomic Energy Agency	Storage of radioactive wastes.	C.B. Ozaki
Josef Süßmilch	Nuclear Research Institute Rez, Czech Republic	Vitrification of waste from a nuclear power plant accident.	P. Hart
Dr. Ing. Miroslav Kyrš	Nuclear Research Institute 250 68 Rez, Czech Republic	Immobilizing cobalt dicarbollide, a complexing agent, on solid support.	P. Hart
Dr. Jan John & Ferdinand Šebesta	Czech Technical University Břehová 7 115 19 Prague 1 Czech Republic	Resin-bound ion exchangers with high metal loading capability and fast complexation kinetics.	P. Hart
Simon J. Wisbey	AEA Technology Decommissioning and Waste Management 424.4 Harwell Oxfordshire OX11 0RA United Kingdom	Uncertainty analysis and performance assessment software; MASCOT code for performance assessments.	B.P. Pulsipher
John D. Psaras	Division of Risk and Policy Analysis Office of Nuclear Safety U.S. Department of Energy NS-20 Washington, D.C. 20546	Statistical approach to dealing with uncertainty.	B.P. Pulsipher
Dr. Sergey V. Stefanovsky Deputy Director	RADON 2/14, The 7th Rostovsky Lane 119121 Moscow, Russia	Statistical approach to dealing with uncertainty.	B.P. Pulsipher
Josef Süßmilch	Nuclear Research Institute 250 68 Rez, Czech Republic	Statistical applications in glass formulations.	B.P. Pulsipher

Patrick Delahaye	Cogema 50440 Beaumont, France	Process qualification and statistical uncertainties.	B.P. Pulsipher
B.R. Martens	BFS Albert-Schweitzer Strasse 18 Salzgitter, Germany	Quality control.	B.P. Pulsipher
Laurence Baillif	Eurus Conslant 14 Rue du Printemps Paris 75017, France	Quality control	B.P. Pulsipher
Lauria Dejanira	Institute de Radioprotection, AV Salvador Allende S/N, Gacarepegua, Rio de Janeiro Brazil	Discussed the issues of low-level soil and groundwater contamination and remediation approaches used in Brazil.	W.L. Johnson
Albert S. Aloy	V.G. Khlopin Radium Institute 28 Shvernkik Avenue 1940201 Street Petersburg, Russia	Last spring's American/Russian environmental workshop. Expressed desire for further interaction.	M.C. Hagood
Evgeny Kudriavtsev	Ministry of Atomic Energy Russian Federation B Ordynka Moscow, Russia	Last spring's American/Russian environmental workshop. Future relationships with Hanford.	M.C. Hagood
Yr V. Kuznetsov	V.G. Khlopin Radium Institute 28 Shvernkik Avenue 1940201 Street Petersburg, Russia	Co-chaired "Environmental Remediation Site Characterization and Monitoring" session. Discussed set-up of session.	M.C. Hagood
Alexander B. Smirnov	Ministry of Nuclear Engineering MAYAK Lenin Str 60, Apt 18 Chelyabinsk-65, Russia	His groundwater modeling efforts at Chelyabinsk. Passed on information on a student exchange for E. Drozkho.	M.C. Hagood

Pavel Franta Dr. Ing. Miroslav Kyrš	Nuclear Research Institute 250 68 Rez, Czech Republic	Originators or developers of the Cobalt Dicarbolide process for extraction of cesium, strontium, and technetium from waste. Discussed their proposals for future collaboration with DOE.	S.C. Slate
S. Hermanek	Institute of Inorganic Chemistry Academy of Sciences Czech Republic		
E.G. Koudriavtsev	MINATOM Russia	Wants continued contact and information exchange on environmental remediation. As leader of Russian delegation, he provided the official Russian evaluation of the meeting. He also requested consideration of providing a modified version of the short course in Russia.	S.C. Slate
Dr. Jan John & Ferdinand Šebesta	Czech Technical University Břehová 7 115 19 Prague 1, Czech Republic	Organic/inorganic exchange separations systems. Working on removing cesium from damaged Czech reactor water. Looking for a commercial partner; their cost is about \$10,000 per FTE per year.	S.C. Slate
Leo P. Buckley Manager	AECL Waste Processing Technology Chalk River Laboratories Chalk River, Ontario Canada K0J 1J0	Developed physical separations technique to remove heavy metals from water. Interested in building a chemically enhanced barrier.	S.C. Slate
Werner Knoch Senior Project Manager	KEWA Kernbrennstoff Wiederaufarbeitungstechnik GmbH Baringstrasse 6 D-3000 Hannover 1 Germany	Engineering source behind the Pamela Project. Interested in working with the DOE High-Level Waste Project.	S.C. Slate

Edward W. Hooper	Separation Technology Dept AEA Technology Harwell Laboratory B353 Dicot, Oxfordshire OX11 0RA United Kingdom	Novel Absorber Evaluation Club, an informal group dedicated to exchanging information on various separations agents. The club also does testing on agents provided by members. A liaison should be established between this club and DOE separations efforts.	S.C. Slate
Vladimir Balek	Nuclear Research Institute 250 68 Rez, Czech Republic	Radon emanation method.	P.R. Hrma
Stanislav Hermanek	Nuclear Research Institute 250 68 Rez, Czech Republic	Borohydrate fuels.	P.R. Hrma
Milan Drabek	Czech Geological Institute Prague, Czech Republic	Liquidus temperature measurement, waste glass durability.	P.R. Hrma
Josef Süßmilch	Nuclear Research Institute 250 68 Rez, Czech Republic	High chromium waste vitrification.	P.R. Hrma
Jan Hlavac	Institute of Silicate Prague, Czech Republic	High chromium waste vitrification.	P.R. Hrma
Jiri Matej	Institute of Silicate Prague, Czech Republic	High chromium waste vitrification.	P.R. Hrma
Lubomir Nemec	Institute of Silicate Prague, Czech Republic	High chromium waste vitrification.	P.R. Hrma
Sergey Stefanovski	RADON 2/14, The 7th Rostovsky Lane 119121 Moscow, Russia	High sulfate waste vitrification.	P.R. Hrma
Tomas Zizka	Glass Research Institute Hradec Kralove, Czech Republic	High chromium waste vitrification.	P.R. Hrma
Jan Kavka	Glass Research Institute Hradec Kralove, Czech Republic	High chromium waste vitrification.	P.R. Hrma
Zdenek Baloun	Glass Research Institute Hradec Kralove, Czech Republic	High chromium waste vitrification.	P.R. Hrma

Zdenek Baloun	Glass Research Institute Hradec Kralove, Czech Republic	High chromium waste vitrification.	P.R. Hrma
---------------	--	------------------------------------	-----------

APPENDIX C

LITERATURE ACQUIRED

LITERATURE ACQUIRED

All attendees received a 2500-page proceeding covering all four technical programs. The proceedings consist of peer-reviewed full papers. Copies of over 200 key non-US papers have been distributed to 27 different DOE program managers for review relative to the needs of their programs.

Literature is grouped under the name of the person who reported collecting it.

T.M. Crandall

Information on Spain's radioactive waste management program, which is operated by ENRESA, a public corporation. In particular, literature on the El Cobril low level and intermediate level waste storage facility and the decommissioning of the Andujar uranium mill.

P.R. Hrma

Vladimir Balek, *Emanation Thermal Analysis and its Application Potential*, Thermochemica Acta, 192 (1991) 1-17, Elsevier, Amsterdam.

Josef Süssmilch, *Vitrification of Wastes with High Level of Chromium Compounds* (in Czech), 1993, thesis, Nuclear Research Institute, Rez, Czech Republic.

C.B. Ozaki

Dukovany, *Nuclear Power Plant*, Information Center, NPP Dukovany, Czech Republic.

BNFL, *Company Profile*, British Nuclear Fuels plc 1992, United Kingdom.

BNFL, *Waste Management*, British Nuclear Fuels plc 1989, United Kingdom.

AEA Technology, *Atom*, No. 429, July/August 1993, Canberra Packard Ltd., United Kingdom.

International Atomic Energy Agency, *Order Form for Radioactive Waste Management Publications*, July 1993, Division of Nuclear Fuel Cycle and Waste Management, Vienna, Austria.

Agence Nationale pour la Gestion des Dechets Radioactifs (ANDRA), *Centre de lab*, France.

International Atomic Energy Agency, *Nature and Magnitude of the Problem of Spent Radiation Sources*, IAEA-TECDOC-620, September 1991, Vienna, Austria.

International Atomic Energy Agency, *Storage of Radioactive Wastes*, IAEA-TECDOC-653, July 1992, Vienna, Austria.

Malcom Keay, *European Energy Markets*, International Energy Agency.

J. Vavrousek, *Energy Situation in Central and Eastern Europe: The Past and the Present*, 1993 International Conference on Nuclear Waste Management and Environmental Remediation, September 6, 1993, Prague, Czech Republic.

A. David Rossin, *But Why Doesn't Anybody Know What To Do About the Waste?*, 1993 International Conference on Nuclear Waste Management and Environmental Remediation, September 6, 1993, Prague, Czech Republic.

Edoprogram, *Bitumenation of Radioactive Waste From Nuclear Power Plant Operation*, Kralovopolska, a.s., Czech Republic.

Nuclear Research Institute, *1992 Annual Report*, Czech Republic.

S.C. Slate

Papers presented at the conference:

Keay, Malcom. 1993. *European Energy Markets*, International Energy Agency.

Vavrousek, J. 1993. *Energy Situation in Central and Eastern Europe: The Past and the Present*.

International Institute for Applied System Analysis. 1993. *Radiation Safety of the Biosphere: A summary of a Project Proposal*.

Consortium d'Assistance Operationnelle aux Pays de l'Europe de l'Est (Cassiopee). 1993. *European Economic Interest Grouping*.

KAP. 1993. *The Specialized Activities in Domain of the Environment Protection*. KAP spol. sr.o., Stupska 15, 298 00 Praha, Czech Republic.

1992 Annual Report. 1993. Nuclear Research Institute, Rez, Czech Republic

The Novel Absorber Evaluation Club. 1992. AEA Technology, Oxfordshire, UK.

Technology Brochures:

The Framatome Indra Vitrification Process, Framatome Nuclear Operations, Paris, France.

New Remote Control Inspection Techniques, JGC Corp., Tokyo, Japan.

Wet Oxidation Process (Volume Reduction Technology), JGC Corp.,

Tokyo, Japan.

High Temperature Slagging Incinerator (Volume Reduction Technology), JGC Corp., Tokyo, Japan.

Radwaste Incinerator, JGC Corp., Tokyo, Japan.

Hazardous and Mixed Waste Handling, JGC Corp., Tokyo, Japan.

Waste Package Inspection System for Shipping and Disposal, JGC Corp., Tokyo, Japan.

Incineration of Radioactive and Hazardous Waste, SGN Reseau Eurisys, Saint-Quentin-en-Yvelines Cedex, France.

Dismantling and Waste Processing, Framatome Nuclear Operations, Paris, France.

Incinerator Facility, NUKEM GmbH, Alzenau, Germany.

Groundwater Remediation, AECL Research, Manitoba, Canada.

J. Tixier

About ten articles, technical papers, and journal publications on microtechnology that have appeared since 1980. The reports will help researchers at PNL determine if and where possibilities for collaboration in this area exist with KfK.

D.E. Wood

IAEA Safety Series No. 111-P-1.1, *Application of Exemption Principles to the Recycle and Reuse of Materials from Nuclear Facilities*, December 1992.

IAEA Safety Series No. 89, *Principles for the Exemption of Radiation Sources and Practices from Regulatory Control*, September 1988.

Minutes of the INWAC Sub-Group on Principles and Criteria for Radioactive Waste Disposal, IAEA, November 1992.

J.R. Zamecnik

IVO-CsTreat System, IVO International, Ltd, Rajatorpantie 8, Vantaa, Finland.

APPENDIX D

AGENDA

Session Number	Technical Session	L/ILW	HLW	ER	JOINT	ROOM
	Sunday, 5 September					
	Registration 15.00 - 19.00					
	Reception 19.00 - 21.00					
	Monday, 6 September 9.30 - 12.00					
1	Opening Session					Koncerni Sal
	Monday, 6 September 13.30 - 17.00					
2	National Environmental Management Regulations: Issues And Assessment				●	Maly Sal
3	L/ILW Disposal From An International Viewpoint	●				Komorni Sal
4	Solid Waste Volume Reduction, Treatment And Packaging Experience	●				Novy Sal
5	Engineered And Geological Barriers		●			Klub I
6	Recent Developments In Environmental Remediation Technologies			●		Klub II
7	Radioactive Transporation And Related Issues		●			S2
	Tuesday, 7 September 8.30 - 12.00					
8	Significant Issues And Strategies In Environmental Management				●	Maly Sal
9	National Programs for HLW And Spent Fuel Management		●			Komorni Sal
10	Decommissioning Of Nuclear Power Reactors			●		Novy Sal
11	Design Of Integrated Systems For Management Of Nuclear Waste	●				Klub I
12	Mixed Waste (Hazardous And Radioactive) Treatment And Disposal (I)	●				Klub II
13	ER Site Characterization And Monitoring			●		S2
14	Advanced L/ILW Conditioning Technologies Including Incineration	●				Poster
	Tuesday, 7 September 13.30 - 17.00					
15	National Programs For L/ILW Management	●				Maly Sal
16	Recent Advance In HLW Treatment		●			Komorni Sal
17	Decontamination And Decommissioning Of Other Nuclear Facilities			●		Novy Sal
18	Acceptance Criteria For Very Low-Level Radioactive Wastes				●	Klub I
19	Mixed Waste (Hazardous And Radioactive) Treatment And Disposal (II)	●				Klub II
20	Prediction Of Contaminant Migration And Related Doses			●		S2
21	Science And Engineering Of The Repository System		●			Poster

Session Number	Technical Session	L/ILW	HLW	ER	JOINT	ROOM
	Wednesday, 8 September 8.30 - 12.00					
22	National Examples Of Spent Fuel Storage Systems		●			Maly Sal
23	Policy And Practice In Public Involvement In Environmental Management				●	Komorni Sal
24	L/ILW Waste Characterization, Assay, And Tracking Systems (I)	●				Novy Sal
25	Treatment Of Wastes From Decontamination And Decommissioning Operations		●			Klub I
26	Management Of Complex Environmental Clean-Up Projects			●		Klub II
27	Disposal Systems For HLW And Spent Fuel; Design And Status		●			S2
28	Disposal Site Characterization And Performance Assessment	●				Poster
	Wednesday, 8 September 13.30 - 17.00					
29	Experiences In Actual Clean-up Actions			●		Maly Sal
30	Reprocessing And Its Influence On Waste Quantities		●			Komorni Sal
31	L/ILW Waste Characterization, Assay, And Tracking Systems (II)	●				Novy Sal
32	Decontamination And Decommissioning Demolition Technologies			●		Klub I
33	Qualification Method For HLW		●			Klub II
34	Site Characterization And Underground Testing		●			S2
35	Science And Engineering Of HLW And Spent Fuel Storage Systems		●			Poster
	Thursday, 9 September 8.30 - 12.00					
36	Transmutation And Separations of Radioactivity		●			Maly Sal
37	Established And Emerging Environmental Management Organizations				●	Komorni Sal
38	Remediation Of Obsolete Sites From Uranium Mining And Milling			●		Nova Sal
39	Radioactive Waste Management And Practices In Developing Countries	●				Klub I
40	Waste Management From Unconventional (e.g. VVER) Nuclear Power Reactors	●				Klub II
41	Disposal Site Selection Approaches and Issues		●			S2
42**	Waste Minimization, Avoidance, and Recycling In Nuclear Power Plants	●				Poster
43**	Liquid Waste Treatment Processess And Experience	●				Poster
	Thursday, 9 September 13.30 - 17.00					
44	Ecological Impacts From Radioactive Environmental Contamination			●		Maly Sal
45*	L/ILW Storage Facilities - Design And Experience	●				Komorni Sal
46*	L/ILW Forms And Acceptance Criteria For Disposal	●				Komorni Sal
47	Safety Assessments and Methodology For Repositories		●			Novy Sal
48	Management Of Non-Standard Or Accident Wastes	●				Klub I
49	Economic Considerations In Environmental Management				●	Klub II
50*	Quality Assurance And Control In Nuclear Waste Management	●				S2
51*	Management Of Radioactive Wastes Outside The Nuclear Cycle	●				S2

* Half-Sessions
 ** Joint Poster Sessions

.....
**► ASME PROFESSIONAL
DEVELOPMENT
SHORT COURSE PROGRAM**

**COURSE A: RADIOACTIVE WASTE MANAGEMENT
FOR NUCLEAR POWER REACTORS**

ASME Course No.: PD122

ASME Program No.: 9470

Course Schedule: Thursday 8.30 to 17.00
Friday 8.30 to 17.00
Saturday 8.30 to 12.00
September 9 - 11, 1993

Course Fees: ASME/AESJ/ANS/CNS/JSME Members:
US \$385
Participants from Central/East European countries
and CIS, with economies in transition: US\$ 150.
All others: US\$ 485

General

The management of radioactive waste is an important area of nuclear power and energy production. Nuclear plant designers, engineers, operators, and governmental regulators must be kept abreast of radwaste equipment operation, new technologies, and radiological and regulatory requirements, including cleanup of contaminated sites.

This course addresses the same areas as the regular annual course given in U.S.A., however, it is designed for an international audience. The length of the course has been reduced to 2 1/2 days to fit the conference schedule.

Who Should Attend

Working engineers of utilities, architectural/engineering companies, consulting companies and organizations that provide radioactive waste services, and reactor component manufacturing companies will benefit by attending this course. The course will also be useful for governmental agency staff members who desire engineering and practical information concerning the management of radioactive waste and people responsible for management of radioactive waste in research reactor organizations.

Panel Discussions

A unique course feature will be the holding of panel discussions that will give attendees the opportunity to actively participate in the program. The interactive panel discussions will deal with

liquid and gaseous wastes; solidification and volume reduction; and radwaste operation experience in North America, and Western and Eastern Europe.

Course Notes

The course will rely upon hand outs prepared by the international speakers. These materials will be provided to the audience in a three-ring binder. A supplementary textbook, *Radioactive Waste Technology*, will be offered to course participants for an additional fee.

Course Topics

- Sources of Radioactive Waste (Reactors, Remediation)
- Liquid Waste Management (Evaporators, Ion Exchanges)
- Immobilization (Cement, Bitumen, Organic Polymers)
- Volume Reduction (Super Compaction, Incineration)
- Disposal (Shallow Land Burial, Engineered Burial)
- Packaging
- Radiation Protection
- Transportation Regulations
- Disposal Requirements
- Transuranic Waste Management
- Reprocessing and High-Level Waste Treatment
- Spent Fuel Storage
- High-Level Waste Disposal
- Status of Contaminated Areas
(US, CIS, Eastern Europe, Western Europe)
- Clean-Up Choices and Strategies (In-Situ Treatment, Underground Water Management, Management of Contaminated Soil)
- Economics
- Interaction with the Public
- Decommissioning
- Management of Mixed Waste
- Gaseous Waste
- Regulations/International Agreements on Waste Management

COURSE B: ENVIRONMENTAL RESTORATION OF NUCLEAR FACILITIES AND PROPERTIES

ASME Course No.: PD052

ASME Program No.: 9470

Course Schedule: Thursday 8.30 to 17.00
Friday 8.30 to 17.00
Saturday 8.30 to 12.00
September 9 - 11, 1993

Course Fees: ASME/AESJ/ANS/CNS/JSME Members: US \$385
Participants from Central/East European countries
and CIS, with economies in transition: US\$ 150.
All others: US\$ 485

General

The course will present an overview of the primary elements in the environmental restoration process. This course addresses areas similar to the regular annual course given in U.S.A., however, it is designed for an international audience. The length of the course has been reduced to 2 1/2 days to fit the conference schedule.

Who Should Attend

Working engineers of utilities, architectural/engineering companies, research organizations, consulting companies and organizations that provide environmental restoration services, and governmental agency staff members will benefit by attending this course.

Case Studies

The course format consists of a summary presentation on a topic, followed by a few illustrative case histories. The case studies show the practical application of recommended practices. Discussions will include evaluation of successful environmental restoration projects, as well as projects that experienced difficulties, and examination of alternative approaches that could have been used. Case study topics typical of those that may be presented include decontamination and decommissioning of reactors or other nuclear facilities, cleanup of contaminated soil and ground water, and cleanup of former uranium mines.

Course Notes

Hand outs prepared by course instructors will be provided in three-ring notebooks. These hand outs will include hard copies of slides or overhead transparencies used in the lectures.

Course Topics

- Regulations and their Impacts
- ER Planning Process
- Site Characterization and Remedial Design
- Remedial Action
- Project Close out
- Project Management
- ER Technologies
- Management of Wastes from ER Activities

► TECHNICAL SESSIONS

► SESSION 1

Monday, 9.30 - 12.00

Koncertni Sal

OPENING SESSION

Opening Address: RADOVAN KOHOUT, Conference General Chairman, Kohout & Associates, Ltd., Toronto, CANADA

Welcome Address: VLADIMIR DLOUHY, Minister of Industry and Trade of the Czech Republic, Prague, CZECH REPUBLIC
JAN KOUKAL, Mayor of Prague, Prague, CZECH REPUBLIC

► Intermission

Co-Chairmen: RADOVAN KOHOUT, Kohout & Associates, Ltd., Toronto, CANADA
VLADIMIR TALASEK (TUEV/The Institute of Chemical Technology), Prague, CZECH REPUBLIC

1. *Wide Energy Issues, Including European Energy Markets and Related Environmental Considerations
H. STEEG, Executive Director, International Energy Agency (IEA), Organization for Economic Co-operation and Development (OECD), Paris, FRANCE

2. *Energy Situation in Central and Eastern Europe: The Past and the Present
J. VAVROUSEK, Former Minister and Chairman, Federal Committee for the Environment, Prague, CZECH REPUBLIC

3. *"But Why Doesn't Anybody Know What to Do about Nuclear Waste?"
A.D. ROSSIN, President, American Nuclear Society 1992-93; President, Rossin & Associates, Los Altos Hills, CA, U.S.A.

► SESSION 2

Monday, 13.30 - 17.00

Maly Sal

NATIONAL ENVIRONMENTAL MANAGEMENT REGULATIONS: ISSUES AND ASSESSMENT

Co-Chairmen: K.H. SCHALLER, CEC, Brussels
D. WOOD, Westinghouse Hanford Company, U.S.A.
T. KAGAWA, JGC Corporation, JAPAN

Session Organizer: A. LARSSON, Kemakta Consultant Co., SWEDEN

* Invited paper

1. European Community Legislation and Recommendations in the Field of Radioactive Waste Management and Disposal
K.H. SCHALLER and S. ORLOWSKI, Commission of the European Communities, Brussels

2. "How Clean is Clean" in the United States Federal and Washington State Cleanup Regulations
H.G. LANDAU, Landau Associates, Inc., U.S.A.

3. The U.S. Department of Energy Process for Performance Assessment for Disposal of Low-Level Radioactive Waste
D.E. WOOD, Westinghouse Hanford Company, E.L. WILHITE, Westinghouse Savannah River Company, K.W. OWENS, SAIC, Inc., G.J. DUGGAN, U.S. Department of Energy, U.S.A.

4. Clean-up Standards and Pathways Analysis Methods
J.S. DEVGUN, Argonne National Laboratory, U.S.A.

5. Safety Assessment Comparison Methodology for Toxic and Radioactive Wastes (SACO version 1.0)
C. TORRES, I. SIMON and A. AGUERO, Instituto de Medio Ambiente/CIEMAT, SPAIN, R.H. LITTLE and G.M. SMITH, Intera Information Technologies, U.K.

6. Iterative Performance Assessments as a Regulatory Tool for Evaluating Repository Safety: How Experiences from SKI Project- 90 Were Used in Formulating the New Performance Assessment Project SITE-94
J. ANDERSSON, Swedish Nuclear Power Inspectorate, SWEDEN

7. Safety Concept While Managing Radioactive Waste Formed as a Result of Decontamination Measures at Territories of Ukraine After Chernobyl Power Plant Accident
V.P. KARAMUSHKA, S.G. CHUKHIN and V.V. OSTROBORODOV, VNIPIROMTEKHNOLOGII, RUSSIA

► SESSION 3

Monday, 13.30 - 17.00

Komorni Sal

L/ILW DISPOSAL FROM AN INTERNATIONAL VIEWPOINT

Co-Chairmen: E.J. BONANO, Ktech Corporation, U.S.A.
H. CORNELISSEN, V.R.O.M., THE NETHERLANDS

Session Organizer: L.H. VONS, E.C.N., THE NETHERLANDS

1. Radwaste Disposal Facility in Dukovany NPP
J. KUJOVANY, NPP Dukovany, CZECH REPUBLIC

2. Environmental Radiohygienic Surveillance of the Hungarian Central Radwaste Disposal Site
L. JUHASZ, J. GUCZI, B. KANYAR, D. STUR, I. TURAI and A. UGRON, National Research Institute for Radiobiology and Radiohygiene, HUNGARY

3. Disposal Concept of L/ILW in Germany Project Konrad
J. P. LEMPERT and U. CZAJKOWSKI, DBE, GERMANY

10 TECHNICAL SESSIONS

4. Ultimate Disposal of Low and Medium Level Radioactive Waste in France

C. RINGEARD, ANDRA, FRANCE

5. El Cabril. A Near Surface Repository for L/LW in Spain

P. ZULOAGA and J. GRAVALOS, ENRESA, SPAIN

6. Repository for Final Disposal of Medium Level Wastes

J. CAMPA-PAHISA, Comision Nacional de Energia Atomica, ARGENTINA

7. Operation and Management Plan of the Rokkasho Low-Level Radioactive Waste Storage Center

Y. NAKANISKI, T. TOMOZAWA, Y. MAHARA and H. IIMURA, Japan Nuclear Fuel Ltd., JAPAN

► SESSION 4

Monday, 13.30 - 17.00

Novy Sal

SOLID WASTE VOLUME REDUCTION, TREATMENT AND PACKAGING EXPERIENCE

Co-Chairmen: M. KIKUCHI, Hitachi, JAPAN

F. PASSANT, Nuclear Electric, U.K.

1. Operational Experience Acquired in Radioactive Waste Compaction

S. BAUER and P. MOHR, Kraftanlagen Heidelberg, W. HEMPELMANN, KIK, GERMANY

2. A High Integrity Transportable Supercompactor

J. SIMS, Waste Chem, U.K., G. SCHMIDT, NUKEM, GERMANY

3. The Second Radioactive Waste Volume Reduction System at Hamaoka NPP of the Chubu Electric Power Company

M. SUZUKI and H. NAKAZAWA, The Chubu Electric Power Company, K. HAYASHI, H. YAI and M. OKUNO, NGK Insulators, JAPAN

4. Integrated Treatment and Handling of Highly Activated Components From Nuclear Facilities

K.A. SCHNEIDER, A. KIOLBASSA, and K. A. ROSE, NUKEM GmbH, GERMANY, J. M. RAYMONT, Waste Chem, U.S.A.

5. Low-Level Radioactive Waste Package Inspection for Shipping and Disposal

T. NAKASHIMA and M. HARA, JGC Corporation, JAPAN

6. Mobile Inspection and Repackaging Unit

G.A. WHITNEY and R.J. ROBERTS, Westinghouse Hanford Company, U.S.A.

7. Hard Chemical Decontamination of Steam Generator Tube Bundles

M. DUBOURG and G. DORIMINI, Framatome and M. CAMPANI, EdF, FRANCE

8. Modernization of the Decontamination Methods of the First Loop of a Nuclear Reactor

E.V. ZAKHAROVA and V.I. KAZARIN, Institute of Physical Chemistry, Academy of Sciences of Russia, RUSSIA

TECHNICAL SESSIONS 19

► SESSION 5

Monday, 13.30 - 17.00

Klub I

ENGINEERED AND GEOLOGICAL BARRIERS

Chairman: R. PUSCH, Clay Technology AB, SWEDEN

Session Organizer: J. WALTON, Southwest Research Institute, U.S.A.

1. A Spanish Reference Concept for a Repository in Granite - The Role of the Barrier System

L. B. NILSSON, SKB, Swedish Nuclear Fuel and Waste Management Co., SWEDEN, F. HUERTAS, ENRESA, SPAIN

2. PEGASUS, A European Research Project on the Effects of Gas in Underground Storage Facilities for Radioactive Waste

B. HAJTINK and T. McMENAMIN, Commission of the European Communities, Brussels

3. Waste Package/Engineered Barrier System Design Concepts for the Direct Disposal of Spent Fuel in the Potential United States' Repository at Yucca Mountain, Nevada

D. STAHL, B&W Fuel Company, D. J. HARRISON, U. S. Department of Energy, U.S.A.

4. Hygrothermal Performance of an Engineered Clay Barrier During Sustained Heating

A.P.S. SELVADURAI, Carlton University, C. ONOFREI, AECL Research, CANADA

5. Mechanical Interaction Between Rock, Buffer and Canister in Repositories

L. BORGESSON, Clay Technology AB, SWEDEN

► SESSION 6

Monday, 13.30 - 17.00

Klub II

RECENT DEVELOPMENTS IN ENVIRONMENTAL REMEDIATION TECHNOLOGIES

Co-Chairmen: H. KURIBAYASHI, JGC Corporation, JAPAN

S. SLATE, Battelle Pacific Northwest Laboratories, U.S.A.

1. Combining Innovative Technology Demonstrations with Dense Nonaqueous Phase Liquids Cleanup

M.C. HAGOOD, K.J. KOEGLER, S.J. TRENT and V.J. ROHAY, Westinghouse Hanford Company, S.L. STEIN, T.M. BROUNS, G.H. MCCABE and S.D. TOMICH, Pacific Northwest Laboratories, U.S.A.

2. Basic Directions and Problems of Radioactive Waste Management Program in the "Mayak" Production Association, Chelyabinsk, Russia
E.G. DROZHKO, A.P. SUSLOV, V.I. FETISOV, Y.G. GLAGOLENKO, G.M. MEDVEDEV, V.I. OSNOVIN and E.G. DZEKUN, "Mayak" Production Association, RUSSIA

3. Radioactive Waste Immobilization Technology for Belarus Site Remediation after Chernobyl Accident

A.J. GREBEN'KOV and V.P. TRUBNIKOV, Institute of Power Engineering Problems, V.A. NIKOLAEV, Institute of Radiation and Physical Chemistry Problems, BELARUS, G.T. SURZHIKOV, Special Enterprise "Complex" Research and Production Association "Pripyat", UKRAINE

4. Experience in Mining Plutonium for Soil Clean-up

E.T. BRAMLITT, Defense Nuclear Agency, U.S.A.

5. Remediation Process Technology for Ground Water

L.P. BUCKLEY, S. VIJAYAN and P.C. WONG, AECL, Chalk River Laboratory, CANADA

6. Applications of Robotics in Environmental Remediation

P.W. KRUSE, Spar Aerospace Limited, CANADA

7. In Situ Vitrification: Providing a Comprehensive Solution for Remediation of Contaminated Soils

J.S. TIXIER and L.E. THOMPSON, Pacific Northwest Laboratories, U.S.A.

.....
► **SESSION 2**

Monday, 13.30 - 17.00

S2

RADIOACTIVE TRANSPORTATION AND RELATED ISSUES

Co-Chairmen: B. GUSTAFSSON, SKB, SWEDEN

L.H. HARMON, U.S. DEPARTMENT OF ENERGY, U.S.A.

Session Organizer: O. S. WANG, Westinghouse Hanford Co., U.S.A.

1. COGEMA Operating Experience in the Transportation of Spent Fuel, Nuclear Materials and Radioactive Waste

H. BERNARD and J. I. CHARLES, COGEMA, FRANCE

2. Castor Cask With High Loading Capacity for Transport and Storage of VVER 440 Spent Fuel

R. DIERSCH and D. METHLING, GNB-Essen, GERMANY

3. Ontario Hydro's Transportation of Radioactive Material and Emergency Response Plan

N. KARMAI, Ontario Hydro, CANADA

4. Risk Assessment and Management of Onsite Transportation of Nuclear Wastes

O.S. WANG and J. G. FIELD, Westinghouse Hanford Co., U.S.A.

5. Cask Drop Onto Reinforced Concrete Slab During Cask Handling in Storage Facility

C. ITO and K. SHIRAI, Central Research Institute of Electric Power Industry (CRIEPI), JAPAN

6. Fire Test for the KSC-4 Spent Fuel Transport Cask

H. LEE and S. CHUNG, KAERI, Korea Atomic Energy Research Institute, KOREA

.....
► **SESSION 8**

Tuesday, 8.30 - 12.00

Maly Sal

SIGNIFICANT ISSUES AND STRATEGIES IN ENVIRONMENTAL MANAGEMENT

Co-Chairmen: A. SUZUKI, The University of Tokyo, JAPAN

R.P. WHITFIELD, U.S. Department of Energy, U.S.A.

Session Organizers: R. KOHOUT, Kohout & Associates, Ltd., CANADA

S. SLATE, Battelle Pacific Northwest Laboratories, U.S.A.

1. The United States Department of Energy's Environmental Restoration Program

P. WHITFIELD and J.C. LEHR, U.S. Department of Energy, U.S.A.

2. Investigation of the Feasibility of an International Integrated Demonstration

M.C. HAGOOD, Westinghouse Hanford Company, T.M. BROUNS, A.M. LESPERANCE, G.H. McCABE and S.L. STEIN, Pacific Northwest Laboratories, U.S.A.

3. Russian Prospects for Plutonium Utilization

E.G. KUDRYAVTSEV and E.I. MIKERIN, Ministry for Atomic Energy of the Russian Federation, RUSSIA

4. Technological Aspects of U and Pu Recycle as Most Important in Closed Nuclear Fuel Cycle

B.V. NIKIPELOV and E.G. KUDRYAVTSEV, Ministry for Atomic Energy of Russian Federation, B.S. ZAKHARKIN, I.S. GOLOVNIN, A.A. Bochvar Scientific Research Institute of Inorganic Materials, V.N. OSNOVIN and E.G. DZEKUN, Facility "Mayak", E.A. FILIPPOV, Scientific Research Institute of Chemical Technology, RUSSIA

5. The Plutonium Issue and the Environmental Problem

A. SUZUKI, The University of Tokyo, JAPAN

6. Comparison of Recycle and Disposal Options for Fissile Materials Arising From Disarmament Treaties

N.J. NUMARK, N.J. Numark Associates, Inc., T. SUZUKI, Massachusetts Institute of Technology, U.S.A.

7. The Negotiator: A Novel Approach for Gaining Public Acceptance

D.H. LEROY, Office of the United States Nuclear Waste Negotiator, U.S.A.

.....
► SESSION 9

Tuesday, 8.30 - 12.00

Komorni Sal

NATIONAL PROGRAMS FOR HLW AND SPENT FUEL MANAGEMENT

Co-Chairmen: P.-E. AHLSTROEM, Swedish Nuclear Fuel and Waste Management Co., SWEDEN
 L.H. HARMON, U.S. Department of Energy, U.S.A.
 J.-P. OLIVIER, OECD/NEA, Paris

1. The French National Program for Spent Fuel and High Level Waste Management

J.P. GIRAUD and J.A. deMONTALEMBERT, COGEMA, FRANCE

2. German Program for Vitrified HLW and Spent Fuel Management

W. LUTZE and K.D. CLOSS, KIK Karlsruhe, GERMANY

3. Swedish Spent Fuel Management: Systems, Facilities and Operating Experiences

J. VOGT, SKB, Swedish Nuclear Fuel and Waste Management Co., SWEDEN

4. Spent Fuel Management of the Finnish Nuclear Power Plants

V. RYHANEN, TVO, Teollisuuden Voima Oy, and J. PALMU, IVO, Imatran Voima Oy, FINLAND

5. Conceptual Approach to Radioactive Waste Management in Czech Republic

J. MAREK, Ministry of Industry and Trade, CZECH REPUBLIC

6. Spanish High Level Radioactive Waste Management System Issues

A. ULIBARRI and A. VEGANZONES, ENRESA, SPAIN

7. Technology Development Program for Idaho Chemical Processing Plant

L.F. ERMOLD and D.A. KNECHT, Westinghouse Idaho Nuclear Company, Inc., U.S.A.

.....
► SESSION 10

Tuesday, 8.30 - 12.00

Novy Sal

DECOMMISSIONING OF NUCLEAR POWER REACTORS

Co-Chairmen: W. HEAFIELD, British Nuclear Fuels plc, U.K.
 K. LEE, Korea Advanced Institute of Science and Technology, KOREA

1. The Preliminary Planning for Decommissioning Nuclear Facilities in Taiwan

K.K. LI, Da-Yeh Institute of Technology, TAIWAN, CHINA

2. Decommissioning of Nuclear Power Plant A-1

M. BOSANSKY, R. HUDCOVIC and D. GOLIAN, NPP Bohunice, SLOVAK REPUBLIC

3. Decommissioning Experience with Whiteshell Research 1

R.A. HELBRECHT, AECL Whiteshell Laboratories, CANADA

4. Decommissioning Concept for the Thorium High-Temperature Reactor THTR-300

A. STERINGER, H. KRATZ and M. SUCHOWITZ, Kraftanlagen AG Heidelberg, GERMANY

5. Decommissioning of Reactors 1 - 5 of the Greifswald NPS (KGR)

S. BAUER, K. KOHLER and M. SUCHOWITZ, Kraftanlagen AG Heidelberg, GERMANY

6. Decommissioning Experience: One-Piece Removal and Transport of a LWR Pressure Vessel and Internals

J.W. CLOSS, Northern States Power Company, U.S.A.

7. The Decommissioning of the Graphite Moderated Production Reactors at the U.S. Department of Energy's Hanford Site

S.T. SPENCE, Kaiser Engineers Hanford Company, U.S.A.

.....
► SESSION 11

Tuesday, 8.30 - 12.00

Klub I

DESIGN OF INTEGRATED SYSTEMS FOR MANAGEMENT OF NUCLEAR WASTES

Co-Chairmen: R. BAKER, NUS Corporation, U.S.A.
 L.P. BUCKLEY, AECL, CANADA

1. KKP-Waste Treatment and Disposal

W. BLASER and E. GRUNDKE, NPP Philippsburg, GERMANY

2. Review of CANDU NPP Environmental Releases and Waste Production: Current Experience and Future Initiatives

D. BARBER, B.A. SHALABY and L.P. BUCKLEY, Atomic Energy of Canada Limited, CANADA

3. Design and Operation of the Surry Radwaste Facility

L. MORRIS, Virginia Power Surry Radwaste Facility, W. HALVERSON, JGC Corporation, U.S.A.

4. Studies on an Advanced Repository System with Enhanced Engineered Barriers (A Framework)

A. FUJIWARA, S. TASHIRO, and S. IKARI, Radioactive Waste Management and A. SUZUKI, Tokyo University, JAPAN

5. Low Level Waste Management at Nuclear Electric Power Stations

S.C. GORDELIER and P.B. WOOLAM, Nuclear Electric, U.K.

6. Low and Intermediate Level Waste Management in EdF PWRS

J.M. DUCOULOMBIER and B. LANTES, EdF Industrial Safety, FRANCE

7. Radioactive Waste Computerized Management
M. COMMUNAUX and B. LANTES, EdF, FRANCE

.....
► **SESSION 12**

Tuesday, 8.30 - 12.00

Klub II

MIXED (HAZARDOUS AND RADIOACTIVE) WASTE TREATMENT AND DISPOSAL (I)

Co-Chairmen: A. DE GOEYSE, ONDRAF, BELGIUM
J. CLINE, Private Consultant, U.S.A.

Session Organizer: E. McDANIEL, Oak Ridge Laboratory, U.S.A.

1. Thermal Treatment of Organic Radioactive Waste
A. CHRUBASIK and W. STICH, NUKEM, GmbH, GERMANY
2. Thermal Behavior of Hazardous and Radioactive Metals Under Incineration Conditions
Y.C. SEO, H.C. YANG, H.H. PARK and K. H. KANG, Korea Atomic Energy Research Institute, KOREA
3. Treatment of Waste by Molten Salt Oxidation Process at the Oak Ridge National Laboratory
S.M. CROSLEY, D.K. LORENZO and J.E. VAN CLEVE, Oak Ridge National Laboratory and R.L. GAY, K.M. BARCLAY, J.C. NEWCOMB, and S.J. YOSIM, Rockwell International, U.S.A.
4. Molten Salt Oxidation of Mixed Wastes
J.D. NAVRATIL and R.L. GAY, Rockwell International, U.S.A.
5. Deep Geological Disposal of Mixed Waste in Bedded Salt: The Waste Isolation Pilot Plant
N.T. REMPE, Westinghouse Electric Corporation, U.S.A.
6. U.S. Department of Energy, Office of Technology Development, Mixed-Waste Treatment Research, Development, Demonstration, Testing and Evaluation
J.B. BERRY, Oak Ridge National Laboratory, G.J. COYLE, JR. and P. LURK, U.S. Department of Energy, U.S.A.

.....
► **SESSION 13**

Tuesday, 8.30 - 12.00

S2

ER SITE CHARACTERIZATION AND MONITORING

Co-Chairmen: M.C. HAGOOD, Westinghouse Hanford Company, U.S.A.
Y.V. KUZNETSOV, V.G. Khlopin Radium Institute, RUSSIA

1. Vadose Zone Characterization of Highly Radioactive Contaminated Soils at Hanford

M.A. BUCKMASTER, Westinghouse Hanford Company, U.S.A.

2. Characterization of a Site Contaminated by Waste From a Monazite Ore Processing Plant

D.C. LAURIA, Y. NOUAILHETAS, V.R. REIS and J.M. GODOY, Instituto de Radioprotecao e Dosimetria, E.G. AGUDO, Companhia de Tecnologia de Saneamento Ambiental, BRAZIL

3. Monitoring of Radioactive Contamination of Water Systems After Chernobyl Accident

Y.V. KUZNETSOV, V.G. Khlopin Radium Institute, RUSSIA

4. Problems of Radioactive Waste Disposal in the Territory of Republic Belarus

V.M. EFREMENKOV, State Committee on Supervision of Industrial and Nuclear Safety, A.V. KUDEL'SKY and N.G. YASOVEEV, State Committee of Geology, BYELORUSSIA

5. History, Contamination and Monitoring of Water Bodies at the P/A "Mayak"

E.G. DROZHKO, V.I. SHARALAPOV, A.K. POSOKHOV, N.V. KUZINA and G.A. POSTOVALOVA, Ministry for Atomic Energy, RUSSIA

6. Radiation Monitoring System for Nuclear Reprocessing Plant of "Mayak" Production Association

E.B. SMETANINA, E.G. DROZHKO and V.I. SHARALAPOV, Production Association "Mayak", RUSSIA

7. Measurement Network for Impact Assessment of Industrial Radon Sources

S. BERNHARD and Y. VAUZELLE, ALGADE, N. FOURCADE and P. ZETTWOOG, CERTAC SA, FRANCE, W. MILLER, DSR GmbH, GERMANY

.....
► **SESSION 14**

Tuesday, 9.00 - 12.00

Poster

ADVANCED L/LW CONDITIONING TECHNOLOGIES INCLUDING INCINERATION

Co-Chairmen: R. BURCL, NPP Research Institute, SLOVAK REPUBLIC
M.R. JOUAN, C.E. VALRHO, FRANCE
M. KIKUCHI, Hitachi, JAPAN

Session Organizer: P. WILLIAMS, Williams & Associates, U.S.A.

1. A High Performance Cement for Solidification of Spent Ion Exchange Resin

M. KIKUCHI, M. MATSUDA, T. NISHI, S. TAMATA and T. IZUMIDA, Hitachi, JAPAN

2. Advanced Cement Solidification System

T. NAKASHIMA, H. KURIBAYASHI and F. TODO, JGC Corporation, JAPAN

3. Fibre Reinforced Concrete An Advanced Technology for LL/ML Radwaste Conditioning and Disposal
E. TCHEMITCHEFF, SGN, A. VERDIER, Sogefibre, FRANCE
4. Cement Encapsulation of Intermediate Level Waste Slurries
H.G. LEWIS, and C.M. CASSIDY, British Nuclear Fuels plc, U.K.
5. Processing of Radioactive Waste Produced in Czechoslovak Nuclear Power Plants by Means of the Bitumination Technology
A. PEKAR, L. DAVID and M. BREZA, VUJE Trnava, SLOVAK REPUBLIC
6. Ceramization of Low and Intermediate Level Radioactive Waste
X. BERSON and O. FIQUET, CEA-DCC Centre de Cadarache, FRANCE
7. TRESS - A Transportable Radioactive Effluent Solidification System
J. SIMS, Waste Chem, U.K.
8. Vitrification of Intermediate Level Liquid Radioactive Waste
S.A. DMITRIEV, A.P. KOBELEV, F.A. LIFANOV, M.I. OJOVAN, A.E. SAVKIN and I.A. SOBOLEV, Moscow Scientific Industrial Association "RADON", RUSSIA
9. Vitrification of Reactor Waste
J. SUSSMILCH, Nuclear Research Institute Rez, CZECH REPUBLIC, A. JOUAN, CEA, FRANCE
10. Concentration, Drying, and Calcination of Liquid or Powdered Radioactive Waste by the Isolfash Process
X. AUGUSTIN and A. DE BUZONNIERE, Technicatome, G. BRUNEL, C.E.A., FRANCE
11. The Development of Plant for Reprocessing of Radioactive Waste From Atomic Power Plant Decommissioning With Cementation Method
A.S. BARINOV, A.S. VOLKOV, S.A. DMITRIEV, V.U. FLIT and V.M. CHEBISHOP, Moscow Scientific Industrial Association "RADON", RUSSIA
12. Conditioning of Spent IER From PWR Nuclear Power Plants
A. DE BUZONNIERE and X. AUGUSTIN, Technicatome, G. BRUNEL and H. MASSIT, C.E.A. FRANCE
13. A New Process for Volume Reduction of Radwaste, Drying and Calcination of Crystals
V.B. KRAPUKHIN, V.I. KARETA, V.D. ZURIN, V.A. LAVRIKOV and S.E. GRUSHERSKY, Institute of Physical Chemistry of the Russian Academy of Sciences, RUSSIA
14. Research Activities of NPPRI in the Field of Radioactive Waste Management
R. BURCL, A. PEKAR, E. TITLOVA and M. BREZA, Nuclear Power Plants Research Institute, SLOVAK REPUBLIC
15. Processing Liquid Radioactive Waste by Centrifuge and Indrum Drying Facility at NPP Phillipsburg
W. BLASER and E. GRUNDKE, Kernkraftwerk Phillipsburg, K. BLINN, Siemens, GERMANY
16. Advanced Treatment Processes for Low and Intermediate Level Radwastes in India
S.K. SAMANTA, I.J. SINGH, M. RAMASWAMY and T.K. THEYYUNNI, Bhabha Atomic Research Centre, INDIA

17. Fundamental Study on Recovery of Uranium Oxide From HEP-7 Filters
H. MATSUMOTO, T. IZUMIDA, H. TSUCHIYA and H. IBA, Hitachi, JAPAN
18. Treatment (Separation and Recovery of Uranium) of Solid Wastes (Sludge Form) Generated at Uranium Fuel Fabrication Plants
H. SHIMAUCHI, H. NAKAHIRA, K. KIRISHIMA and H. SUGAI, Tokai Research Center and M. YAMAMOTO, Radioactive Waste Management Center, JAPAN
19. Development of a Uranium Reduction System for Incineration Residue Generated at LWR Nuclear Fuel Fabrication Plant for LWR in Japan
H. KAI, N. SUZUKI, T. SATO and T. SAMPEI, Nuclear Fuel Industries Ltd., H. HIRATA, RWM Center, JAPAN
20. The Hanford Purex Plant Process Condensate Effluent Treatment Facility (ETF)
S. GOETSCH and E. DAY, ADTECHS Corporation, K. RICKENBACH, Kaiser and J.W. KELLY, Westinghouse Hanford Company, U.S.A.
21. Operational Experience of the Juelich Incineration System in the Treatment of Radioactive Waste
W. LINS, Kraftanlagen Heidelberg, S. HALASZOVICH, KFA Juelich, GERMANY
22. Volume Reduction and Vitrification of Nuclear Waste With Thermal Plasma
W. HOFFELNER, Moser-Glaser & Co. Ltd., SWITZERLAND
23. A Solution to Level 3 Dismantling of Gas Cooled Reactors: Graphite Incineration
M. DUBOURG, Framatome, FRANCE
24. Mixed Incineration of RIAW and Liquid Scintillator Waste After Storage for Decay
K. NABA, K. NAKAZATO and K. KATOAKA, Radiation Safety Laboratory, Kio University, JAPAN
25. Incineration of Radioactive Waste in Shaft Furnace
S.A. DMITRIEV, I.A. KNYASEV and A.P. KOBELEV, Moscow Scientific and Industrial Association "Radon", RUSSIA
26. The Application of Probabilistic Risk Assessment to a LLW Incinerator
K.K. LI, Da-Yeh Institute of Technology, F.T. HUANG, National Tsing Hua University, TAIWAN, CHINA

.....

► SESSION 15

Tuesday, 13.30 - 17.00

Maly Sal

NATIONAL PROGRAMS FOR L/ILW MANAGEMENT

Co-Chairmen: D. ALEXANDRE, C.E.A./C.E.N. Cadarache, FRANCE
C. OZAKI, EG&G, U.S.A.

Session Organizer: A. Miller, Private Consultant, U.S.A.

1. Concept and Experiences with LLW and MLW Handling in CZECH and SLOVAK REPUBLICS

L. NEUMANN, M. HOLAN, L. TOMIK, J. KULOVANY and P. SIEFERT,
Nuclear Research Institute Rez, CZECH REPUBLIC

2. The Institutional Wastes Management in the Czech Republic

J. HOLUB, M. JANU and J. MARSAL, Institute for Research,
CZECH REPUBLIC

3. Low Level Radioactive Waste Management in Canada

P.A. BROWN and G.A. UNDERDOWN, Energy Mines and Resources,
R.W. POLLOCK, Low Level Radioactive Waste Management Office, CANADA

4. Environmental Policy on L/LLW Management and Disposal in China

Z. YAMIN, National Environmental Protection Agency, CHINA

5. Status of Radioactive Waste Management in Taiwan

C.C. HUANG, Radwaste Administration Atomic Energy Council, TAIWAN,
CHINA

6. Radioactive Waste Management in India-Practices and Experience

R.V. AMALRAJ, R.C. RASTOGI, M.S. KUMRA, M.K.T. NAIR and
A. PRASAD, Bhabha Atomic Research Center, INDIA

7. Radioactive Waste Management at Nuclear Electric Power Stations

S.C. GORDELIER, Nuclear Electric, U.K.

8. The Recent Advance in Low-Level Waste Management in Japanese Utilities

T. ENOMOTO, Tokyo Electric Power Co., JAPAN

► SESSION 16

Tuesday, 13.30 - 17.00

Komorni Sal

RECENT ADVANCES IN HLW TREATMENT

Co-Chairmen: C.C. CHAPMAN, Battelle Pacific Northwest
Laboratories, U.S.A.

V.S. TSYPLENKOV, IAEA, Vienna

O. VOJTECH, Nuclear Research Institute Rez,
CZECH REPUBLIC

1. Progress Achieved in HLW Vitrification Techniques at INE

W. GRUNEWALD and G. ROTH, KIK Karlsruhe, GERMANY

2. Pretreatment of High Level Radioactive Waste at the West Valley Demonstration Project

P.J. VALENTI and J.A. YEAZEL, West Valley Nuclear Services Co., Inc.,
U.S.A.

3. Vitrification of HLLW in the People's Republic of China

D. SUN and X. WANG, Beijing Institute of Nuclear Engineering (BINE),
CHINA

4. Technology and Apparatus for Solidification of Radioactive Wastes from Nuclear Fuel Cycle by High Temperature Adsorption of Metals on Inorganic Matrices

A.K. NARDOVA and E.A. PHILIPPOV, Russian Research Institute of
Chemical Technology, RUSSIA

5. Measurement of Cesium and Mercury Emissions from the Vitrification of Simulated High Level Radioactive Waste

J.R. ZAMECNIK, Westinghouse Savannah River Company, U.S.A.

6. Radioactive Waste Immobilization in Protective Ceramic Forms by the HIP Method at High Pressures

S.Yu. SAYENKO, Kharkov Institute of Physics & Technology, and
V.P. KANTSEDAL, Kharkov Institute of Physics and Technology, UKRAINE

7. Mobile Unit for High Active Spent Radiation Sources Immobilization

I.A. SOBOLEV and M.I. OZHOVAN, Moscow Scientific and Industrial
Association RADON, RUSSIA

► SESSION 17

Tuesday, 13.30 - 17.00

Novy Sal

DECONTAMINATION AND DECOMMISSIONING OF OTHER NUCLEAR FACILITIES

Co-Chairmen: K. ISHIGURE, University of Tokyo, JAPAN

B. VIGREUX, S.G.N., FRANCE

1. Project Specific Selection of Decommissioning Techniques

B.G. CHRIST and E.L. WEHNER, NUKEM GmbH, GERMANY

2. The Experience of Decontamination Operations under the Conditions of the Chernobyl NPP Accident

N.P. ARKHIPOV, G.S. MESHALKIN and A.N. ARKHIPOV, Pripjat Research
and Industrial Association, UKRAINE

3. Research on Clean-up of Buildings and Structures in Urban Areas of Ukraine Affected by the Accident at the Chernobyl NPP

I.F. VOVK, Ministry for Environmental Protection of Ukraine,
N.P. MOVCHAN, Y.G. FEDORENKO, A.A. SHIPOGUN and B.P. ZLOBENKO,
Department of Radiogeochemistry of Environment, UKRAINE

4. Decommissioning and Waste Disposal Methods for an Uranium Mill Facility in Spain

J.L. SANTIAGO, ENRESA, M. SANCHEZ, INITEC, SPAIN

5. Decontamination and Dismantling of the Piver Prototype Vitrification Facility at Marcoule, France

S. ROUDIL and G. SCELO, SGN, C. DESCHAUD and A. JOUAN, CEA,
FRANCE

6. Decommissioning of the Gaseous Diffusion Plant at BNFL Capenhurst

S.G. BAXTER, British Nuclear Fuels plc, U.K., P. BRADBURY, British
Nuclear Fuels plc, Inc., U.S.A.

7. Decommissioning Experience and Plans at BNFL Sellafield and AEA Windscale
A. COLQUHOUN, British Nuclear Fuels plc, G. WREN, AEA Windscale, U.K.

.....
► **SESSION 18**

Tuesday, 13.30 - 15.00

Klub I

ACCEPTANCE CRITERIA FOR VERY LOW-LEVEL RADIOACTIVE WASTES

Co-Chairmen: G. LINSLEY, IAEA, Vienna
L. NACHMILNER, Nuclear Research Institute Rez, CZECH REPUBLIC

1. BRC Waste Management in Taiwan
T.D.S. LIU, Radwaste Administration Atomic Energy Council, TAIWAN, CHINA
2. Criteria for Releases and Disposal of Low Level and Intermediate Level Waste in Sweden
G. LINDBOM, Swedish Radiation Protection Institute, SWEDEN
3. CERISE, a French Radioprotection Code, to Assess the Radiological Impact and Acceptance Criteria of Installations for Material Handling, and Recycling or Disposal of Very Low Level Radioactive Waste
P. SANTUCCI and P. GUETAT, CEA, FRANCE

.....
► **SESSION 19**

Tuesday, 13.30 - 17.00

Klub II

MIXED (HAZARDOUS AND RADIOACTIVE) WASTE TREATMENT AND DISPOSAL (II)

Co-Chairmen: A. DE GOEYSE, ONDRAF, BELGIUM
J. CLINE, Private Consultant, U.S.A.
Session Organizer: E. McDANIEL, Oak Ridge Laboratory, U.S.A.

1. Radioactive and Chemtoxic Waste: Only Radioactive Waste?
M. TOCCI, ENEA, ITALY
2. The Waste Isolation Pilot Plant - A Solution to Intermediate-Level Mixed Waste Disposal
A.E. HUNT, U.S. Department of Energy, J.B. TILLMAN, S.M. Stoller Corporation, U.S.A.
3. Radioactive Mixed Waste Disposal
W.G. JASEN, and E.G. ERPENBECK, Westinghouse Hanford Company, U.S.A.

4. Immobilization of Incombustible Waste Using Cement
M. TOYOHARA, Y. MINAMI, M. WADA, H. HEKI and H. MATSUURA, Toshiba Corporation, JAPAN

5. Heavy Metals in Radioactive Waste from Belgian Nuclear Installations: Identification - Production - Prevention
B. SKA, A. DE GOEYSE, ONDRAF/NIRAS, BELGIUM

6. Integrated Treatment Process for Hazardous and Mixed Wastes
K. SUZUKI, M. FUJIMURA, M. SHIBYA, T. NAKASHIMA and Y. MORIYA, JGC Corporation, JAPAN

.....
► **SESSION 20**

Tuesday, 13.30 - 17.00

S2

PREDICTION OF CONTAMINANT MIGRATION AND RELATED DOSES

Co-Chairmen: E.G. DROZHKO, Russian Academy of Sciences, RUSSIA
M. VANECEK, Nuclear Research Institute Rez, CZECH REPUBLIC

1. Radioactivity Pollution and Protection of Underground Waters within the Location of Nuclear Power Plants in Jaslavske Bohunice
J. PLSKO and M. KOSTOLANSKY, EKOSUR, R. POLAK, HYDROPOL, SLOVAK REPUBLIC
2. The Prospects of Usage of Information Data Base at the Production Association "Mayak" as for Modeling of the Ural Region Ecosystems
G. MOKROV, G. DROZHKO, V. GLAGOLENKO and A.B. SMIRNOV, Ministry of Atomic Energy of Russian Federation, RUSSIA
3. The Role of Waterpath in Forming the Effective Irradiation Doses for Public Living in Dniper Areas
A.M. SERDYUK, V.I. GEETS, V.V. SIKORENKO-GUSAR, Ukrainian State Medical Center of Environmental Health, UKRAINE
4. German Contribution to the Assessment of Doses and Health Risks from Nuclear Catastrophes in the Former Soviet Union
W. BURKART, Institute for Radiation Hygiene, GERMANY
5. Field Studies of Engineered Barriers for Closure of Low Level Radioactive Waste Landfills at Los Alamos, New Mexico, USA
J.W. NYHAN, G.J. LANGHORST, C.E. MARTIN, J.L. MARTINEZ and T.G. SCHOFIELD, Los Alamos National Laboratory, U.S.A.
6. The Validity of Generic Limits on Residual Uranium-238 Radioactivity in Soil
R.P. WOOD and R.E. ECKART, University of Cincinnati, U.S.A.
7. An Analysis of Exposures Resulting from Thorium Resident in Soils
T. IJAZ and R.E. ECKART, University of Cincinnati, U.S.A.

.....
► SESSION 21

Tuesday, 14.00 - 17.00

Poster

SCIENCE AND ENGINEERING OF THE REPOSITORY SYSTEM

Co-Chairmen: A. ALOY, V.G. Khlopin Radium Institute, RUSSIA
 R. PUSCH, Clay Technology AB, SWEDEN

Session Organizer: J. WALTON, Southwest Research Institute, U.S.A.

1. Incentives for and Methodology of the Study on Radiation Induced Glass Wasteform Degradation

A. ALOY, V.G. Khlopin Radium Institute, A. NECHAEV, Leningrad Technological Institute, RUSSIA

2. Investigation of Cs, Sr, U(VI) Sorption on Analcime and Mica-Layer Phases at Elevated T and P

A.F. RED'KIN, Russian Academy of Science, RUSSIA

3. Behaviour of HLWF Characterized By Means of Radiometric Emanation Method Under In-Situ Repository Simulated Conditions

V. BALEK, Nuclear Research Institute Charles University, CZECH REPUBLIC

4. Status of Disposal Techniques for Spent Fuel in Germany: Results of Demonstration Tests for Direct Disposal

H.J. ENGELMANN and W. FILBERT, DBE, GERMANY

5. Salt Brickwork as Long-Term Sealing in Salt Formations

F. WALTER and U. YARAMANCI, GSF, GERMANY

6. Impact of Alpha-Recoil Damage on Dissolution of Thoriated Glass

Y. EYAL, Technion - Israel Institute of Technology, ISRAEL, R. C. EWING, University of New Mexico, U.S.A.

7. Temperature and pH Dependence of Neptunium(V) Sorption on Bentonite

T. OHE and M. TSUKAMOTO, Central Research Institute of Electric Power Industry (CRIEPI), JAPAN

8. Primary Diffusion Path of Uranium (VI) in Laboratory Scale Water-Saturated Inada Granite

K. IDEMITSU and H. FURUYA, Kyushu University, JAPAN

9. Creep Analysis of the Rock Around Engineered Barriers

Y. MITANI and Y. UTSUGIDA, Shimizu Corporation, JAPAN

10. Water Transport in the Near Field Rock of a Blasted Tunnel in a Repository

L. BORGESSON and R. PUSCH, Clay Technology AB, SWEDEN

11. Longevity of Smectite Buffers in Repositories

R. PUSCH and O. KARNLAND, Clay Technology AB, SWEDEN

12. Diffusion of Ions in Compacted Bentonite

F.T. MADSEN and G. KAHR, Swiss Federal Institute of Technology (ETH), SWITZERLAND

13. Analysis of Waste Package Environment as Related to Initiation and Propagation of Localized Corrosion

J.C. WALTON and N. SRIDHAR, Southwest Research Institute, U.S.A.

.....
► SESSION 22

Wednesday, 9.30 - 12.00

Hotel Forum

NATIONAL EXAMPLES OF SPENT FUEL STORAGE SYSTEMS

Co-Chairmen: B. HEAFIELD, British Nuclear Fuels plc, U.K.

S. NAQVI, Ontario Hydro, CANADA

1. BNFL Experience in the Design and Operation of Spent Fuel Storage Facilities

C. BRISTOL, BNFL, British Nuclear Fuels, U.K.

2. Spent Fuel Storage: A Reliable Technology in the Back End of Fuel Cycle

M. PEEHS and J. BANCK, Siemens AG, GERMANY

3. Study on Concrete Cask Storage of Spent Fuel in Japan

C. ITOH, Central Research Institute of Electric Power Industry (CRIEPI), A. ONODERA, Hitachi Zosen Corporation, JAPAN

4. MACSTOR: Dry Spent Fuel Storage for the Nuclear Power Industry

F.E. PARE and P. PATTANTYUS, AECL CANDU, CANADA

5. Leaker B.W.R. Spent Fuel Elements: Radiochemical Analysis on Cover Gases of Storage Containers After Long Storage

A.L. PARATORE, ENEL SPA, DPT-UAN, G. PASTORE, FIAT SEPIN, C.D.R., ITALY

6. Spent VVER Fuel Storage Subcriticality Investigation

J. BROULIK and L. MARKOVA, Nuclear Research Institute Rez, CZECH REPUBLIC

7. Feasible Variants for Intermediate Storage of the Spent Fuel Obtained at NPP Cernavoda, Romania

M. RADU and G. POPESCU, Institute of Power Studies and Design, ROMANIA

.....
► SESSION 23A

Wednesday, 8.30 - 12.00

Komorní Sal

PROCESSES FOR PUBLIC INVOLVEMENT IN ENVIRONMENTAL ACTIVITIES AND DECISIONS

Co-Chairmen: K.D. KUHN, WAK Karlsruhe, GERMANY

J. MAREK, Ministry of Industry and Trade, CZECH REPUBLIC

Session Organizer: S. UNGERMARK, SKB, SWEDEN

34 TECHNICAL SESSIONS**1. Technical Advantages and Political Necessity of Public Involvement in Environmental Remediation: The Case of the U.S. and Russian Weapons Complexes**

J.C. SHIDELER, JK Research Associates, Inc., U.S.A.

2. Managing Low-Level Radioactive Waste in a Democratic Society: Requirements and Accommodations

T. ORTEIGER, Illinois Department of Nuclear Safety, M. AYERS, Sangamon State University, U.S.A.

3. Nuclear Waste Policy and Public Acceptance in France Since 1979

J.C. GUAIS, NUSYS, FRANCE

4. Total Quality Management Applications for Hanford's Five-Year Plan and Public Outreach

J.M. PETERSON, U.S. Department of Energy, U.S.A.

5. Public Acceptance Activities for the Development of New Commercial Low-Level Radioactive Waste Disposal Capacity in the United States of America

C.B. OZAKI and R.L. SCOTT, EG&G Idaho, Inc., U.S.A.

6. The Value and Need for Long Term Conservation of Information Regarding Nuclear Waste Repositories

T. ENG, Swedish Nuclear Fuel & Waste Management Co., M. JENSEN, The Swedish Radiation Protection Institute, SWEDEN

.....
► **SESSION 23B**

Wednesday, 13.30 - 17.00

Klub I

RECENT EXPERIENCES IN PUBLIC PARTICIPATION ACTIVITIES

Co-Chairmen: K.D. KUHN, WAK Karlsruhe, GERMANY
J. MAREK, Ministry of Industry and Trade, CZECH REPUBLIC

Session Organizer: S. UNGERMARK, SKB, SWEDEN

1. Public and Political Issues in HLW Management: The Spanish Approach

V. GONZALEZ, ENRESA, M. MOLINA, ENRESA, SPAIN

2. Site Selection and Characterization for the Historic Low-Level Radioactive Wastes in Ontario, Cooperative Siting Process

A.D. PAKTUNC, Department of Energy, Mines and Resources, CANADA

3. Radioactive Waste Repository Site Selection in the Republic of Slovenia

M. JERAN and B. DUHOVNIK, Elektropojekt Ljubljana, SLOVENIA

4. The Yami's Opposition to the Lanya LLW Storage Installation

K.K. LI, Taiwan Power Company, TAIWAN, CHINA, S.Y. CHANG, Georgia Institute of Technology, U.S.A.

TECHNICAL SESSIONS 35**5. Public and Political Issues in Radioactive Waste Management in the Federal Republic of Germany**

A. NEIS, Federal Ministry for Environment, GERMANY

.....
► **SESSION 24**

Wednesday, 8.30 - 12.00

Novy Sal

L/ILW WASTE CHARACTERIZATION, ASSAY, AND TRACKING SYSTEMS (I)

Co-Chairmen: C. HORNIBROOK, EPRI, U.S.A.
D. JAMES, Private Consultant, U.S.A.

Session Organizer: C. TORRES-VIDAL, CIEMAT, SPAIN

1. Control and Tracking Arrangements for Solid Low-Level Waste Disposals to the United Kingdom DRIGG Disposal Site

K.G. ELGIE and P. GRIMWOOD, British Nuclear Fuels plc, U.K.

2. Tracking Low-Level Radioactive Waste: A Continental System

N.R. KING, Regulatory Management Consultants, U.S.A.

3. Evaluating Long-Lived Nuclides in Low-Level Waste Streams

D. JAMES, D.W. James & Associates, U.S.A.

4. Development and Application of a Gamma Scanning System for LLW and ILW Packages

J.A. SUAREZ, G. PINA and C. PEREZ, CIEMAT, SPAIN

5. Results of Low Level Waste Analysis of Plutonium with a Passive Neutron Coincidence Counter

D.R. DAVIDSON and E.R. MARTIN, Jomar Systems Division, Canberra Industries, U.S.A.

6. A Proposal for Radioactive Waste Reclassification

D.V. LEMONE, University of Texas at El Paso, L. JACOBI, JR., Texas Low-Level Radioactive Waste Disposal Authority, U.S.A.

.....
► **SESSION 25**

Wednesday, 8.30 - 12.00

Klub I

TREATMENT OF WASTES FROM DECONTAMINATION AND DECOMMISSIONING OPERATIONS

Co-Chairmen: J. BLAZEK, DECOM, SLOVAK REPUBLIC
J. MOORE, U.S. Department of Energy, U.S.A.

1. Integrated System for Management of Decommissioning and Mixed Wastes in Germany

E.R. MERZ, Research Center Juelich, KFA, GERMANY

2. Development of Decontamination Techniques for Decommissioning Commercial Nuclear Power Plants

T. ISHIKURA, T. MIWA, T. ONOZAWA and H. OHTSUKA, Nuclear Power Engineering Corporation, K. ISHIGURE, University of Tokyo, JAPAN

3. Recent Trends in the Area of the Decontamination of Nuclear Power Plants in the Slovak Republic and in the Czech Republic

D. MAJERSKY, M. SOLCANYI and M. PRAZSKA, AIDeco, SLOVAK REPUBLIC

4. Analysis of the Treatment of the Radioactive Wastes Arising From the NPP-V1 Decommissioning

E. HLADKY, J. TIMULAK, DECOM SLOVAKIA, J. BLAZEK, Nuclear Power Plant Research Institute, L. TOMIK, Nuclear Power Plant V1, SLOVAK REPUBLIC, J. PETR, Energoprojekt Praha, CZECH REPUBLIC

5. Attapulgie, A Decontaminating Medium, Research Tool in the Radioprotection Field

G. PANCIATICI, A. BELFIORE and M. POGGIANTI, Centro Ricerche Esperienze Studi Applicazioni Militari, ITALY

6. Current Studies on the Decommissioning Materials Recycling at Japan Atomic Energy Research Institute

K. FUJIKI and H. NAKAMURA, Japan Atomic Energy Research Institute, JAPAN

► SESSION 26

Wednesday, 8.30 - 12.00

Klub II

MANAGEMENT OF COMPLEX ENVIRONMENTAL CLEAN-UP PROJECTS

Co-Chairman: N. ROTHERMICH, Martin Marietta Energy Systems, U.S.A.
J.C. LEHR, U.S. Department of Energy, U.S.A.

1. The Remediation Process: Approach and Elements of the Department of Energy's Environmental Restoration Program in a Superfund World

J.C. LEHR, U.S. Department of Energy, U.S.A.

2. Update on Lessons Learned from Clean-up Projects at Oak Ridge

R.C. SLEEMAN, U.S. Department of Energy, U.S.A.

3. Managing Site Remediation Using Pathway Analysis: Application to a Semi-Arid Site

E.E. RUTZ, T. IJAZ, R.P. WOOD and R.E. ECKART, University of Cincinnati, U.S.A.

4. Design Criteria Applicable to the Environmental Restoration of Sites Affected by Uranium Mining Activities in the Past

P. CARBONERAS, ENRESA, M. SANCHEZ, INITEC, SPAIN

5. Management Approaches for Environmental Restoration at the U.S. Department of Energy Weapons Complex Savannah River Site: A Case Study

S.V. JOHNSON, U.S. Department of Energy, J.J. MAYBERRY, Ebasco Environmental Division, U.S.A.

6. The Transfer from Nuclear Development

L.W. SMITH, U.S. Department of Energy, U.S.A.

► SESSION 27

Wednesday, 8.30 - 12.00

S2

DISPOSAL SYSTEMS FOR HLW AND SPENT FUEL: DESIGN AND STATUS

Chairman: A. ULIBARRI, ENRESA, SPAIN

Session Organizer: P. SOO, Brookhaven National Laboratory, U.S.A.

1. Reference Concepts for the Final Disposal of LWR Spent Fuel and Other High Activity Wastes in Spain

F. HUERTAS and A. ULIBARRI, ENRESA, SPAIN

2. Operational Safety Assessment of Underground Test Facilities for Mined Geologic Waste Disposal

H.K. ELDER, U. S. Department of Energy, and C.J. CAUDILL, SAIC, Science Applications International Corporation, U.S.A.

3. Dam Constructions as Sealing Systems in Rock Salt

H.-J. ENGELMANN and W. BOLLINGERFEHR, DBE, GERMANY

4. The Necessity for Complex Long-Term Predictions While Designing Systems for Disposal of Radwaste and Role of Those Predictions in Development of Programs for Environment Protection

O.L. KEDROVSKY and I.Y. SCHISHCHITZ, VNIPIROMTEKHNOLOGII, RUSSIA

5. Technological Parameters of Underground Facilities for Long-Term Storage of High-Temperature Sources

O.L. KEDROVSKY and I.Y. SCHISHCHITZ, VNIPIROMTEKHNOLOGII, RUSSIA

6. Ecological Aspects of Underground Radwaste Isolation Concept in Permafrost Rocks of Far North of Russia

A.N. KAZAKOV and N.F. LOBANOV, VNIPIROMTEKHNOLOGII, RUSSIA

7. Grounding of the Boundary of Safety Zone of the Influence of HLW Disposed into Geological Formations with Account of Structural Technogenic and Tectonic Non-Uniformities of Massif

T.A. GUPALO, VNIPIROMTEKHNOLOGII, RUSSIA

.....
► SESSION 28

Wednesday, 9.00 - 12.00

Poster

DISPOSAL SITE CHARACTERIZATION AND PERFORMANCE ASSESSMENT

Co-Chairmen: BARBER, ANDRA, FRANCE
 E.J. BONANO, Ktech Corporation, U.S.A.
 K. JINDRICH, Czech Nuclear Regulatory
 Commission, CZECH REPUBLIC

Session Organizer: D. STAHL, Babcock & Wilcox Fuel Co., U.S.A.

1. The Efficiency of Making Bentonite Barriers During the Disposal of Solidified Nuclear Wastes
 M.K. SAVUSHKINA and I.M. KOSAREVA, Russian Academy of Sciences, RUSSIA
2. Compaction Test of Bentonite-Sand Mixtures with Vibratory Roller
 T. ISHII and Y. HORIE, Shimizu Corporation, T. SUZUKI and I. NISHINO, Mitsui Corporation, Y. HARADA and A. FUJIWARA, Radwaste Management Center, JAPAN
3. A Study on Water Infiltration Barriers with Compacted Layered Soils
 Y. UMEDA and K. KOMORI, JDC Corporation, A. FUJIWARA, Radwaste Management Center, JAPAN
4. On Grouting Test Using a Suspension of Ultrafine Clay on Artificially Cracked Rock Samples
 Y. ITO, T. SAKAGUCHI and K. NISHIYAMA, Kumagai Gumi Company, Ltd., A. FUJIWARA, Radwaste Management Center, JAPAN
5. The Influence of Adsorption Properties on Radionuclide Transport in Porous Medium
 C.H. LEE, Radwaste Administration, TAIWAN, CHINA
6. An Experimental Study on Permeability of Concrete Silos for Performance Assessment OF a Radioactive Waste Repository
 K. KONISHI, K. IRIYA and N. TAKEDA, OBAYASHI Corporation, A. FUJIWARA, RWM Center, JAPAN
7. The Behavior of SR-90 and CS-137 During High-Temperature Leaching of Nuclear Waste Solidified on the Basis of Alumophosphate Compositions
 M.K. SAVUSHKINA and I.M. KOSAREVA, Russian Academy of Sciences, RUSSIA
8. Direct Drilling Related Releases from the WIPP Repository
 J.W. BERGLUND, The University of New Mexico, U.S.A.
9. A Mass Conservative Numerical Solution of Vertical Water Flow and Mass Transport Equations in Unsaturated Porous Media
 S.C. LIM and K.J. LEE, Korea Advanced Institute of Science and Technology, KOREA

10. Laboratory Tracer Tests Supposing an Engineered Barrier System and Comparison with Numerical Analyses

Y. MORO and A. KOBAYASHI, Hazma-Gumi Corporation, A. FUJIWARA, Radioactive Waste Management Center, JAPAN

11. An Integrated Program of Near-Field Data Collection for Repository Post-Closure Performance Assessment

A.D. MORETON, C.J. TWEED and S.J. WISBEY, AEA Technology, U.K.

12. Field Tracer Tests at the Dukovany Shallow-Ground Repository Site

P. MAREK, Nuclear Research Institute Rez, CZECH REPUBLIC

13. Effects of Organic Acid Producing Micro-Organisms on the Biodegradation of Nuclear Waste Embedding Matrices Such as Cement and on the Transport and/or Retardation of Radionuclides

M.F. LIBERT, R. SELLIER, M. TRESCINSKI and H. SPOR, CEA/Cadarache, FRANCE

14. Safety Aspects Related to the Operation of El Cabril LLW Disposal Facility

J.A. ALONSO, ENRESA, M.D.C.RUIZ, CSN, SPAIN

.....
► SESSION 29

Wednesday, 13.30 - 17.00

Hotel Forum

EXPERIENCES IN ACTUAL CLEAN-UP ACTIONS

Co-Chairmen: R. BASCHWITZ, COGEMA, FRANCE
 R.C. SLEEMAN, U.S. Department of Energy, U.S.A.
 L. SMITH, U.S. Department of Energy, U.S.A.

Session Organizer: N. ROTHERMICH, Martin Marietta Energy Systems, U.S.A.

1. Environmental Remediation of Historic Low-Level Radioactive Waste Sites in Canada

R.W. POLLOCK, Low-Level Radioactive Waste Management Office, CANADA

2. Environmental Remediation of Contaminated Sites at the Hanford Site

C.D. WITTEICH and W.L. JOHNSON, Westinghouse Hanford Company, U.S.A.

3. Commercial Experience in Treating U.S. Department of Energy Mixed Waste

G.A. BENDA, RUST International, U.S.A.

4. Rehabilitation of Soils and Surfaces After a Nuclear Accident: Some Techniques Tested in the Chernobyl Zone

A. JOUVE and H. MAUBERT, Institut de Protection et de Surete Nucleaire, FRANCE, R. MILLAN-GOMEZ, Centro de Investigaciones Energeticas Medioambientales y Tecnologicas, SPAIN, Y. KUTLHAMEDOV, Ukrainian Academy of Sciences, UKRAINE

5. International Perspective on the Role of Acid Generation in Selecting Decommissioning Techniques for Uranium Mining Sites in Eastern Germany

D.G. FEASBY, CANMET, D.B. CHAMBERS and J.M. SCHARER, SENES Consultants Limited, R.G. DAKERS, Consultant, CANADA, M.H. GOLDSWORTHY, Golder Associates, GERMANY

6. Creation of Antimigration Barriers for Restoration of Aquifers Contaminated with Radwaste

E.V. ZAKHAROVA, and E.P. KAYMIN, Russian Academy of Sciences, J.V. KULTIN and A.I. RYBALCHENKO, Scientific Research Institute of Industrial Engineering, RUSSIA

7. Actual Clean-up Experiences with High-Temperature Thermal Treatment of Contaminated Soils in Canada and Germany - Comparison of Requirements and Results

E. BEITINGER, Woodward-Clyde Consultants, W.J. MILLS, Woodward-Clyde Federal Services, U.S.A.

.....
► **SESSION 30**

Wednesday, 13.30 - 17.00

Komorni Sal

REPROCESSING AND ITS INFLUENCE ON WASTE QUANTITIES

Co-Chairmen: G. BAUDIN, C.E.A., FRANCE
A. TSARENKO, IAEA, Vienna

1. Advanced Purex Process and Waste Minimization at La Hague
H. MASSON and H. NOUGUIER, COGEMA, FRANCE

2. Formation of Liquid Radioactive Wastes in Technology of Regeneration of Spent Nuclear Fuel of Atomic Power Station and Ways of Their Minimization
V.P. UFIMTZEV and Eu.G. DZEKUN, Ministry of Atomic Power Engineering Industry of Russian Federation, RUSSIA

3. Radionuclide Separations for the Reduction of High-Level Waste Volume
G.J. LUMETTA and J.L. SWANSON, Pacific Northwest Laboratory, U.S.A.

4. Management of High-Level Wastes (HLW) from Nuclear Power Plant (NPP) Spent Fuel Reprocessing in Terms of Tritium Localization and Nitric Acid Regeneration
B. Ya. ZILBERMAN and V.F. SAPRYKIN, V.G. Khlopin Radium Institute, RUSSIA

5. Application of Inorganic Adsorbents and Ion Exchange Resins for Decontamination of Solutions from Cesium and Strontium Radionuclides
V.V. MILUTIN, Russian Academy of Sciences, RUSSIA

6. An Experience of Use of the Installation for the Cleaning of Gas Effluents from Tritium
V.A. VOITENKO and N.F. KOLOMIETS, Ukrainian State Committee on Nuclear and Radiation Safety, UKRAINE

7. Bidentate Extractants for Deep Extraction of Actinides from HLW
A.M. ROZEN, B.S. ZAKHARKIN, Z.I. NIKOLOTOVA, N.A. KARTASHEVA and V.I. VOLK, A.A. Bochvar Scientific Research Institute of Inorganic Materials, RUSSIA

.....
► **SESSION 31**

Wednesday, 13.30 - 17.00

Novy Sal

L/LW WASTE CHARACTERIZATION, ASSAY, AND TRACKING SYSTEMS (II)

Co-Chairmen: C. HORNIBROOK, EPRI, U.S.A.
D. JAMES, Private Consultant, U.S.A.

Session Organizer: C. TORRES-VIDAL, CIEMAT, SPAIN

1. Sorting of Solid Radioactive Wastes

J. MAREK, Ministry of Industry and Trade, I. PECIVAL and J. HEJTMAN, DIAMO J. WILDMAN, NPP Dukovany, T. CECHAK, Czech Technical University, CZECH REPUBLIC

2. Characterization of Nuclide Inventories in Waste Streams From Nuclear Power Plants

U. OPPERMAN and W. MULLER, GRS mbH, GERMANY

3. The Determination of Critical Nuclides in PWR Waste Streams
A. DE GOEYSE, ONDRAF/NIRAS, B. CENTNER, BELGATOM, BELGIUM

4. Nondestructive Assay of Boxed Radioactive Waste
R.J. ROBERTS, W.P. GILLES and W.G. JACEN, Westinghouse Hanford Company, U.S.A.

5. In Situ Electrochemical Characterization of Grouted Radioactive Waste
A.A. KRUGER, Westinghouse Hanford Company, J. GU, W. SHEN and M. TOMKIEWICZ, Brooklyn College of CUNY, U.S.A.

.....
► **SESSION 32**

Wednesday, 13.30 - 17.00

Klub II

DECONTAMINATION AND DECOMMISSIONING DEMOLITION TECHNOLOGIES

Co-Chairmen: S. SPENCE, Kaiser Engineers, U.S.A.
E. MERZ, KFA Juelich GmbH, GERMANY

1. Systems Engineering for Decommissioning the Japan Power Demonstration Reactor (JPDR) - A Study on Characteristics of Decommissioning Waste
S. YANAGIHARA, S. ITOH and K. SHIRAISHI, Japan Atomic Energy Research Institute, JAPAN

42 TECHNICAL SESSIONS

2. The Experiences of Using Ultrahigh-Pressure Waterjet to Decontaminate the Nuclear Facilities at INER

T. WEI and J. HSIEH, Institute of Nuclear Energy Research, TAIWAN, CHINA

3. A Microwave System to Scarify Concrete Surfaces: Development and Testing

P. CORLETO and M. GUIDOTTI, ENEA CRE Casaccia, E. PETAGNA and G. RAGAZZO, ENEA CRE Trisaia, ITALY

4. Garitta Project: An Example of Conditioning of Large Dimensions Irradiated Components

F. MANTEGA and F. SANSON, CISE-ENEL, A. GAROFALO and T. VITIELLO, ENEL, ITALY

5. The Design of a Relocatable Confinement Building and Decontamination Module to Facilitate D&D of Hanford's Plutonium Concentration Facility

A.P. NEATHERY, Kaiser Engineers Hanford Company, U.S.A.

► SESSION 33

Wednesday, 13.30 - 17.00

Klub II

QUALIFICATION METHODS FOR HLW

Co-Chairmen: P. HRMA, Battelle Pacific Northwest Laboratories, U.S.A.
C. SOMBRET, CEA/CEN, FRANCE

1. Qualification Methods and Quality Control of Vitrified HLW in France

J.M. YVINEC and P. DELAHAYE, COGEMA, FRANCE

2. Principles of Qualification of the Pamela Process for the Vitrification of HLLW of the Karlsruhe Reprocessing Plant (WAK)

E. EWEST and W. KUNZ, GNS - Gesellschaft für Nuklear-Service, GERMANY

3. Processing Constraints on High-Level Nuclear Waste Glasses for Hanford Waste Vitrification Plant

P. HRMA, Pacific Northwest Laboratory, U.S.A.

4. The Use of Glass Matrices for Solidification of Radioactive Wastes

V.V. GROMOV and A.A. MINAEV, Russian Academy of Sciences, RUSSIA

5. Qualification of Crystalline Phases in HLW-Glass

S. LUO and Y. JIANG, China Institute of Atomic Energy (CIAE), CHINA

6. Glass Products for the Vitrification of HLLW in a Joule-Heated Ceramic Melter and the Effects of Platinoids on the Glass Properties

B. LUCKSCHEITER, KIK Karlsruhe, GERMANY

7. Study of High-Level Liquid Waste Component Behavior During Solidification to Produce Phosphate and Borosilicate Vitreous Materials

A.V. DEMIN and Yu. I. MATYUNIN, A.A. Bochvar Scientific and Research Institute of Inorganic Materials, RUSSIA

TECHNICAL SESSIONS 43

► SESSION 34

Wednesday, 13.30 - 17.00

S2

SITE CHARACTERIZATION AND UNDERGROUND TESTING

Co-Chairman: T. AIKAS, TVO, FINLAND
M. RAYNAL, ANDRA, FRANCE

1. Program and Results of Preliminary Site Characterization for Final Disposal of Spent Nuclear Fuel in Finland

T. AIKAS, TVO, Teollisuuden Voima Oy, FINLAND

2. Site Evaluation for a Defense Transuranic Nuclear Waste Repository

L. CHATURVEDI, Environmental Evaluation Group, U.S.A.

3. The ASPO Hard Rock Laboratory—A Preparation for the Licensing of the Deep Geological Repository for Spent Fuel in Sweden

G. BACKBLOM, SKB, Swedish Nuclear Fuel and Waste Management Co., SWEDEN

4. The REV Project - Experiments, Techniques and Theoretical Considerations with a View to an ILW and Spent HTR Fuel Emplacement Test at the ASSE Salt Mine

D. NIEPHAUS, Forschungszentrum Jülich GmbH (KFA), GERMANY

5. An Underground Characterization Program for a Nuclear Fuel Waste Disposal Vault in Plutonic Rock

P.M. THOMPSON and R.A. EVERITT, AECL Research, CANADA

6. Scientific and Technical Objectives of Underground Laboratories in France

M. RAYNAL and J.L. TISON, ANDRA, FRANCE

7. Examination of Geological Formations and Crystalline Rock Properties on the Underground Repository Site for Solidified Waste Disposal

E.A. LEONOV and I.Y. SCHISHCHITZ, VNIIPROMTEKHNOLOGII, RUSSIA

8. The Conceptual Design of Deep Geological Disposal in France: I A Basis for Research and Development

J.-M. HOORELBEKE and P. RAIMBAULT, ANDRA, FRANCE

► SESSION 35

Wednesday, 14.00 - 17.00

Poster

SCIENCE AND ENGINEERING OF HLW AND SPENT FUEL STORAGE SYSTEMS

Co-Chairmen: B. HEAFIELD, British Nuclear Fuels plc, U.K.
S. NAQVI, Ontario Hydro, CANADA

Session Organizer: BARBER, ANDRA, FRANCE

1. How Metal Casks Fit Spent Fuel Interim Storage Strategies
H. LEERS and B. SAVORNIN, Transnucleaire, FRANCE
2. Current Interim Used Fuel Storage Practice in Canada
C.R. FROST, Ontario Hydro, K.M. WASYWICH, AECL Research, Whiteshell Laboratories, CANADA
3. Dry Store for VVER/RBMK Fuel Using Reinforced Concrete Containers
W.F. HOWE and L. GRANDE, Ontario Hydro, CANADA
4. The Canadian Long-Term Experimental Used Fuel Storage Program
K.M. WASYWICH, AECL Research, and C.R. FROST, Ontario Hydro, CANADA
5. A Versatile Passive and Active Non-Destructive Device for Spent Fuel Assemblies Monitoring
R. BERNE and G. BIGNAN, CEA - DRN/DER/SSAE, FRANCE
6. The Cascad Spent Fuel Dry Storage Facility
C. BONNET and M. GIORGIO, SGN, FRANCE
7. Use of Fuelstor Vault for Interim Spent Fuel Storage in Czech Republic
H. GUNTHER, Siemens AG, GERMANY, Z. VALVODA, DIAMO s.p., Nuclear Fuel Institute, CZECH REPUBLIC
8. Complete Characterization of Spent Fuel Assemblies and Alpha Waste Packages
G.G. SIMON, NUKEM GmbH, H. WURZ, KfK Karlsruhe, GERMANY
9. Interim Storage of Spent Fuel Assemblies from VVER-Reactors, Taking as an Example the Cask Dry Storage for the Czech Dukovany Nuclear Power Plant
W. BOTZEM and P. ARNTZEN, NUKEM GmbH, GERMANY
10. The Development of a Management Strategy for Interim Storage and Final Disposal of Nuclear Wastes
H.J. ENGELMANN, DBE, and P. ARNTZEN, NUKEM GmbH, GERMANY
11. Post Irradiation Creep and Rupture of Irradiated PWR Fuel Cladding
M. MAYUZUMI, Central Research Institute of Electric Power Industry (CRIEPI), K. MURAI, Nuclear Development Corporation, JAPAN
12. Development of Vitrified Waste Storage System
S. NAMIKI and Y. TANI, Ishikawajima-Harima Heavy Industries Co., Ltd. (IHI), JAPAN
13. Behavior of Spent Fuels Under Dry Storage in Oxidizing Atmosphere
S. KAWASAKI and J. NAKAMURA, Japan Atomic Energy Research Institute (JAERI), JAPAN
14. A Design Study of Horizontal Dry Storage System in Japan
R. MINAMI and Y. DOI, Kawasaki Heavy Industries, Ltd., JAPAN
15. Conceptual Design of Vault Dry Storage Facility
H. NAKASHIRA and T. FUTAMI, Sumitomo Metal Mining Co., Ltd., JAPAN

.....
► **SESSION 36**

Thursday, 8.30 - 12.00

Hotel Forum

TRANSMUTATION AND SEPARATIONS OF RADIOACTIVITY

- Co-Chairmen: G. BAUDIN, C.E.A., FRANCE
E.G. Koudryavtsev, Ministry for Atomic Energy of the Russian Federation, RUSSIA
- Session Organizer: L.D. HOLTON, Battelle, Pacific Northwest Laboratories, U.S.A.

1. Concept of Grouping in Partitioning of HLW for Self-Consistent Fuel Cycle
A. KITAMOTO and M. MUYANTO, Tokyo Institute of Technology, JAPAN
2. Actinide Transmutation in a Thermal Reactor
A. FACCHINI and V. SANJUST, Politecnico di Milano, ITALY
3. Neutron Transmutation of Radwaste Nuclides in Nuclear Fuel Cycle: Conceptual Considerations
B. V. NIKIPELOV and E. G. KUDRYAVTSEV, Ministry for Atomic Energy of Russia, RUSSIA
4. High Level Radioactive Waste Partitioning and Conversion into Ceramics Using Metal Oxide Impregnated Ion Exchange Resins
E.A. KOZLITIN, Russian Academy of Sciences, RUSSIA
5. Recovery and Utilization of Valuable Metals from Spent Nuclear Fuel
M. MYOCHIN and K. KAWASE, Power Reactor and Nuclear Fuel Development Corporation, JAPAN
6. Recovery and Utilization of Valuable Metals from Spent Nuclear Fuel (III) Mutual Separation of Valuable Metals
K. KIRISHIMA and H. SHIBAYAMA, Sumitomo Metal Mining Co., Tokai Research Center, JAPAN
7. Optimization of Purex-Process Aimed at Volume Reduction of Aqueous Waste from NPP Spent Fuel Reprocessing
V. I. VOLK and B. S. ZAKHARKIN, A.A. Bochvar Scientific Research Institute of Inorganic Materials, RUSSIA

.....
► **SESSION 37**

Thursday, 8.30 - 12.00

Komorni Sal

ESTABLISHED AND EMERGING ENVIRONMENTAL MANAGEMENT ORGANIZATIONS

- Co-Chairmen: E. HLADKY, DECOM Trnava, SLOVAK REPUBLIC
P.I. RICHTER, Technical University Budapest, HUNGARY
- Session Organizers: N. PATERA, OECD/NEA, Paris
E. WARNECKE, IAEA, Vienna

1. Organizational Structures, Roles and Responsibilities within the Swiss Waste Management Programme

C. McCOMBIE, H. ISSLER and E. KOWALSKI, NAGRA, SWITZERLAND

2. ONDRAF/NIRAS and High-Level Radioactive Waste Management in Belgium

F. DECAMPS, ONDRAF/NIRAS, BELGIUM

3. National Organization of Radwaste Management of the Hungarian NPP

J. VIGASSY and I. CZOCH, Hungarian Atomic Energy Commission,
L. MAROTHY and P. ORMAI, Paks Nuclear Power Plant, HUNGARY

4. National Organization for Management and Disposal of Radioactive Wastes in Bulgaria - Roles and Responsibilities

M. NIZAMSKA, Radiation Protection Inspection, BULGARIA

5. Radioactive Waste Management Strategy in the Republic of Croatia

D. SUBASIC, D. SKANATA and A. SALER, Croatian Radwaste Management Agency, CROATIA

► SESSION 38

Thursday, 8.30 - 12.00

Novy Sal

REMEDIATION OF OBSOLETE SITES FROM URANIUM MINING AND MILLING

Co-Chairmen: T. GRANDALL, U.S. Department of Energy, U.S.A.
R. POLLOCK, Atomic Energy of Canada Ltd., CANADA

1. International Developments in U-Mining and Mill Site Remediation

H. QUARCH and J. KUHLMANN, DSR GmbH, GERMANY, J.L. DAROUSSIN, COGEMA, FRANCE, R.V. POYSER, Pathfinder Mines, U.S.A.

2. The U.S. Uranium Mill Tailings Radiation Control Act - An Environmental Legacy of the Cold War

C.D. WATSON and R.A. NELSON, Jacobs Engineering Group, Inc.,
P. MANN, U.S. Department of Energy, U.S.A.

3. Remediation of the Closed-Down Uranium Mine in Sweden

P. LINDER and B. SUNDBLAD, Studsvik EcoSafe, SWEDEN

4. Remediation of Inactive Mining and Milling Sites

H. MAO, Y. PAN and R. LI, China National Nuclear Corporation, CHINA

5. Challenges and First Solutions Related to the Decommissioning of Uranium Mining in East Germany

M. HAGEN and R. HAHNE, Wismut GmbH, GERMANY

6. Problems with Flooding in the Ronneburg Mining District

M. ECKART, Wismut GmbH, GERMANY

7. Tailings Decommissioning at Wismut GmbH

A. NEUDERT, Wismut GmbH, GERMANY

8. Rehabilitation of Contaminated Territories While Liquidating Enterprises of Uranium Mining Industry of the CIS

V.P. KARAMUSHKA, VNIPIROMTEKHNOLOGII, RUSSIA

► SESSION 39 (Half Session)

Thursday, 8.30 - 10.00

Klub I

RADIOACTIVE WASTE MANAGEMENT AND PRACTICES IN DEVELOPING COUNTRIES

Co-Chairmen: C. BERGMAN, IAEA, Vienna
D.P. PANDE, Bhabha Atomic Research Center, INDIA
M. WACKS, University of Arizona, U.S.A.

1. How a Developing Country is Facing LLW Disposal Problems

C.C. HUANG, Y. T. SHAO, and C. M. TSAI, Radwaste Administration, Atomic Energy Council, TAIWAN, CHINA

2. Waste Management Experience at IPEN - Brazil

R. VICENTE, IPEN - CNEN/SP, BRAZIL

3. Radioactive Waste Management and Practice in Bangladesh

A.S. MOLLAH and M. M. RAHMAN, Institute of Nuclear Science and Technology, BANGLADESH

► SESSION 40 (Half Session)

Thursday, 10.30 - 12.00

Klub I

WASTE MANAGEMENT FROM UNCONVENTIONAL (E.G. VVER) NUCLEAR POWER REACTORS

Co-Chairmen: D. JAMES, James & Associates, U.S.A.
J. RONAKY, NPP of PAKS, HUNGARY

1. Radioactive Waste Treatment in NPP With VVER Reactor Using Balakovo NPP as an Example

U. KUTSCHER, G. HOLKER and A. CHRUBASIK, NUKEM, GmbH, GERMANY, P. L. IPATOV and V. I. IGNATOR, Balakovo NPP, RUSSIA

2. Electrodialysis Recovery of Boric Acid and Potassium Hydroxide from Eluates of SWC Facilities at NPP with VVER

S.N. DUDNIK, P.M. VIRICH, E.Y. KRAMSKIKH, O.L. MASANOV and I.P. TUROVSKY, A.A. Bochvar Scientific Research Institute of Inorganic Materials, RUSSIA

3. Characterization and Conditioning of Radioactive Graphite

A.E. DUQUE, A. URIARTE, A. SUAREZ, B. FABRELLAS and A. GONZALEZ, CIEMAT, SPAIN

4. Approach to Radwaste Management at Russian NPPS

V. RYZHKOVA, L. KHAMYONOV, S. HUBETSOV, V. ZIMM, Research Institute for NPP Operation, RUSSIA

.....
► SESSION 41

Thursday, 8.30 - 12.00

S2

DISPOSAL SITE SELECTION APPROACHES AND ISSUES

Co-Chairmen: N. CHAPMAN, INTERA, U.K.

P.-E. AHLSTROEM, Swedish Nuclear Fuel and Waste Management Co., SWEDEN

1. Siting of a Deep Geological Repository for Spent Nuclear Fuel in Sweden

C. THEGERSTROM, SKB, Swedish Nuclear Fuel and Waste Management Co., SWEDEN

2. Geotechnical Aspects of Site Selection and Characterization, Waste Isolation Pilot Plant, Southeastern New Mexico, USA

D. W. POWERS, Consulting Geologist, U.S.A.

3. The Siting Programme of Geological Repository for Spent Fuel/High-Level Waste in Czech Republic

P. NOVOTNY, Czech Power Company, CZECH REPUBLIC

4. The Petrographic Criteria of Selection of Geological Environments for Building High-Level Waste (HLW) Repository

B. I. OMEL'YANENKO and G. P. ZARAIKY, Russian Academy of Sciences, RUSSIA

5. Thermal and Physical Aspects Accounted During Underground Isolation of Heat Generating Radwaste into Permafrost Rocks

A. N. KAZAKOV and N.F. LOBANOV, VNIPIROMTEKHNOLOGII, RUSSIA

6. Site Selection Criteria of Deep Geological Repository - Discussion of Main Methodological Items

P. LIETAVA, L. NACHMILNER, S. KONOPASKOVA and M. VANECEK, Nuclear Research Institute Rez, CZECH REPUBLIC

.....
► SESSION 42

Thursday, 9.00 - 12.00

Joint Poster

WASTE MINIMIZATION, AVOIDANCE, AND RECYCLING IN NUCLEAR POWER PLANTS

Co-Chairmen: B. LANTES, EdF, FRANCE

R. BAKER, NUS Corporation, U.S.A.

Session Organizer: T. HILLMER, Arizona Public Service, U.S.A.

1. Minimization of Radioactive Waste Through Appropriate Treatment

A. JACOBI, JR., Electrowatt Engineering Services Ltd., J. P. WENGER, M. ZEERLEDER, W. ZEHNDER, SWITZERLAND

2. Minimization of Formation of Wastes from the Operation of Czechoslovak Nuclear Power Plants

O. MOHYLA and J. STEPANEK, DIAMO-Nuclear Fuel Institute, K. CADA and J. WILD, NPP Dukovany, P. SEIFERT, NPP Temelin, CZECH REPUBLIC, I. KNIZ and L. ZBORAY, NPP Bohunice, SLOVAK REPUBLIC

3. Ultrasonic Washing and Electrodecontamination as Means to Change Waste Classification

G. NAUD, J.P. GAUCHON, M. LATTAUD and M. ROUET, CEA FRANCE

4. Decontamination Study on the Non-Combustible Solid Wastes Generated from Nuclear Fuel Fabrication Plants

T. KOTOKU, K. KIMURA and H. IKUSE, Nuclear Technology Center, Mitsubishi Materials Corporation, S. ABE, Radioactive Waste Management Center, JAPAN

5. Demonstration Test on Manufacturing 2001 Drum Inner Shielding Material for Recycling of Reactor Operating Metal Scrap

A. UMEMURA, K. KIMURA and H. UENO, Mitsubishi Materials Corporation, JAPAN

6. Demonstration Test on Manufacturing Steel Bars for Concrete Reinforcement for Recycling of Reactor Decommissioning Metal Scrap

D. SAKURAJ, M. MINAMI and Y. ANABUKI, Nippon Steel Corporation, K. KOBAYASHI, Tohoku Electric, JAPAN

7. Radionuclide Behavior in Induction Heat Melting and Its Products for Non-Combustible Solid Waste

T. TESHIMA and Y. KARITA, NGK Insulators, Ltd., O. OKAMATO, H. OHNO, Chubu Electric, JAPAN

8. A Remotely Operated Melting Plant for Recycling of Low Level Radioactive Materials

R. LANZA, Ansaldo, ITALY, M. SAPPOK, Siempelkamp Giesserei, GERMANY

9. The Use of Melting Techniques in the Decontamination of Uranium Deposits on Aluminum Alloy

G. IMBARD, CEA, FRANCE

.....
► SESSION 43

Thursday, 9.00 - 12.00

Joint Poster

LIQUID WASTE TREATMENT PROCESSES AND EXPERIENCE

Co-Chairmen: L.P. BUCKLEY, AECL, Chalk River Laboratory, CANADA

C. COURTOIS, C.E.A./C.E.N. Cadarache, FRANCE

L. KONECNY, NPP Bohunice, SLOVAK REPUBLIC

Session Organizer: L. THOMAS, PacNuc, U.S.A.

1. Treatment of Liquid Radioactive Waste Using a Combination of Chemical Processes With Ultrafiltration

V.N. ZABRODSKY, Y.P. DAVIDOR, I.G. TORPOV and V.M. EFREMENKOV, Academy of Science, BYELORUSSIA

2. Properties Required by Extractants for the Decontamination of Liquid Waste Using Supported Liquid Membrane

J.F. DOZOL, H. ROUQUETTE, S. EYMARD and B. TOURNOIS, CEA, FRANCE

3. Treatment of Laundry Waste by the Combination of Ultrafiltration and Reverse Osmosis

K.W. LEE, S.C. PARK, H.H. PARK and J.H. KIM, KAERI, KOREA

4. Extraction of Boric Acid From Liquid Waste of NPP With VVER

G. CHECHELNITSKI, O. BESSONOV and J. TIMULAK, DECOM and P. SINYAVSKI, South Ukraine NPP, UKRAINE

5. Development and Results of Pilot Check of Electromembrane Process of Liquid Waste Purification

B.V. MARTYNOV, V.V. SMIRNOV and V.I. DEMKIN, A.A. Bochvar Research Institute of Inorganic Materials, RUSSIA

6. Application of Inorganic Adsorbents and Ion Exchange Resins for Decontamination of Solutions From Cesium and Strontium Radionuclides

V.V. MILUTIN and V.M. GELIS, Russian Academy of Sciences, R.A. PENZIN, All-Union Research Institute of Chemical Technology, RUSSIA

7. Use of Inorganic Ion-Exchange Materials for the Treatment of Liquid Wastes

I.M. EL-NAGER, M.I. EL-DESSOUKY and H.F. ALY, Atomic Energy Authority, EGYPT

8. Technological Solutions and Liquid Waste Decontamination by the Method of Selective Sorption

Y. KORCHAGIN, S. HUBETSOV and S. MINAER, Research Institute for NPP Operation, V. KARETA and A. GRIVKORA, IFHAN, RUSSIA

9. Optimization of Sorption Technology of Liquid Low Level Radioactive Waste Reprocessing

B.V. MARTYNOV, A.P. DARIENKO and N.P. TROOSHKOV, A.A. Bochvar Research Institute of Inorganic Materials, RUSSIA

10. Separation and Solidification of Cesium From a Nuclear Evaporator Concentrate With a Hexacyanoferrate Ion Exchanger

J. LEHTO and R. HARJULA, University of Helsinki, E. TUSAAND and A. PAAVOLA, Imatran Voima Power Company, FINLAND

11. Advanced Liquid Waste Treatment

K. BLINN, Siemens, GERMANY

12. Advanced Centrifuge System

K. BLINN, Siemens, GERMANY

13. Low Level Liquid Waste Conditioning at the ENEA Trisaia Centre

L. DIPACE, G. LIPPOLIS and P. RISOLUTI, ENEA CRE, ITALY

14. Processing Liquid Radioactive Waste by Centrifuge and Indrum Drying Facility at NPP Phillipsburg

W. BLASER and E. GRUNDKE, Kernkraftwerk Philippsburg, GERMANY

15. Mobile Plant for Low-Level Radioactive Waste Reprocessing

I.A. SOBOLEV, V.I. PANETLEYEV and V.I. DYEMKIN, Moscow Scientific and Industrial Association, RUSSIA

16. Surfactants Containing Radioactive Run-Off Ozone Treatment Influence on Water Waste Special Treatment

S.A. PROKUDINA and M.A. GRACHOK, The Byelorussian State Economic University, BYELORUSSIA

17. The Method of Purification of Waste Water of NPS From Petroleum Oil Using UV-Radiation

V.V. KULEMIN and V.I. KARETA, Institute of Physical Chemistry of the Russian Academy of Sciences, RUSSIA

18. Use of Tangential Filtration Unit for Processing Liquid Waste of Nuclear Laundries

X. AUGUSTIN and A. DE BUZONNIERE, Technicatome, H. BARNIER, CEA, FRANCE

19. Processing of Low Level and Medium Level Liquid Wastes Through the Use of Sodium Borohydride

G. BRUNEL, P. CHAUVET and H. MASSIT, CEA, FRANCE

20. Evaluation and Prediction of Thermophysical Properties of Radiochemical Effluents in Waste Management

S. MATHUSOOTHANAN, R. MUTHIAH and D.P. PANDE, Bhabha Atomic Research Center, INDIA

21. Review of Experimental Studies of Hydrodynamics and Heat Transfer for Improving Performance of Vaporizers to Reduce Volume of Liquid Effluents

D.P. PANDE, Bhabha Atomic Research Center, B.S. VARSHNEY, University of Roorkee, INDIA

22. Optimization of Design and Effective Utilization of Evaporators for Volume Reduction of Radiochemical Effluents

D.P. PANDE, Bhabha Atomic Research Center, P.L. DHAR and R.S. AGARWOL, India Institute of Technology, INDIA

23. Separation of SR-90 and CS-137 From Liquid Waste by Chemical Precipitation

M. GANJINEH, Atomic Energy Organization of Iran, IRAN

.....
► **SESSION 44**

Thursday, 13.30 - 17.00

Hotel Forum

ECOLOGICAL IMPACTS FROM RADIOACTIVE ENVIRONMENTAL CONTAMINATION

Co-Chairmen:

V.M. EFREMENKOV, House of Government, BYELORUSSIA

L. VOGEL, BDM International/SAIC, U.S.A.

1. Amounts and Activity Concentrations of Radioactive Wastes from the Clean-up of Large Areas Contaminated in Nuclear Accidents

J. LEHTO, University of Helsinki, T.K. IKAHEIMONEN, Finnish Centre for Nuclear and Radiation Safety, FINLAND, J. ROED, Riso National Laboratory, DENMARK, B. SALBU, Agricultural University of Norway, NORWAY

2. Dynamics of the Radiation Situation on the Territory of the Republic of Belarus

I.I. MATVEYENKO and O.M. ZHUKOVA, Belarus State Department for Hydrometeorology, REPUBLIC OF BELARUS

3. Problems of Rehabilitation of the Territory Within the Chernobyl NPP Accident Zone

G.S. MESHALKIN, N.P. ARKHIPOV and A.N. ARKHIPOV, Pripyat Research and Industrial Association, UKRAINE

4. Hygienic Evaluation of Radiation Consequences After the Chernobyl Accident in Highly Populated Areas of Ukraine

I.I. KARACHEV, N.M. BOROVIKOVA, N.V. TKACHENKO, and L.K. MARKELOVA, Ukrainian State Medical Center of Environmental Health, UKRAINE

5. Farm Crops Resistance Formation and its Modification in Agrocoenoses Exposed to Chronic Irradiation

L.M. ULYANENKO and A.S. FILIPAS, Institute of Agricultural Radiology, RUSSIA

6. State of Agrocoenoses in Case of Large-Scale Radioactive Contamination of Areas

A.S. FILIPAS, G.N. KHOKHLOV and L.N. ULYANENDO, Institute of Agricultural Radiology, RUSSIA

► SESSION 45 (Half Session)

Thursday, 13.30 - 15.30

Komorni Sal

L/ILW STORAGE FACILITIES - DESIGN AND EXPERIENCE

Chairman: C. HORNIBROOK, EPRI, U.S.A.

Session Organizer: P. KREJSA, Research Institute Seibersdorf, AUSTRIA

1. On-Site Storage of Low and Intermediate Level Radwaste at INER, Taiwan, China

B.L. PEN, Chemical Engineering Division Institute of Nuclear Energy Research, TAIWAN, CHINA

2. On-Site Low-Level Radwaste Storage Facility

D. GARDNER and C. KNAUSS, United Engineers & Constructors, U.S.A.

3. Comprehensive Safety Cases for Radioactive Waste Management Facilities

P.B. WOOLAM, Nuclear Electric, U.K.

4. Graphical Visualization of Implemented Storage Databases

C. FISHER and H. P. HAMP, Admintec, GERMANY

► SESSION 46 (Half Session)

Thursday, 15.30 - 17.00

Komorni Sal

L/ILW FORMS AND ACCEPTANCE CRITERIA FOR DISPOSAL

Co-Chairmen: R.M. ATABEK, CEA, FRANCE

P. COLOMBO, Brookhaven Laboratories, U.S.A.

1. Leaching Scale Effect for Radioactive Waste Encapsulated in Cement, Bitumen, or Polymer

J.C. NOMINE, J. GIRARD, G. BRUNEL, J.F. MONTIGON, and J. F. FERRIOT, CEA-CE-SACLAY/CADARACHE, FRANCE

2. Leach Rate of Radionuclides Immobilized in a Cylindrical Cement Waste Form

C.L. KIM, Y. HWANG, C.H. CHO and M.C. LEE, Korea Atomic Energy Research Institute, KOREA

3. Acceptance Criteria for Waste Packages in the Cabrill Repository Waste Quality Verification Laboratory

A. MORALES and J. GRAVALOS, ENRESA, SPAIN

► SESSION 47

Thursday, 13.30 - 17.00

Novy Sal

SAFETY ASSESSMENTS AND METHODOLOGY FOR REPOSITORIES

Co-Chairmen: I.G. MCKINLEY, NAGRA, SWITZERLAND

H. SAKUMA, PNC Chubu Works, JAPAN

Session Organizer: S.M. COPLAN, U.S. Nuclear Regulatory Commission, U.S.A.

1. Conclusions from a Total System Assessment Within Kristallin-I

I. G. MCKINLEY and C. McCOMBIE, NAGRA, SWITZERLAND

2. Kristallin-I Performance Assessment: First Results

P. ZUIDEMA and I.G. MCKINLEY, NAGRA, SWITZERLAND

3. Performance Assessment of the Geological Disposal of Radioactive Wastes in a Clay Layer: Status for the Mol Site

J.L. MARIVOET and A.A. BONNE, Nuclear Research Centre, SCK/CEN, BELGIUM

4. Methodology for Safety Assessment of Geologic Disposal of High-Level Radioactive Waste

H. KIMURA and T. TAKAHASHI, Japan Atomic Energy Research Institute (JAERI), JAPAN

5. Near-Field Geologic Environment as an Effective Barrier Against Radioactive Transport

H. UMEKI and H. SAKUMA, Power Reactor, Nuclear Fuel Development Corp., JAPAN

6. A Comparative Assessment of the Radiological Impact of the Disposal of Spent Fuel and Vitrified High-Level Waste

C.B. BOYLE and J.E. SINCLAIR, AEA Technology, U.K.

7. On Problem of Burial of Solid Tritium-Containing High Radioactive Wastes

V. A. VOITENKO and N. F. KOLOMIETS, Ukrainian State Committee on Nuclear and Radiation Safety, UKRAINE

► SESSION 48

Thursday, 13.30 - 17.00

Klub I

MANAGEMENT OF NON-STANDARD OR ACCIDENT WASTES

Co-Chairmen: J. CLINE, Consultant, U.S.A.
N. SHTEYNBERG, State Committee of Ukraine, UKRAINE

1. The Vitrification of Accident Wastes From the Nuclear Power Plant A-1 in Slovakia

J. SUSSMILCH, Nuclear Research Institute Rez, CZECH REPUBLIC

2. Bituminization of the Dowtherm

M. BREZA and A. PEKAR, Nuclear Power Plant Research Institute, Trnava, J. JAMRICH-DECOM, SLOVAK REPUBLIC

3. Management of Accident Radioactive Waste From Czech Nuclear Power Plants

P. FRANTA, M. KVASNICOVA, L. KUCA, M. MARHOL, M. SANTACOVA and F. VACKEVA, Nuclear Research Institute Rez, CZECH REPUBLIC

4. Gasification as the Utilization Method of Wood Radioactive Wastes

I.A. SAVUSHKIN, G.G. KOLCHANOV and V.N. SOLOVIEV, Power Engineering Institute, BYELORUSSIA

5. Composite Ion - Exchangers and Their Possible Use in Treatment of Low/Intermediate Level Liquid Radioactive Wastes

F. SEBESTA, A. MOTL and J. JOHN, Czech Technical University, CZECH REPUBLIC

► SESSION 49

Thursday, 13.30 - 17.00

Klub II

ECONOMIC CONSIDERATIONS IN ENVIRONMENTAL MANAGEMENT

Co-Chairmen: P. KUNSCH, ONDRAF/NIRAS, BELGIUM
V.R. SLIGL, SENCO, CANADA

Session Organizer: T. TAMAI, Ishikawajima-Harima Heavy Industries, JAPAN

1. Preliminary Estimates of Cost Savings for Defense High-Level Waste Vitrification Options

R.A. MERRILL and C.C. CHAPMAN, Battelle, Pacific Northwest Laboratories, U.S.A.

2. Cost Analysis of Germany Waste Repositories

H.P. BERG and H.J. DEBSKI, Bundesamt für Strahlenschutz, GERMANY

3. Assessment and Comparison of Waste Management System Costs for Nuclear and Other Energy Systems

F. LONG, Ontario Hydro, CANADA; R.D. WARD, Nuclear Electric, P. McNICHOLAS, AEA Technology, U.K., R.W. ALBERS, National Institute of Public Health & Environmental Protection, THE NETHERLANDS, H. ZACCAI, ONDRAF/NIRAS, BELGIUM, V. TSYPLENKOV, IAEA, AUSTRIA

4. Economic Aspects Related to the Shallow Land Disposal of Nuclear Waste: The Belgian Case

P. KUNSCH, H. ZACCAI, J. VAN MIEGROET, ONDRAF/NIRAS, BELGIUM

5. Evaluation of Comparative System Economics and Operability of Concrete Cask for Fuel Storage

R.W. LAMBERT, Electric Power Research Institute, D.K. ZABRANSKY, Wisconsin Electric Power Co., J.V. MASSEY, Sierra Nuclear Corp., U.S.A.

6. Role of Radioactivity in Formation of a Toxicometric Criterion Formation Concerning an Ecological Optimization of an Economic Structure

A.M. SERD'UK, V. SVATKOV and V. SYKORENKO-GOUSAR, Ukrainian State Medical Center of the Environmental Health, UKRAINE

► SESSION 50

Thursday, 13.30 - 15.30

S2

QUALITY ASSURANCE AND CONTROL IN NUCLEAR WASTE MANAGEMENT

Co-Chairmen: R. ODOJ, KFA Juelich, GERMANY
C.M. TSAI, AEC, TAIWAN, CHINA

1. The German Quality System for Waste Repositories

I. BECKMERHAGEN, H.P. BERG and P. BRENNECKE, BIS, GERMANY

2. Quality Assurance Applied to Waste Packaging Characterization, Quality Control and Auditing in the United Kingdom

T.H. GREEN, L.A. CHANCE and A.J. EDWARDS, Winfrith Technology Center, T.D. BROWN, Dounreay, B.A. PARTRIDGE, Harwell, U.K.

3. Converting Repository Storage Criteria into Rules for Materials Conditioning

R. BECKER and W. STEGMAIER, KfK Karlsruhe, GERMANY

4. Quality Assurance for Radioactive Waste Packages - A General Approach

B.R. MARTENS, BfS, GERMANY

► SESSION CHAIRMEN INDEX

Name	Sess No.	Name	Sess No.
P.E. AHLSTROEM	9, 41	J. MAREK	23A, 23B
T. AIKAS	34	E. McDANIEL	12, 19
D. ALEXANDRE	15	I.G. MCKINLEY	47
A. ALOY	21	E. MERZ	32
R.M. ATABEK	46	A. MILLER	15
R. BAKER	11, 42	J. MOORE	25
A. BARBER	28	L. NACHMILNER	18
R. BASCHWITZ	29	S. NAQVI	22, 35
G. BAUDIN	30, 36	R. ODOJ	50
C. BERGMAN	39	J.P. OLIVIER	9
J. BLAZEK	25	C. OZAKI	15
E.J. BONANO	3, 28	D.P. PANDE	39
L.P. BUCKLEY	11, 43	F. PASSANT	4
R. BURCL	14	N. PATERA	37
N. CHAPMAN	41	R. POLLOCK	38
C.C. CHAPMAN	16	R. PUSCH	5, 21
J. CLINE	12, 19, 48	M. RAYNAL	34
P. COLOMBO	46	P.I. RICHTER	37
S.M. COPLAN	47	J. RONAKY	40
H. CORNELISSEN	3	N. ROTHERMICH	26, 29
C. COURTOIS	43	H. SAKUMA	47
T. CRANDALL	38	K.H. SCHALLER	2
A. DEGOEYSE	12	N. SHTEYNBERG	48
E.G. DROZHKO	20	S. SLATE	6, 8
V.M. EFREMENKOV	44	R.C. SLEEMAN	29
A. DE GOEYSE	19	V.R. SLIGL	49
B. GUSTAFSSON	7	L. SMITH	29
M.C. HAGOOD	13	C. SOMBRET	33
L.H. HARMON	7, 9	P. SOO	27
W. HEAFIELD	10	S. SPENCE	32
B. HEAFIELD	22	D. STAHL	28
B. HEAFIELD	35	A. SUZUKI	8
T. HILLMER	42	V. TALASEK	1
E. HLADKY	37	T. TAMAI	49
L.D. HOLTÓN	36	L. THOMAS	43
C. HORNIBROOK	24, 31, 45	C. TORRES-VIDAL	24, 31
P. HRNA	33	C.M. TSAI	50
K. ISHIGURE	17	A. TSARENKO	30
D. JAMES	24, 31, 40	V.S. TSYPLENKOV	16
K. JINDRICH	28	A. ULIBARRI	27
M.R. JOUAN	14	S. UNGERMARK	23A, 23B
T. KAGAWA	2	C.E. VALRHO	14
M. KIKUCHI	4	M. VANECEK	20
R. KOHOUT	1, 8	B. VIGREUX	17
L. KONECNY	43	L. VOGEL	44
E.G. KOUDRYAVTSEV	36	O. VOJTECH	16
P. KREJSA	45	L.H. VONS	3
K.D. KUHN	23A, 23B	M. WACKS	39
P. KUNSCH	49	J. WALTON	5
H. KURIBAYASHI	6	J. WALTON	21
Y.V. KUZNETSOV	13	O.S. WANG	7
B. LANTES	42	E. WARNECKE	37
A. LARSSON	2	R.P. WHITFIELD	8
K. LEE	10	P. WILLIAMS	14
J.C. LEHR	26	D. WOOD	2
G. LINSLEY	18		

APPENDIX E

ACTION ITEMS

All proposed actions involving direct contact with international agencies will be coordinated with the International Technology Exchange Program.

ACTION ITEM	Responsible Staff
Explore opportunities with RADON in Russia.	C.C. Chapman
Explore 6 to 12 month assignment at Hanford for S. Yu Sayenko, Ukraine. Potential contributor to Tank Waste Remediation System and vitrification programs.	C.C. Chapman
Send technical reports on off-gas clean up to the professor from the Czech Republic.	C.C. Chapman
Plan a visit to several UMTRA sites, in conjunction with the Waste Management '94 conference, for several Canadian colleagues.	T.M. Crandall
Establish contact between UMTRA Project Office and British colleague on hydrologic modeling and regulatory compliance.	T.M. Crandall
Provide copy of the EC paper on standards to DOE-EH.	L.K. Price
Encourage FUSRAP program to evaluate merits of color coding similar to Canadians.	L.K. Price
Provide copy of Capenhurst paper to ORO D&D Branch.	L.K. Price
Follow-up on radioactive scrap metal recycling presentations by Italy, Germany, and Japan for application to Terra-Vit process.	J. Tixier
Obtain copy of proceedings of Technical Seminar on Melting and Recycling of Metallic Waste from Decommissioning, to be held in Krefeld, Germany in October.	J. Tixier
Upon receipt of information from NGK Insulators, Ltd, Japan, on their proprietary ceramic filter for Cs capture, see if there is an application for the ISV process being developed for ORNL sites.	J. Tixier
Prepare an article on ISV for <i>Nuclear Engineering International</i> .	J. Tixier
Encourage European experts to participate in the Waste Management '94 Symposium, Tucson, AZ, Feb 27-Mar 3.	D.E. Wood
IWT section of SRTC should look into the IVO-CsTreat System for use in cesium removal at SRS.	J.R. Zamecnik

DWPT section of SRTC should look into the EnVitCo melter work done at ORNL for comparison with the planned Glasstech stirred melter.	J.R. Zamecnik
Follow up with Mr. Motl, determine appropriate wastewater streams to evaluate absorber at Oak Ridge.	J. Moore
Review attapulgate decontamination by CRESAM, determine if gel can be used in D&D ID planning.	J. Moore
Obtain paper by Mr Fujiki on recycling metal scrap, distribute to D&D IDC and ORNL PI.	J. Moore
Pass microwave decontamination paper to D&D IDC and ORNL PI.	J. Moore
Follow up with DOE program managers who received copies of key international papers to quantify benefit and identify possible actions.	S.C. Slate
Provide final list of attendees to ITEP for inclusion in EnviroTrade.	S.C. Slate
Contact ITEP to see if information developed by Linda Lehman would benefit DOE programs.	S.C. Slate
Contact AECL on possible collaboration on chemically enhance barrier use and tritium removal.	S.C. Slate
Follow up with ESP IP on contacting EW Hooper on the Novel Absorber Club.	S.C. Slate
Contact JDC for information on barriers.	S.C. Slate
Contact D.W. Knecht, WINCO, to discuss interest and collaboration on DOE High-Level Waste Project.	S.C. Slate
Identify areas of collaboration on vitrification of high chromium high-level wastes. Include Czech research institutes in the mailing list.	P.R. Hrma

DISTRIBUTION

No. of
Copies

No. of
Copies

OFFSITE

ONSITE

12 DOE/Office of Scientific and
Technical Information

DOE Richland Operations Office

3 Dave Geiser
Acting Director
EM International Exchange
Division, EM-523
Office of Technology
Integration and
Environmental Education
Development
U.S. Department of Energy
Washington D.C. 20585

14 Dorri Liikala K8-50

15 Pacific Northwest Laboratory

S. J. Mitchell K7-94
S. C. Slate (10) K1-19
Publishing Coordination
Technical Report file (3)

SUMMARY ONLY
Office of Domestic and
International Energy
Policy, EP-1
7C-016/FORS
Attn: Foreign Travel
Unit
U.S. Department of Energy
Washington D.C. 20585

Note: One copy of this report was
sent to each of the conference
attendees by separate distribution.

SUMMARY ONLY
Office of Counter-
intelligence, IN-20
GA-226/FORS
U.S. Department of Energy
Washington D.C. 20585

SUMMARY ONLY
Office of Arms Control
and Nonproliferation,
AN-1
4B-014/FORS
U.S. Department of Energy
Washington D.C. 20585

END

**DATE
FILMED**

2/11/94