

DOE/EM--98 003908

EM INTERNATIONAL ACTIVITIES



MAY
1998
HIGHLIGHTS



United States
Department of Energy
Office of
Environmental
Management

This report has been reproduced directly from the best available copy.

Available to DOE and DOE Contractors from the Office of Scientific and Technical Information, P.O. Box 62, Oak Ridge, TN 37831; prices available from (423) 576-8401.

Available to the public from the U.S. Department of Commerce, Technology Administration, National Technical Information Service, Springfield, VA 22161, (703) 487-4650.



Printed with soy ink on recycled paper

DOE/EM--98003908

EM INTERNATIONAL ACTIVITIES



**MAY
1998
HIGHLIGHTS**



MASTER *dy*

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED



United States
Department of Energy
Office of
Environmental
Management

SUMMARY OF INTERNATIONAL ACTIVITIES

Prepared by International Technology Systems Applications, May 1997

TABLE OF CONTENTS

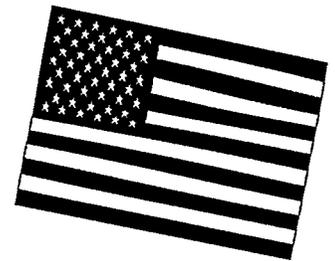
EM INTERNATIONAL ACTIVITY HIGHLIGHTS

May 1998

I.	Global Issues Facing EM.	1
II.	Activities in Western Europe	2
III.	Activities in Central and Eastern Europe	4
IV.	Activities in Russia	7
V.	Activities in Asia and the Pacific Rim	19
VI.	Activities in South America	22
VII.	Activities in North America	25
VIII.	Country Studies	29
IX.	International Organizations	30

GLOBAL ISSUES FACING ENVIRONMENTAL MANAGEMENT

On May 13, 1996, DOE, in consultation with the **Department of State**, issued its *Record of Decision on a Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel*. Under this policy, the U.S. will accept and manage up to 20 metric tons of spent nuclear fuel and target material (containing uranium enriched in the U.S.) from 41 countries. These countries have converted, or plan to convert, research reactors from the use of highly enriched uranium fuel to low enriched uranium fuel or have shut down their research reactors. Aluminum-based spent fuel will be managed at DOE's **Savannah River Site (SRS)** in South Carolina, and non-aluminum based spent fuel will be managed at the **Idaho National Engineering and Environmental Laboratory** in Idaho. The duration of this policy is 10 years (until May 2006) to allow for cool down and shipment of the material. It will be shipped into the U.S. through two military ports, the **Charleston Naval Weapons Station** in South Carolina and the **Concord Naval Weapons Station** in California, and will proceed to DOE management sites by either truck or rail.



Five shipments of research reactor spent fuel have been successfully completed at the **SRS** since the acceptance policy was implemented in May 1996. In September 1996, six casks containing aluminum-based spent fuel from research reactors in Europe (Germany, Sweden, and Switzerland) and two casks from South America (Chile and Columbia) were received. In December 1996, one cask from Canada was received. In March 1997, seven casks were received from Europe (Germany, Switzerland, Spain, and Italy). In August 1997, seven casks were received from Asia (Japan, via Europe) and Europe (Sweden, Germany, and Spain). During the fifth shipment, completed in January 1998, eight casks were received from Europe (Denmark, Italy, Germany, Sweden, and Greece). Five additional shipments are scheduled over the next twelve months.

With this program to accept foreign research reactor spent fuel in place, DOE is working to transition research reactor operators into managing their own spent fuel. DOE is also assisting countries in converting highly enriched uranium to low enriched uranium fuel. In addition, the U.S. is reaching out to new partners, such as China and Russia, in the *Reduced Enrichment for Research and Test Reactors* program.

Contact: Ken Chacey, EM-67, (202) 586-9441



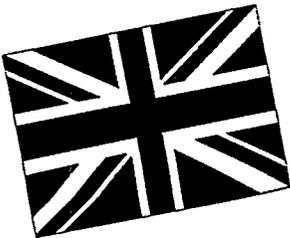
ACTIVITIES IN WESTERN EUROPE



GERMANY

Both the U.S. and Germany have active research and development programs underway in the field of radioactive waste management. Under a previous agreement with the **German Bundesministerium für Forschung und Technologie**, EM-76 engaged in a cooperation and technical information exchange to evaluate the safety and efficiency of radioactive materials transport. This cooperation addressed technical issues of concern to the **International Atomic Energy Agency**. Reactivation of the agreement is in process and will focus on fracture mechanics design methodology, air transport package analysis and design issues, seals and other closure mechanisms, sea transport, risk assessment, decontamination and decommissioning of nuclear facilities, and thermal and structural analyses.

Contact: Ashook Kapoor, EM-76, (301) 903-6838



UNITED KINGDOM

EM-50 has contracted through the United Kingdom Atomic Energy Authority (UKAEA), with AEA Technology, Inc. to jointly identify, modify, and demonstrate technology and processes in the U.S. AEA Technology had been tasked with evaluating their operating program for applicability to the U.S. waste cleanup program. Utilizing their broad experience in nuclear waste programs, AEA Technology and EM-50 Focus Areas have successfully identified and deployed several technologies supporting high-level waste tanks and D&D. Projects of special note include:

- A 40,000 gallon Oak Ridge Bethel Valley Evaporator Service Tank was successfully cleaned out using Fluidic Pulse Jets for Mixing of Compacted Sludge in Horizontal Storage Tanks, which is an **AEA Technology**. The site user has procured the services of **AEA Technology** to clean two additional tanks and has issued an order for a larger system to be used on larger capacity tanks.

- Two Fluidic Sampler Pump Systems were demonstrated and delivered to **Savannah River Site** for deployment in High-Level Nuclear Waste Tanks (#48, #49). These systems reduce personnel exposures, allow accurate measurements, and ensure specification of the feed material. Work has begun in FY98 for a variable depth sampler to be used in tanks at Hanford, Savannah River, and Idaho.
- A demonstration of **AEA Technology's** Approach to Glovebox D&D was prepared in FY97 and concluded with a demonstration in their test facility in October 1997. The system will be part of a large-scale demonstration of glovebox D&D in FY98.

Contact: Dave Geiser, EM-53, (301) 903-7640

ACTIVITIES IN CENTRAL AND EASTERN EUROPE

REGIONAL

In cooperation with **Florida State University (FSU)** and the **Institute for Central and Eastern European Cooperative Environmental Research**, the **Office of Environmental Management (EM)** is co-sponsoring the **Fourth International Symposium and Exhibition on Environmental Contamination in Central and Eastern Europe (WARSAW '98)**. This symposium will be held September 15-17, 1998 and will focus on problems related to hazardous waste and toxic substances, including radioactive and mixed waste in the context of contaminated air, water, and land. This symposium will highlight:

- Technical focus areas such as Site Restoration & Remediation; Waste Treatment & Disposal; Technology Development; Environmental Monitoring; Site Characterization; Containment & Control; and Human Health & Risk Assessment
- Integrated equipment and technology exhibition, concurrent technical sessions, and platform and interactive poster presentations

- Symposium business Commercialization Center and post-symposium technical tours

A special session will highlight the **EM** cooperative project and technology demonstrations with the Institute for **Ecology of Industrial Areas (IETU)** in Katowice, Poland.

The abstract submission deadline is May 22, 1998 and the early registration deadline is July 15, 1998. For additional conference information please contact Roy Herndon, FSU, (904) 644-5207.

Central European country profiles currently exist on the environmental characteristics and requirements of Hungary, Poland, and the Czech and Slovak Republics. Country studies also examine the roles of government and non-government environmental organizations, their programs and priorities, the universities and research centers involved in environmental research and education, and points-of-contact for additional information.

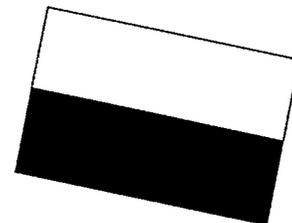
Contact: Elizabeth O'Malley, EM-54, (202) 586-0175

IETU, **EM's** principal partner for cooperative research and demonstration projects in the Central/Eastern European region, has established a **Risk Abatement Center for East and Central Europe (RACE)**, which opened in September 1996 in Katowice, Poland. **RACE** is a not-for-profit, non-governmental, international, cooperative research, education, and implementation center working on regional environmental needs. Its efforts focus on international environmental policy development, education and know-how transfer, providing a forum for implementing significant policy changes, technology transfer, and increasing public awareness. It utilizes risk-based tools for prioritizing problems and managing the environment with regard to social, legal, economic, and political considerations.

RACE was developed in response to the critical need for comprehensive, cost-effective environmental risk assessment and reduction strategies in Central and Eastern Europe (CEE), as well as in response to the call for more independent regional environmental centers as outlined in the October 1995, *United Nations Economic Commission for Europe Declaration of Ministers in Sofia*.

Contact: Elizabeth O'Malley, EM-54, (202) 586-0175

POLAND



EM, FSU, and IETU have adopted a framework for establishing a **Central/Eastern Europe Joint Coordinating Committee for Environmental Systems (JCCES-CEE)**, to identify and implement joint projects in Poland and other countries in CEE. IETU designated RACE as the implementing organization for management of the JCCES-CEE framework. Through this framework, EM established a process for efficient and systematic identification and initiation of joint research projects, new technologies, and other activities to address environmental issues of national interest and mutual concern in the CEE region.

Characterization and soil decontamination remediation technology, demonstrations, collaboration on risk assessment, and other activities are being carried out under a *Memorandum of Cooperation* between EM and IETU in Katowice, Poland. The **Department of Energy's (DOE's)** primary objectives for the project are to advance Research and Development of EM technologies in the U.S. and to promote commercial development between U.S. and Polish environmental technology firms. There are currently three projects being conducted under this agreement.

Contact: Elizabeth O'Malley, EM-54, (202) 586-0175

PHYTOREMEDIATION OF HEAVY METAL-CONTAMINATED SOILS

A project is being conducted between DOE/EM and IETU in the area of phytoremediation. The project is entitled *Treatability Study on Phytoextraction Applicability*, and is being conducted by Phytotech, Inc. This treatability study was undertaken for DOE to assess the applicability of phytoremediation, particularly Phytotech's technology at lead (Pb) contaminated sites. The objective of the study was to define the soil characteristics, determine if the soils could sustain plant growth, and if Phytotech's technology could result in economically beneficial metal uptake via the Brassica juncea plant. Initial studies indicate that a substantial portion of Pb in the samples from Poland were found to be phytoextractable. This treatability study suggests phytoremediation will be successful in substantially decreasing Pb concentration in the surface soil.

The goal of the phytoremediation project is to document the costs (in terms of man-hours, materials, and support services) necessary to implement the technology in a full-field setting. Current plans call for planting a multi-acre site using established plant species and soil amendment protocols. These crops will be planted as many times as possible for each plant species during the growing season (2-3 crops). The technology will be applied as a field demonstration with no experimental manipulations and with only the level of monitoring which would be appropriate for regulatory approval in the U.S.

The results of this activity will be a detailed report on the level of effort, cost, and results of this field activity. This project also includes ongoing activities to evaluate the soil toxicity of amendment application, screening of native plants for metal accumulation capabilities, and the evaluation of innovative amendment plant species strategies for phytoremediation.

MILESTONES:

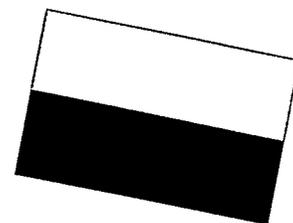
Pre-Field activities	January-April 1998
Crop 1 planting	April 1998
Crop 2 planting	June 1998
Crop 3 planting	August 1998
Data analysis/reporting	October-November 1998

Contact: Skip Chamberlin, EM-53, (301) 903-7248

**BIOREMEDIATION OF
HYDROCARBON-CONTAMINATED SOILS**

DOE also has established a project in connection with IETU, Westinghouse Savannah River Company (WSRC), Ames Laboratory, and FSU entitled, *The Chechowice Oil Refinery Bioremediation Demonstration of a Process Waste Lagoon*. This collaboration between the project participants, which include: IETU, DOE, WSRC, and FSU, will provide the basis for international technology transfer of new and innovative remediation technologies that can be applied in Poland and the Eastern European Region as well. *The Czechowice Oil Refinery* project will bring together proven techniques and remediation tools used by WSRC to remove and/or destroy contaminants, via biostimu-

lation of indigenous microbes found in the environment. The strategies employed will include bioremediation, using the natural cleansing capacity of the environment to degrade the hydrocarbon pollutants. A treatability study of the material to be remediated will determine the physical and chemical parameters necessary to maintain and stimulate an active microbial community that can sustain a high biodegradation rate of the contaminants. The overall objective of the bioremediation project is to provide a cost-effective bioremediation demonstration of petroleum contaminated soil at the Czechowice Oil Refinery. This technology should provide maximum flexibility for application to other sites in the Katowice area, Poland, and CEE.

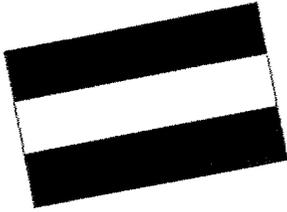


The goal of the biopile project for 1998 is to follow the operation of the biopile through a full year of seasonal variation. The biopile is mirrored by experimental columns that have been established and are maintained at IETU. In addition, a computer model has been developed to extrapolate changes in the columns to the full field conditions of the biopile. As environmental conditions change (e.g. rainfall, temperature) modifications will need to be made to the operation of the biopile to optimize its operation. The approach for 1998 is to model those changes with the computer and the soil columns, and to predict the nature and magnitude of changes to the operation of the biopile from the results of the column study. The field activities for 1998 will be to routinely monitor the biopile and soil columns and to design, test, and implement changes needed to optimize the operation of both systems.

MILESTONES:

Field Campaign 1	January -March 1998
Field Campaign 2	April-June 1998
Field Campaign 3	July-September 1998
Field Campaign 4 (optional)	October-December 1998

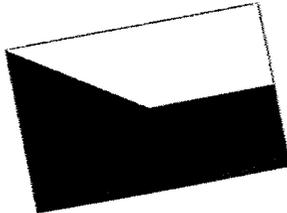
Contact: Skip Chamberlin, EM-53, (301) 903-7248



HUNGARY

One of the research projects developed under the framework for JCCES-CEE is *The Development and Field-Testing of a Highly Specialized Chlorophyll Fluorometer for Measuring Environmental Stress on Plants*. The project is being conducted by **Central European Advanced Technologies** and the **Department of Atomic Physics of the Technical University of Budapest**. In June 1997, a progress report was submitted entitled, "Development of field measurement program, conduct IETU training and evaluation of field performance of prototype instrument," which included information about placing the system into operation, finalizing the measurement program, training of an IETU technician, and performance of the instrument in the field.

Contact: Skip Chamberlin, EM-53, (301) 903-7248



CZECH REPUBLIC

EM plans to continue a project with the **Czech Technical University** to perform a laboratory evaluation of the radioactive and chemical stability of polyacrylonitrile (PAN) as a binder material for use with inorganic ion exchangers in the separation of radionuclides in a variety of acidic, neutral, and alkaline liquid radioactive waste forms. This evaluation also addresses the compatibility of the PAN binder with a select number of absorbers that are currently applicable to the ongoing EM waste separations programs. Initial test results have been favorable.

Under a contract with EM, the **Czech Nuclear Research Institute** is conducting a *Review of Advanced Separations Technologies in the Czech Republic* project. The review covers technologies in use or under development that deal with solvent extraction, ion exchange, and adsorption.

Contact: Kurt Gerdes, EM-53, (301)903-7289

ACTIVITIES IN RUSSIA IV.

BACKGROUND

In 1990, the **Department of Energy (DOE)** and the **Ministry of Atomic Energy for the Russian Federation (MINATOM)** signed a Memorandum of Cooperation (MOC) in the area of Environmental Restoration and Waste Management. This MOC is managed by the **Joint Coordinating Committee for Environmental Restoration and Waste Management (JCCEM)**, which meets annually to determine projects of mutual interest and benefit. Through direct technical exchange with **MINATOM** institutes, **DOE** benefits from the expertise of the Russian scientific community at a dramatic cost-saving U.S. labor investment ratio of 20 to 1. Under the auspices of the **JCCEM**, the best scientists in the world have come together to share experiences and develop innovative technologies in ten areas: Separations, Characterization, Mixed Waste, High-Level Waste (HLW), Tanks, Solidification, Decontamination and Decommissioning (D&D), Transuranic (TRU) Stabilization, Emergency Response, and Scientist Exchange.

The 7th **JCCEM** met in St. Petersburg, Russia in May 1997. At that meeting, it was decided that 27 ongoing projects would be funded at a level of approximately \$1 million. Of these technologies, six will be demonstrated in the U.S. by the end of FY98, and deployment opportunities are currently under discussion.

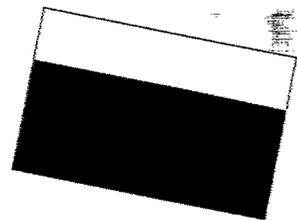
The 8th meeting of the **JCCEM** is scheduled for September 1998 and will be held in Washington, D.C.

PROJECTS UNDER THE JCCEM

SEPARATIONS:

Cobalt Dicarbolide Solvent Extraction

Since 1992, Environmental Management (EM) has contracted with the Khlopin Radium Institute (KRI) to perform an experimental research program on the applicability of a Russian Separations technology, cobalt dicarbollide, to the processing of HLW in the U.S. It has already been



demonstrated to remove cesium, strontium, and the actinides uranium, plutonium (Pu), americium, and neptunium. A fourth U.S. testing with a non-aromatic diluent took place in Idaho Falls in Fall 1997 on actual Idaho waste, and a fifth U.S. testing will be conducted in Spring 1998. The chlorinated solvent extraction process is being evaluated for both Hanford sludges and Idaho sodium-bearing waste. Due to this cooperative technology development, this technology has been deployed in Russia, and an industrial scale cobalt dicarbollide waste processing facility is under construction at the Krasnoyarsk site.

Copper Ferrocyanide Sorbent

Copper Ferrocyanide Sorbent technology has been developed in cooperation with the **Institute of Physical Chemistry** over the last four years. Since 1995, demonstrations in Idaho have shown its ability to remove cesium and strontium from actual Idaho tank waste. Current project tasks include evaluation applicability to Idaho calcine and mercury sorption. Hot cell tests on Idaho waste are scheduled for Spring 1998 at **Idaho National Engineering and Environmental Laboratory (INEEL)**.

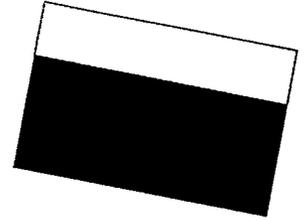
Actinides in Alkaline Solution

The **Institute of Physical Chemistry** has been studying actinides in alkaline solution for over 30 years. Ongoing work is related to criticality safety and segregation of low-and high-level waste in the disposition of Pu in Hanford tanks: *Solid State Transformations of Pu (IV) Hydroxide Precipitates*; and *the Interaction between Pu (IV, VI) Hydroxide/Oxide Compounds and d-Element Hydroxide to Forecast Phase Composition and Location of Pu in Actual Waste*. Another project in its third year is the *Investigation of the Removal of TRU and Technetium from Alkaline Waste by Coprecipitation*. To increase U.S. expertise on this topic, a senior specialist from the **Institute of Physical Chemistry** has been invited to conduct a course at **Washington State University** in the spring of 1998.

Crown Ethers Extraction

In 1995, a project was initiated with the **Institute of Chemical Technology** to study Crown Ethers extraction technology for removal of radionuclides and toxic metals from low-and high-level waste, as well as to control the chemical (redox potential) conditions in both alkaline and acidic waste and process solution. It is currently being evaluated to identify potential U.S. site users.

CONTAMINANT TRANSPORT MIGRATION AND CHARACTERIZATION:



Mayak Regional Model in Fractured Rock

It was agreed at the first meeting of the JCCEM that Characterization was an area of mutual interest. A cooperative project was initiated to use data from a Russian database along with recently collected samples to construct a three-dimensional regional model of contaminant migration through the fractured rock at Chelyabinsk, near the Mayak former weapons production site. This three-dimensional model is designed to be a cost-effective, predictive tool for characterization of the Idaho site because of its geological similarity to Chelyabinsk. This model is being developed at **Pacific Northwest National Laboratory (PNNL)** and **Hydrospetzgeologiya** in Moscow, Russia, and is expected to reach maturity by September 1998.

Chelyabinsk Field Studies

One of the highlights of the work conducted under the JCCEM has been the joint Chelyabinsk field tests on the shores of the Mishelyak river system near Lake Karachai. Lake Karachai was used as an unlined surface repository for liquid radioactive waste from Mayak. Since 1994, teams of EM scientists and engineers have joined their Russian team members in the field to conduct sampling. During the most recent expedition in July 1997, the 3rd Chelyabinsk Field Study, depth discreet samplers were installed to study the discharge of the aqueous contaminant plume into the river system. The data will be analyzed for use in constructing the regional model and will also be published under joint authorship in peer-reviewed scientific and technical journals.

Tomsk Regional Model in Deep Well Injection Area

A similar study of contaminant transport migration uses the existing Tomsk data to construct a computer model of contaminant migration from deep well injections. This project began in 1996 on a much smaller scale. While the geology of the Tomsk site is not as similar to U.S. sites, this study is useful to the DOE complex because of relevant experiences in contaminant migration.

Contact: Adam Hutter, EML, (212) 620-3576

MIXED WASTE PROCESSING:

Iron Phosphate Ceramics

In 1996, a project was initiated with **KRI** to investigate low-temperature Iron-Phosphate Ceramics for solidification of mixed low-level waste. Now in its second year, U.S. demonstration will be conducted on simulated waste in the fall of 1997, and if they are successful, demonstrations on actual waste will be conducted in Summer 1998. A Russian patent application that includes both U.S. and Russian specialists as co-developers is in process. In addition to these tests on low-level waste streams at Idaho, the Pu Focus Area has contracted with the Russian team to investigate the applicability of this technology to Rocky Flats' TRU ash.

Plasmatron with Induction Cold Crucible Melter (PICCM)

In 1995, The **Institute of Chemical Technology** was tasked by EM to build a plasmatron with induction cold crucible melter on a pilot scale. The unit was constructed and tested in Russia and then shipped to the **Georgia Institute of Technology** in Atlanta, Georgia. Non-radioactive tests were conducted with the melter in 1996. Unfortunately, **Georgia Tech** is dismantling the facility which housed the melter.

After a careful review of facilities which would be best able to evaluate and further develop the PICCM melter, **Mississippi State University's Diagnostic Analysis Laboratory (DIAL)** was identified. Plans are currently underway for the transition of the melter from **Georgia Tech** to DIAL. Further development and testing of the melter will continue under an **EM University Programs** grant to **DIAL**.

Because of the unique characteristics of the apparatus, a patent application was filed by **DOE** on behalf of the Russian inventors. This is one of the first **JCCEM** projects for which patent protection was filed. Two separate patent applications have been submitted to the U.S. Patent Office.

Ongoing Assessment of Russian Technologies

The Mixed Waste Focus Area (MWFA) has tasked **KRI** with researching and identifying Russian technologies that may be of interest to it. This has been an ongoing project since 1996. Essentially, this project saves time and money because the specialists at **KRI** are able to pre-sort Russian technologies according to MWFA needs assessments.

Contact: Jenya Macheret, DOE-ID (208) 526-2708

HIGH-LEVEL WASTE TANKS:

Tank Retrieval Equipment

Since 1995, the Tank Focus Area (TFA) has been working with specialists from various Russian institutes to share common experiences with tank operations and technologies. Over two years of technology development workshops, TFA contracted a Russian team from the **Integrated Mining Chemical Combine at Krasnyarsk**, the **Institute of Physical Chemistry**, and Radiochemservice joint stock company to build a pulsating pump and pulsating monitor for demonstration in a quarter scale tank at **PNNL**, which was conducted in July 1997. Preliminary results are extremely promising. The Russians have already emptied two of their tanks with this technology and anticipate production scale deployment. Discussions are underway with regard to applicability of this equipment for Oak Ridge tanks.

Sludge Modeling

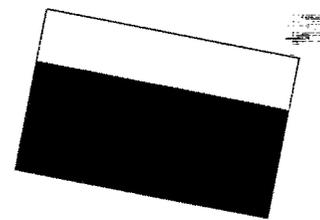
Because the EM 10 Year Plan identifies sludge as a major cost-saving area, TFA contracted the **Institute of Physical Chemistry** to measure and analyze the properties of sludge during different stages of the flow sheets. Russian experts in the area of modeling crystalline structure and composition use a different strategy than U.S. investigators. This project was funded in FY 96-97 and a final report is currently being reviewed.

Solid-Liquid Phase Separations

During the technical exchanges, it was realized that both the U.S. and Russia had developed a metal-ceramic cross-flow filter. The Russian filter was developed for use at Krasnoyarsk and the U.S. filter for use at Oak Ridge. In 1996, a project was initiated with the **Integrated Mining Chemical Combine** and **KRI** to test both filters using a U.S. simulant recipe, and then actual waste from Krasnoyarsk. The purpose of this project was to gather important performance data on filtrate flux for both filters. A final report was submitted in September 1997.

Users/Developers Technical Exchanges

A second technical exchange in September 1997 in Augusta, Georgia, brought together the site managers from the U.S. and Russia. The main objectives of the meeting were to: 1) discuss the activities involved in retrieval in the U.S. and Russia, 2) discuss the technical difficulties facing both countries in achieving acceptable retrieval for processing and disposal, and 3) discuss the options being evaluated by both countries.



Particular interest was expressed in Russian techniques to provide early warnings of leaks. There was also interest in conducting hot tests at Oak Ridge for the pulsating pump and pulsating monitor. It was also agreed upon that cooperation will take place on joint projects on similar waste streams, demonstrations, and actual field deployment.

The JCCEM is considering a second meeting of the retrieval users, which is planned for September 1998.

Contact: Dave Geiser, EM-53, (301) 903-7640

DECONTAMINATION AND DECOMMISSIONING (D&D):

D&D was added as an area of cooperation in 1995. A new project entitled *Plasma Chemical Conversion of Depleted Uranium Hexafluoride* was funded by the **Institute of Chemical Technology**. The project's goal is to develop a plasma conversion system, which will be installed at the **Institute of Chemical Technology** in Moscow, and then to evaluate the capabilities of U(3)O(8) long-term storage as one of the options for its disposition as a waste. An evaluation of plasma generated U(3)O(8) conversion into ceramic UO(2) is proposed, and experimental evaluation of applicability of anhydrous hydrogen fluoride for electro-chemical production of fluorine is also proposed.

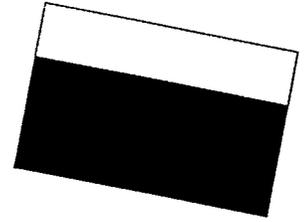
Contact: Jerry Hyde, EM-53, (301) 903-7914

SOLIDIFICATION:

Three technical exchanges have been conducted to share experiences in the operation of large scale melters since 1995. The most recent exchange took place in Augusta, Georgia in September 1997 through coordination of the TFA. Its purpose was to exchange experience on the operation of large-scale melters, review lessons learned, and identify opportunities for future cooperation. The Russian side has been operating a melter since 1990. The U.S. is building a production scale solidification facility at Savannah River.

One of the new developments discussed at the meeting was characterization technologies for use in HLW tanks with barrels and boxes, with the use of an ultrasonic probe to be used to measure tank mixing. Also, the results of using

a millimeter wave pyrometer for measuring the internal temperature of a melter were presented. The results indicate the device is very accurate for determining temperature within the furnace. It was agreed at that meeting that future exchanges may include shared experiences of melter D&D, glass formation, and safety issues of melter malfunction.



Contact: Dave Geiser, EM-53, (301) 903-7640

TRU STABILIZATION:

The first technical exchange was conducted in this area in 1996. Since then, the Pu Focus Area has contracted KRI for three projects in this area.

Silica Gel

The Pu Focus Area began funding a project entitled, *Plutonium Immobilization in Silica Gel from Liquid Waste by means of High Temperature Adsorption* in 1997. This technology has been demonstrated in Russia to immobilize Pu from liquid waste by means of high-temperature adsorption. There are several possible applications at sites within the scope of environmental restoration and waste management, and preliminary interest has been expressed in its applications to the solidification of spent fuel prior to shipment to Savannah River. Discussions of intellectual property rights are underway with the Russian inventors.

The Pu Focus Area is also funding a project to determine the *Radiolytic Gas Generation in Chemically Bonded Iron-Phosphate Matrices Formed by the Cold Ceramic Immobilization of Transuranic Ash Residue Waste*. This project explores an adaptation of the iron-phosphate bonded ceramics technology that is being funded by the Mixed Waste Focus Area. The third project is a *Study of the Synthesis and Thermodynamics of Super Stable Crystalline Matrices for Stabilization and Immobilization of Plutonium Bearing Waste*.

Contact: Bill Scott, DOE-ID, (208) 526-8189

EMERGENCY RESPONSE:

At the 7th JCCEM meeting in May 1997, it was agreed that Emergency Response would be added as an area of cooperation. Three technical exchanges have been conducted in the area of Emergency Response between

the **Hazardous Materials Management and Emergency Response (HAMMER) Training and Education Center** in Richland, Washington and **MINATOM** Emergency Response Centers. Topics of exchange have included scripts used for radiological training exercises, organization of emergency responders, training of first responders to the scene of a radiological accident, and interactions between local, regional, and federal organization during transportation accidents.

In September 1997, a delegation of **MINATOM** Emergency Response Center Managers attended the **HAMMER** opening ceremonies. A technical exchange workshop was conducted, which included participation by personnel from the regional office of the **Federal Emergency Management Agency**.

A reciprocal exchange was conducted in Moscow, Russia in November 1997. At that time, five potential areas of cooperation were drafted for consideration by the **JCCEM**:

1. Collaboration on development of a radiological monitoring simulation system using a combination of Global Positioning System computer technology
2. Collaboration on piloting an integral emergency response process involving all levels of local, state, tribal, and Federal governments
3. Collaboration on the joint participation of training and education programs using the teleconferencing capabilities of both sides
4. Collaboration on the development and implementation of transportation emergency preparedness training tools and courses
5. Collaboration on determining necessary technologies to be used in emergency situation which are consistent with the **HAMMER** business plan

These five proposals were reviewed for their applicability to DOE's domestic technology development clean up mission. Because they fall outside the scope of EM's primary responsibilities, it was decided that future work in the area of Emergency Response will be conducted directly between **HAMMER** and the Russian institutes.

Contact: June Ollero, DOE-RL, (509) 376-3825

SCIENTIST EXCHANGES:

Twenty-three technology development workshops have been held since February 1992, eleven of them in 1997. These exchanges benefit the focus areas by bringing together experts from the only other country with sites similar to DOE's. Through this program, the world's leading technical experts cooperate on the most difficult environmental technology problems.

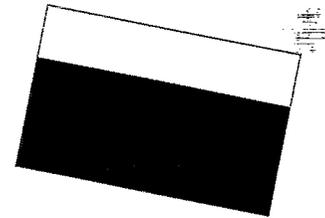
Four Russian graduate students from the Chelyabinsk region were employed as EM research assistants at INEEL for both DOE and contractors while enrolled at **Idaho State University** during the academic year. Three of the graduate students completed their course work and were granted Masters degrees in Summer 1997.

The National Academy of Sciences (NAS) is administering an EM-sponsored program that provides grants of \$16,000-\$30,000 to support the research of Russian scientists at U.S. national laboratories. The program provides support for the foreign visitors to spend six to twelve months at U.S. national laboratories and universities conducting research on various aspects of radioactive waste management. Following is a list of the twelve projects supported during 1996-1997 under the **NAS/National Research Committee's** Radioactive Waste Management Grants Program with the Former Soviet Union:

Dmitry Kulik, State Scientific Institute for Environmental geochemistry, Ukrainian Academy of Sciences, Kiev, Ukraine.
Development of an integrated model of equilibria and sorption by clay minerals of selected actinide and lanthanide elements

Vasily Sinitsyn, Institute of Geochemistry, Mineralogy, and Ore Formation, Ukrainian Academy of Sciences, Kiev, Ukraine.
Experimental investigation of the sorption of lanthanides on clays and clay minerals under hydrothermal conditions

Igor Suslov, Institute of Physics and Power Engineering, Russian Ministry of Atomic Power, Obninsk, Russia. *Development of an arbitrarily high order transport method for unstructured grids, which has applications in shield design and optimization, exposure field characterization, and environmental impact studies*



Dmitry Marinin, Institute of Chemistry, Far Eastern Branch of the Russian Academy of Sciences, Vladivostok, Russia. *Synthesis and evaluation of inorganic ion exchange materials for removal of strontium from high hardness groundwaters*

Evgeny Kontar, Shirshov Institute of Oceanology, Russian Academy of Sciences, Moscow, Russia. *In-situ extraction of radionuclides from natural waters*

Boris Burakov, Khlopin Radium Institute, Russian Academy of Sciences, St. Petersburg, Russia. *Design of waste forms for actinide immobilization*

Dmitry Silin, Moscow State University, Moscow, Russia. *Mathematical modeling of porous media flow and radionuclide transport*

Mikhail Mironenko, Vernadsky Institute of Geochemistry and Analytical Chemistry, Russian Academy of Sciences, Moscow, Russia. *Modify existing 3-D finite-element solute-transport model so that it could be used for cold-region remedial technology development and evaluation*

Boris Serebryakov, Institute of Biophysics, Ministry of Health, Moscow, Russia. *Development of a safety assessment methodology for the Russian regulatory system*

Pavel Pleshanov, Applied Ecology Research Laboratory, Russian Ministry of Health, Moscow, Russia. *Chemical speciation of heavy metals*

Trofim Trofimov, Vernadsky Institute of Geochemistry and Analytical Chemistry, Russian Academy of Sciences, Moscow, Russia. *Separation of actinides and other fission products from solid and liquid wastes*

Contact: Elizabeth O'Malley, EM-54, (202) 586-0175

EM is sponsoring a Russian post-doctoral researcher at the **Seaborg Institute** in Berkeley, California, to perform research in the area of separations technologies.

Contact: Kurt Gerdes, EM-53, (301) 903-7289

Intellectual Property Rights: From Development to Deployment

The commitment to protect intellectual property is a cornerstone of the Russian program. Non-Disclosure agreements are signed for each contract to protect ownership of previously developed intellectual property. In addition, principal investigators are contractually obligated to notify the JCCEM when new or novel knowledge is developed under the auspices of JCCEM contracts so that issues of intellectual property rights can be addressed immediately.

Historically, it had been DOE procedure to file a U.S. patent on behalf of the Russian owners for intellectual property which has been determined to have commercial potential. Three patent applications have already been submitted under the JCCEM program:

Removal of Dissolved Actinides from Alkaline Solutions by the Method of Appearing Reagents, N.N. Krot and R.A. Charushnikova.

Processing of Solid Mixed Waste Containing Radioactive and Hazardous Materials, V.T. Gotochikov, E.A. Filippov, and A.V. Ivanov.

Apparatus for Processing of Solid Mixed Waste Containing Radioactive and Hazardous Materials, V.T. Gotochikov, E.A. Filippov, and A.V. Ivanov.

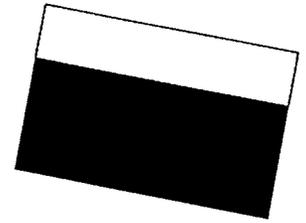
Three additional patent applications are currently being prepared:

New Solvent for the Simultaneous Recovery of Radionuclides from Liquid Radioactive Wastes, V. Romanovsky, I. Smirnov, V. Babain.

New Extraction Processes and Solvents for the Recovery of Cesium, Strontium, Rare Earth Elements, Technetium, and Actinides from Liquid Radioactive Wastes, B. Zaitsev, V. Esimantovsky, L. Lazarev, V. Romanovsky, E. Dzekun.

Iron Phosphate Bonded Ceramics for Solidification of Mixed Low-Level Waste, A. Aloy, E. Kovarkskaya, T. Koltsova, P. Medvedev.

As additional technologies mature, the JCCEM is in the process of re-evaluating the best way to protect intellectual property rights developed under the Memorandum of Cooperation. Recently, issues have been raised about the relationship between the method of intellectual property rights protection and the path to eventual deployment at DOE sites. DOE is





currently exploring how patents are handled under the auspices of other cooperative agreements with Russia. When DOE collaborates with Russian Institutes on projects conducted under the auspices of other international agreements, for example, DOE retains ownership of the patent with an agreement to share 50% of the royalties from licensing fees with their Russian partners, and retain 50% for itself or its contractors. This method overcomes some of the institutional and structural difficulties that Russian Institutes face when trying to enter the U.S. market. DOE is considering proposing that the JCCEM adopt a similar strategy.

Internet Home Pages

A JCCEM Internet Home Page has been developed to improve Russian and U.S. scientist's access to information about activities conducted under the agreement. **Khlopin Radium Institute** is the Russian coordinator for development of the Web site, including text, photographs, and other graphic data about the JCCEM. MINATOM retains authority to approve content for the site. The address for the JCCEM Internet Home Page is:

<http://zx.res.fsu.edu/DOERussianActivities>

OTHER PROJECTS WITH RUSSIA

Pioneer

Pioneer, a state-of-the-art robot based on a design developed with funding from DOE's **Office of Science and Technology**, will begin work at the Chernobyl accident site in Ukraine in early Spring 1998. The robot is based on a design by RedZone Robotics named Houdini, which was funded through the Federal Energy Technology Center's Industry Program, and is currently being used at **Oak Ridge National Laboratory** to retrieve radioactive sludge and debris from an underground storage tank.

Pioneer was built by a team of scientists from the **National Air and Space Administration (NASA)**, **Lawrence Livermore National Laboratory**, **PNNL**, **RedZone Robotics**, **Westinghouse**, **Carnegie Mellon University's Robotics Institute** and its **National Robotics Engineering Consortium**, the **Jet Propulsion Laboratory**, and the **NASA/Ames Research Center**.

Pioneer will be commissioned to assess structural damage to the concrete shell, called the shelter, which was hurriedly built around the reactor after the Chernobyl accident which occurred in 1986. The shelter is now cracked. Information on radioactive hot spots and structural damage gathered by Pioneer will be used to determine cleanup strategies. The robot measures three feet long by 3.3 feet high.

Contact: Kurt Gerdes, Industry Programs, (301) 903-7289

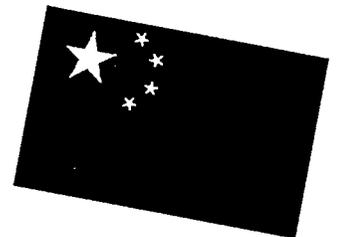
ACTIVITIES IN ASIA AND THE PACIFIC RIM

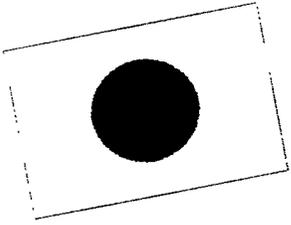
CHINA

An investigation of Chinese environmental needs and expertise has been conducted by the **Office of Science and Technology (OST)** to match opportunities in the Chinese environmental industry with **Environmental Management (EM)** Focus Area needs and expertise. This FY97 activity included the development and implementation of strategies for cooperation between **EM** and Chinese research institutes; activation of relationships between **EM** and potential Chinese partners; identification of opportunities for technical exchange; research into China's technologies and environmental conditions; and communication of **EM** industry partner experience in China.

Secretary of Energy, Federico Peña and Minister Zeng Peiyan, Vice Chairman of China's State Planning Commission, signed the **Agreement of Intent Concerning Peaceful Uses of Nuclear Technology** during the U.S.-China Summit. The agreement is the first step toward joint initiatives in reactor technology and safety; advanced in-service inspection of nuclear power plant components; fuel handling and storage; the production of isotopes for medical, industrial and agricultural uses; and decontamination and decommissioning, which is a focus area of **EM**. Cooperation in these areas will benefit both countries as they seek to address energy needs for the next century.

Contact: Elizabeth O'Malley, EM-54, (202) 586-0175





JAPAN

Power Reactor and Nuclear Fuel Development Corporation

A collaborative agreement was signed in 1998 by the **Department of Energy (DOE)** and the **Power Reactor and Nuclear Fuel Development Corporation of Japan (PNC)** with the objective of further developing radioactive waste management technologies in the following areas:

- 1) methodology development and implementation for performance assessment, site characterization planning, and decision analysis;
- 2) laboratory and field experimental work for process model development;
- and 3) quality assurance and other programmatic support.

The research will be conducted by **DOE** at **Sandia National Laboratories (SNL)** in support of three major PNC initiatives in the areas of High-Level Nuclear Waste Disposal, Transuranic (TRU) Waste Disposal, and Long-Term Research for understanding the basic processes for nuclear waste disposal.

The collaborative project will initially focus on a set of activities that address both near-term needs driven by the H12 progress report and by the need to develop technical approaches for research and development for future activities. Topic areas will include:

- **Site Characterization**
- **Uncertainty**
- **Chemical Retardation**
- **Experimental and code development work on colloid and radionuclide transport**
- **Quality Assurance**

Much of the work will be accomplished by both **PNC** and **SNL**, with communications through written reports, workshops, and technical visits and exchanges by **PNC** and **SNL**.

Analysis and experimental work will complement ongoing performance assessment and experimental work at **PNC**. Details of the Collaborative Program will be decided through discussions and deliberations at the **PNC/DOE** Technical Coordinator's annual meeting.

Contact: Elizabeth O'Malley, EM-54, (202) 586-0175

Japan Atomic Energy Research Institute

The first U.S. DOE Japan Atomic Energy Research Institute (JAERI) Joint Coordinating Committee (JCC) meeting was convened in Washington D.C. on June 9, 1997. DOE/JAERI determined the functions of the JCC and also established three Joint Working Groups in these areas:

- Basic Nuclear Sciences
- Nuclear Safety, D&D, and Waste Management
- Advanced Nuclear Technologies

Also, the JCC executed two new Specific Memoranda of Agreement entitled: *Collaborative Program of Development of a Prototype Communications Link to Share Atmospheric Dispersion and Dose Assessment Modeling Products and Research and Development in Nuclear Material Control, Accountancy Verification, and Physical Protection.*

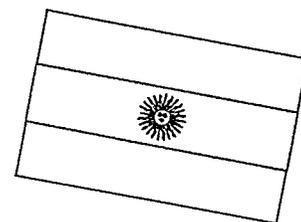
The second JCC meeting is scheduled for early summer of 1998 and will be held in Japan.

Contact: Jud Lilly, EM-42, (301) 903-7218

ACTIVITIES IN SOUTH AMERICA

BACKGROUND

Activities in Argentina are conducted under the auspices of the *Implementing Arrangement between the Department of Energy of the United States of America (DOE) and the National Atomic Energy Commission of the Argentine Republic (CNEA) for Technical Exchange and Cooperation in the Area of Radioactive and Mixed Waste Management*, signed on May 29, 1996. A **Joint Coordinating Committee for Radioactive and Mixed Waste Management (JCCRM)** was established as the managing body for the arrangement and is responsible for selecting specific joint project activities. The JCCRM has outlined four specific technical areas of cooperation:



Characterization and Retrieval (of spent resins), Separation Methods (e.g. crystalline silicotitanate [CST]), Decontamination and Decommissioning (D&D), and Vitrification Processes. The long-term objective of the arrangement is to open new markets and opportunities for U.S. and Argentine environmental technology companies.

The 4th **JCCRM** meeting was held in December 1997 in Miami, Florida during X-Change '97, a Global D&D Conference. The Record of Meeting of the **JCCRM** was signed by both parties, and collaborations were established in the following areas:

D&D

The D&D activities scheduled for FY97 were delayed due to the selection of an appropriate DOE facility for the demonstration of mature and new technologies used for the D&D of Plutonium (Pu) gloveboxes. In December of FY98, the D&D Focus Area obtained an agreement with **Los Alamos National Laboratories (LANL)** for the use of their facility for this large-scale demonstration project.

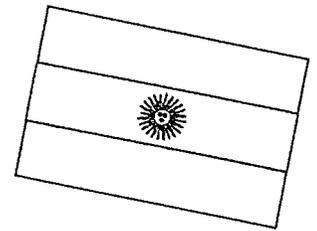
It was agreed that **CNEA** participate as a member of an Integrating Contractor Team, which will have quarterly meetings at **LANL** and monthly tele-conferences in the intervening months. These D&D Pu glovebox activities are scheduled to be completed in 18-24 months.

CST

CNEA is currently investigating treatment and disposal options for organic ion exchange (IX) resins stored at their operating nuclear power reactors. They would like to reduce the hazard of the waste form and the cost of disposal. By reducing the cesium (Cs) and strontium (Sr) concentration, the bulk of the waste stream could be disposed of as low-level waste, thereby significantly reducing the disposal cost. The resulting waste, concentrated in Cs and Sr, could be disposed of as medium-level waste in a safer configuration.

In an effort to improve the efficiency of the Cs removal process and the storage and disposal characteristics of the separated Cs, **DOE** has proposed the use of the inorganic Cs selective ion exchange material **CST**. During FY97, **Pacific Northwest National Laboratories** researchers evaluated **CNEA** Molybdenum-99 waste streams, which were treated with **CST**, using a computer model. An analysis of the data indicated that **CST** could provide

the decontamination factors needed for low-level waste classification. CST activities for FY98 include: 1) reviewing the current process flow sheet, 2) collection of pertinent data for computer modeling, and 3) making recommendations for the definition of functions and requirements for the CST based ion exchange process. It was agreed upon at the 4th JCCRM that DOE will participate with CNEA to conduct cold and hot tests, and further analysis, design activities, and disposal options will be worked cooperatively.



Resin Vitrification

In FY97, a joint program between DOE and CNEA was initiated for the immobilization of spent organic ion exchange resins. Vitrification presented a plausible immobilization option because of the significant volume reductions possible and because of the enhanced performance of glass waste forms. Due to Savannah River Technology Center's experience with vitrification of spent ion exchange resins, immobilization studies were successfully performed on both the bench and melter-scale. However, during further vitrification testing with ion exchange resins, enhancements to the treatment process were discovered.

In FY98, melter-scale studies with Argentine supplied resin material will be performed at **Clemson University** using a prototypical melter system configuration. This will confirm the feasibility of the treatment process and provide off-gas data necessary to determine the hazardous air pollutants of concern. This demonstration will also allow the CNEA representatives an opportunity to collaboratively participate in the vitrification demonstration and to evaluate and review U.S. vitrification equipment for their specific applications.

Uranium Mill Tailings

In June of FY97, a CNEA representative participated in a DOE-sponsored site tour of DOE's uranium mill tailing sites in Colorado and Utah. As a result of this exchange, CNEA is re-evaluating their current methodology for remediating Argentine uranium mill tailings.

Scientist Exchanges

The four scientist exchanges scheduled for FY98 are: 1) CNEA participation in the large-scale demonstration for the D&D of Pu gloveboxes at LANL, 2) CNEA participation in the resin vitrification testing scheduled to take place at Clemson University, 3) DOE participation in the resin testing and

melter evaluation at **Bariloche Laboratories**, and 4) DOE participation in the consultation for the setup and testing of CST at the Ezeiza site.

The 5th JCCRM meeting will be held in Denver, Colorado in September 1998 during SPECTRUM '98.

Contact: Elizabeth O'Malley, EM-54, (202) 586-0175

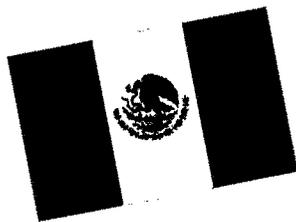
MIL ACTIVITIES IN NORTH AMERICA



CANADA

The Tank Focus Area is managing a multi-site, multi-laboratory and industry effort to complete the development and transfer to the user for Light-Duty Utility Arm (LDUA) Systems. These systems will be used for characterization, surveillance, and limited retrieval operations at Hanford, Idaho, and Oak Ridge. The first two systems were delivered by **Spar Aerospace Limited** of Canada in FY96. One system was deployed in Hanford tank, T-106 and will be used by Hanford for further tank characterization campaigns. At Oak Ridge, the *Gunite and Associated Tanks Treatability Study* project used the Modified LDUA to transfer 20,000 gallons of radioactive waste to safer tanks. The data collected during operation of the Modified LDUA will also support a record of decision on gunite tank remediation. The fourth system has been delivered to Idaho for use in their high-level liquid waste tanks. Tank inspection and in situ waste analysis will be demonstrated in FY98 to support tank closure.

Contact: Dave Geiser, EM-53, (301) 903-7640



MEXICO

Collaboration for work is underway between **Oak Ridge National Laboratory (ORNL)** and **El Instituto Mexicano del Petroleos (IMP)** to share in the development of new technologies and modification of existing technologies for remediation of hazardous waste sites. This project is specifically addressing cleanup of soils contaminated with dense non-aqueous phase

liquids. There has been a joint proposal between **IMP** and **ORNL** for funding from **Petroleos Mexicanos** on bioremediation technology development and testing. Initial bioremediation testing has been conducted at **ORNL** in cooperation with **IMP** staff.

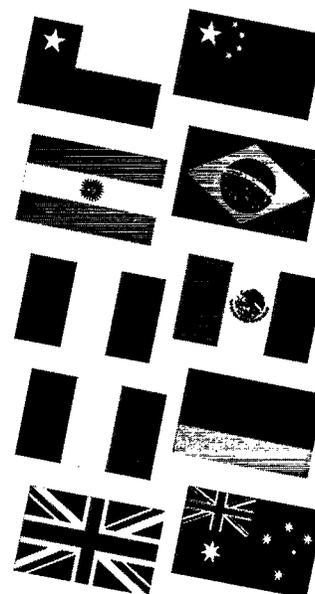
Contact: Skip Chamberlin, EM-53, (301) 903-7248

COUNTRY STUDIES VIII.

The **Office of Environmental Management** is currently compiling Country Studies to update our information in areas such as:

- * Electric Power Capacity
- Nuclear Policy, Capacity, and Reactor Types
- Industrial Fuel Cycle
- Regulatory Structure
- Intellectual Property Rights

Currently, the countries include: Chile, Argentina, France, Belgium, United Kingdom, China, Brazil, Mexico, Germany, and Australia.



INTERNATIONAL ORGANIZATIONS IX.

European Commission

The **European Commission** sponsored an international workshop held in Moscow, Russia, January 26 and 27, 1998, where representatives from all international organizations that collaborate with Russian scientists working on environmental management issues at the **Mayak Production Association** met in order to better organize and plan future work. This was the first

meeting of its kind, and representatives from seven countries participated. The goal of the meeting was to exchange information on research currently being conducted in the region, including projects through the **Joint Coordinating Committee for Environmental Restoration and Waste Management** and **British Nuclear Fuels Ltd (BNFL)**. The participating organizations include:

- PA Mayak-Oziorsk (Russia)
- Hydrospeztzgeologiya-Moscow (Russia)
- Institute of Physics and Energy-Obninsk (Russia)
- Ministry for Atomic Energy of the Russian Federation (MINATOM) (Russia)
- Ministry of Emergency Situations (EMERCOM) (Russia)
- Russian Academy of Sciences, Institute of Geology or Ore Deposits, Petrography, Mineralogy, and Geochemistry-Moscow (Russia)
- BNFL-Warrington (UK)
- Westlakes Research Institute-Moor Row (UK)
- European Commission
- Statens Stralevern, Norwegian Radiation Protection Authority (Norway)
- Battelle Pacific Northwest Laboratory (USA)
- US-Department of Energy
- University of Padova (Italy)

The **Office of Environmental Management (EM)** supports the **U.S. Department of Defense (DoD)** in the **Arctic Military Environmental Cooperation (AMEC)** program, which is a tri-lateral forum for cooperation between the **DoD** and the Norwegian and Russian Ministries of Defense. The objective of **AMEC** is to improve the Russian Navy's spent fuel and radioactive waste management capabilities associated with the Russian nuclear submarine decommissioning program.

EM is supporting two specific projects within **AMEC**: Solid Rad-waste Storage (Project 1.4) and Cooperation in Radiation Safety (Project 1.5). Project 1.4 will first demonstrate surface coating, container, and other solid

rad-waste storage technologies in the arctic environment, then develop capabilities for Russian Navy implementation of these technologies. Project 1.5 will provide a means to exchange U.S. rad-worker training and health physics training with the Russian Navy to improve radiation control practices. Project 1.5 will also provide surplus DOE radiation protection equipment to the Russian Navy to improve their safety capabilities.

Contact: Andrew R. Griffith, EM-65, (301) 903-7120

DOE/EM Membership in the International Atomic Energy Agency-Contact Experts Group (IAEA-CEG)

DOE/EM leads the U.S. Delegation to the IAEA-CEG, established to promote international cooperation with the Russian government, in addressing international environmental concerns emanating from Russia's inadequate management of nuclear waste and military nuclear spent fuel in Northwest Russia. The IAEA forum allows DOE to review the status of Russian policy and management practices in the above fields; and to influence other nations on international initiatives in preventing and mitigating the above environmental concerns, including assessments and technology responses in the safe handling, transport, and storage of nuclear materials. DOE action at the IAEA-CEG carries over to influence other similarly focused international programs, i.e., the AMEC program, in assisting Russia in adopting proven waste management policies and practices. The IAEA-CEG is a working group of representatives from nine countries; the European Commission; selected international private sector interests (for U.S. includes Nuclear Assurance Corp., Lockheed-Martin, and Babcock Wilcox); and international research organizations recognized in the field. Cost to EM is limited to participation at IAEA-CEG meetings on a periodic basis.

Contact: Ken Chacey, EM-60 (202) 586-0671

DOE/EM support to the International Institute for Applied Systems Analysis (IIASA), Austria & Luxemburg

DOE/EM funding to IIASA supports cooperation with the Russian Government, designed to assess, analyze, and make recommendation on radiological data from selected contaminated regions of the Russian central Ural area.

The EM-supported initiative characterizes the major radiological threats to local populations and affected water and land areas impacted by Russia's cold war nuclear weapons development programs. Data on radionuclide concentrations, migration, and transport is also useful in contrasting it with U.S. experience. IASA's initial project phases of centralizing existing data and added data collection are complete; data analysis is underway. Research findings will be provided to the **Russian Ministry of Atomic Energy** with recommendations on implementation of selected remediation initiatives in affected areas. The EM-supported initiative focuses the attention of advisory board members (from Russia, Germany, Austria, France, Canada, and Japan) on environmental management concerns and on response actions for their possible future support. EM contributions to IASA in FY96, \$450K and FY97, \$275K.

Contact: Ken Chacey, EM-60, (202) 586-0671

INTERNATIONAL TECHNOLOGY SYSTEMS APPLICATION (ITSA) PROGRAM INFORMATION

EM International Activities - Highlights is produced twice a year by the International Technology Systems Application (ITSA) staff. For additional copies of this document, to request other publications, or for more information on ITSA, please fill out and return the attached reader reply card.

You can also learn more about the ITSA program on the Internet.
The ITSA Home Page is located at:

[HTTP://em-52.em.doe.gov/ifd/intl/intl.html](http://em-52.em.doe.gov/ifd/intl/intl.html)