

TOPICAL WORKSHOPS

Workshops and other interactive forums sponsored by the EM Science and Risk Policy Programs are useful research integration tools because they bring researchers and technology users together. EMSP workshops either center on subject-specific or site-specific topics, using a particular theme to highlight pressing problems within EM, or are held in conjunction with Focus Area reviews and professional society meetings. The objective of tying an EMSP workshop to a Focus Area review is to better define end-user needs so researchers fully understand the site problem for which their research is targeted. Workshops typically feature presentations of the research being conducted by the principal investigators, with industry and/or end-user participation and feedback.



The EMSP Process Relative to the Focus Areas

Such forums allow the EMSP researchers to learn about and discuss actual technology needs with the end-users. At the same time, site representatives and other end-users have an opportunity to hear about science developments directly from those conducting the R&D work. The EM/OST Focus Areas provide the linkage between the EMSP projects and the Department's ongoing waste management and clean-up programs within the Offices of Waste Management (EM-30), Environmental Restoration (EM-40), and Nuclear Materials and Facility Stabilization (EM-60). The five Focus Areas OST currently supports are:

- Deactivation and Decommissioning Focus Area (DDFA)
- Mixed Waste Focus Area (MWFA)
- Nuclear Materials Focus Area (NMFA)
- Subsurface Contaminants Focus Area (SCFA)
- Tanks Focus Area (TFA).

Through communication and cooperation between EM's site end-users, the Focus Areas identify opportunities to integrate the research results of EMSP projects to improve performance and reliability of their baseline clean-up technologies. The Focus Areas also evaluate EMSP projects and results to reveal opportunities to develop breakthrough technologies to solve EM's long-term environmental problems and reduce risk. Figure 1 shows the circular flow of information between the EMSP and the Focus Areas.

Moving research results to application by end-users involves:

- Working with DOE problem holders to identify needs and priorities
- Working with the OST Focus Areas to coordinate activities
- Communicating science results to Focus Area technology developers and EM problem holders.

Dialogue between the end-users and the researchers regarding how the research results can be applied enables sufficient customer understanding of the EMSP projects to “pull” technology down the chain from research to deployment. Focus Areas indicate and facilitate interaction where there is a potential application and provide recommendations for tailoring planned research activities towards Focus Area needs.

The workshops have been very successful and the presentations made by the researchers have been of consistently high quality. Details of the past and planned workshops, including presentations, are available on our program web page (<http://emsp.em.doe.gov/workshops/index.htm>).

**Workshop on Integration of End-user needs with Research
Projects for EMSP
July 9-10, 1998
Savannah River Site, SC**

The purposes of this workshop were to inform EMSP principal investigators of environmental restoration program needs at SRS, to inform the end-users of currently funded EMSP projects that have relevance to SRS needs, and to determine and plan a program to meet gaps and unmet needs using EMSP research. Among the seventy-five representatives in attendance were EMSP principal investigators; STCG and SCFA end-users; scientists from regional universities, including minority serving institutions and university consortia; DOE contributors; and M&I contractors. The workshop participants received overviews of EMSP and SCFA technologies currently in use at SRS, as well as SRS end-user needs and STCG activities. Tours were available for workshop participants to see SRS needs first-hand.

Three subgroups were formed to develop deployment plans for (1) phytoremediation, (2) DNAPL, characterization, and bioremediation, and (3) metals and rads. The outcome of the phytoremediation subgroup was extremely successful in providing an abbreviated deployment project plan. It was concluded that phytoremediation was a viable technology to meet two stated needs: (1) deploy passive technology for attenuation of VOC, and (2) utilize innovative technologies to replace pump and treat technology. The subgroup proposed three phytoremediation pilot scale demonstrations utilizing loblolly pines, poplar trees, and an aquatic lagoon system. Timelines and cost estimates to process the projects from the science phase through deployment were developed. The DNAPL, characterization, and bioremediation subgroup was less optimistic about the application of the selected southeastern science projects to SRS needs. SRS has large DNAPL plumes where characterization is needed and improved off-gas treatment from vapor extraction technologies is desirable. These selected projects address a gap at SRS. The technologies are 5-9 years away from deployment and currently available technologies allow cleanup to progress. The metals and rads subgroup directed the participating PIs towards discussions with high level waste end-users.

**First Environmental Management Science Program
National Workshop
July 27-30, 1998
Chicago, IL**

The first Environmental Management Science Program (EMSP) National Workshop was held July 27-30, 1998 to communicate the progress and plans of all then-active projects. It served as an opportunity for scientists in different disciplines across the program to become acquainted with each other, and to discuss and coordinate research plans. Abstracts for those projects are available in CD-ROM and hardcopy formats and can also be accessed from the EMSP web site at <http://emsp.em.doe.gov>. The EMSP web site also provides up to date information about ongoing research projects, future events, updated technology needs, and links to other related environmental R&D programs.

INEEL Science Integration Workshop
October 20-22, 1998
Idaho Falls, ID

This site-specific workshop included 101 attendees with interests in four science areas: fractured rock, high level waste (calcine separations), decontamination and decommissioning (D&D), and LandTech. Fractured rock sessions included 12 presentations of ongoing research, followed by two working sessions to discuss opportunities for increased collaboration, as well as the identification of science and technology gaps related to understanding and remediating contaminated fractured rock environments. The D&D group toured the sewage treatment facility at CFA, Pit 9, and the nuclear airplane engine exhibit. The high level waste group toured the calcining facility at INTEC. The LandTech group developed a set of research requirements during their breakout session, and also toured Box Canyon.

Interactions between the PIs and end-users included the following:

- Application of “Lab on a Chip” where Brad Frazee (INEEL) and Greg Collins (Naval Research Laboratory) discussed needs characterization information concerning their important constituents. It was decided that (1) Tom Thiel would get information on the top twelve hitters of “Lab on a Chip” to Greg Collins; (2) Greg would contact the INEEL Sample Management Office in order to test the samples; (3) large scale demonstration of “Lab on a Chip” would be done by Greg and Dick Meservey; and (4) Greg would keep Dick apprised on further research done, with the goal to be using the “Lab on a chip” in the field as part of a large scale demonstration project.
- Mike Savina and Maurice Ross of TRA met with Zawtech, Inc. while in Idaho Falls and they are discussing CRADAs and other industrial partnerships regarding Laser Ablation and Robotics for scabbling.
- Information from INEEL requested transfer of knowledge regarding D&D cost estimates from Brad Frazee. Completed by providing the researchers with the URL that has the information on it.
- Brad Frazee and Dick Meservey will track progress of a novel class of sensors based on light diffraction utilizing polymerized colloidal crystalline arrays for longer-term usage (Sanford Asher). DDFA is interested in field testing a portable sensor.
- Inorganic Ion Exchange Materials for Environmental Restoration research is a promising area because there is an increasing concern regarding water treatment as the size of the reactor being decontaminated and decommissioned increases. The end-users believe there will be a need in the future as commercial power plants are decommissioned. Full-scale membrane filters are needed to cleanup fuel storage basins at the INEEL to warm waste pond disposal limits.

**Workshop on Integration of End-user needs with Research
Projects for EMSP Focus on Deactivation and Decommissioning
November 17-18, 1998
Savannah River Site, SC**

The purposes of the workshop were to:

- Increase the awareness of the EMSP principal investigators of the role of the DDFA and thereby increase the applicability of their projects to the D&D mission of DOE
- Improve SRS knowledge of the EMSP research
- Identify EMSP projects that have direct usefulness to SRS D&D activities
- Determine and discuss EMSP project needs.

Twenty principal investigators and 31 individuals representing the DDFA, end-users, scientists, and DOE program representatives listened to overviews of the EMSP program and the DDFA, discussed lessons learned from the D&D breakout session at the INEEL Workshop and results from the D&D Large Scale Demonstration at the INEEL, and toured SRS's D&D Large Scale Demonstration. The EMSP principal investigators provided a short overview of their projects and afterwards hosted a poster session.

The EMSP PIs gained an improved knowledge of the D&D needs of DOE as a result of the workshop. SRS and selected segments of the DOE complex were informed of the EMSP D&D related research. SRS will provide mentors to several of the projects. Fourteen PIs identified current needs to increase the effectiveness of their research projects. These needs include:

- Representative samples that can be used to test the decontamination process being developed in the laboratory. (A.J. Francis)
- Replicate contaminated metal coupon for quantitative lab tests on biological coatings for removal of contamination radiation. Need to know what is considered "fixed contamination". (Brian Davison)
- Monitoring of mixtures of radionuclides and examining actual samples (e.g. concrete drill samples). Field testing to compare to baseline technologies. (Greg Collins)
- Concrete surface samples and priority of contaminants on concrete (particularly radionuclides). (Brian Spalding)
- Indoor/outdoor location with radioactive airborne contamination to test sampling equipment. Identification of industrial partners. (Piotr Wasiolek)
- More information of the structure and composition of surface contaminants to enable design of more realistic experiments. (Steve Babayan)

- Composition of radioactively contaminated surface layers on pipes and storage tanks, (i.e., type of radionuclides, heavy metal ions, etc.), level of contamination, thickness of surface film. Need 2" x 2" samples. (Carlos Melendres)
- Information on general residues (organics/inorganics/particulates). (R.M. Counce)
- End-users that could benefit from: (1) predictive capability of diffusion between contaminants (plutonium, uranium, etc.) and metal they are in contact with/ contained by (e.g., glove box components and steel storage containers), and (2) a mobile apparatus to detect degree of contamination, chemical and physical characterization of contaminant that has been painted over as opposed to being in a steel container. (Bernard Cooper)
- Database of: (1) alloys/metals commonly contaminated, (2) atmospheric conditions of typical storage and operation in D&D facilities, (3) typical paints/surface coatings that are found on these surfaces, and (4) method and length of time of contamination or exposure to contaminants. (Gary Halada)

These needs range from common samples that could be decontaminated to a mini demonstration facility where representative radioactive samples could be decontaminated with prototype equipment to evaluate the prototype before proceeding to the large scale demonstration facilities provided by the DDFA. Many of the university PIs do not have licenses or facilities to handle radioactive materials, yet need access to these materials for their research.

**Tanks Focus Area (TFA) Workshop
November 17-18, 1998
Richland, WA**

The Tanks Focus Area (TFA) develops technologies to safely and efficiently remediate radioactive waste stored in underground tanks at four sites nationwide. This work is done by leveraging resources and working with a broad team of experts from industry, national laboratories, government contractors, universities, stakeholders, and U.S. Department of Energy.

The goal of the workshop was to further collaboration between EMSP researchers and TFA end-users in the areas of tank waste characterization, retrieval and pretreatment, and tanks remediation. TFA needs were conveyed to the researchers and interactions were established to transfer the research results to the end-user. Linkage to new and past TFA needs and points of contact were given. EMSP awardees discussed their research plans and received feedback from TFA Technical Integration Managers and safety personnel. Minutes from the breakout sessions summarize TFA questions, recommendations to the researchers, linkages to related tasks, and points of contact.

- *Detection and Characterization of Chemicals Present in Tank Waste* by Dr. P. G. Datskos* (ORNL) and Dr. Sepaniak (Univ. of Tenn.)

Questions:

- How do you keep the sensor clean?
- What is the effect of the tank contents (i.e., caustic, acidic, etc.) on the coating?
- Is there an upper limit for temperatures?
- How does radioactivity effect the electronics?

TFA Recommendation:

- There is a need for at-tank rather than in-tank characterization.
- Look at organics at low-levels (ppm) rather than bulk constituents.
- Look at suitable analytes.

- *Correlation of Chemisorption and Electronic Effects for Metal/Oxide Interfaces: Transducing Principles for Temperature Programmed Gas Microsensors* by Dr. Semancik & Dr. Tarlov (NIST), Dr. McAvoy & Dr. Suehle (U of Maryland) - presented by Richard Cavicchi (NIST)

Questions:

- Is it reversible?
- Can it be made quantitative?
- What are the levels of detection?

TFA Recommendation:

- No site needs submitted to TFA for tank head-space monitor development in 1995-1998 time period. 8/95 discussions with Hanford project manager for head space gas analysis in tank SY101 indicated that WHC was satisfied with

IR, GC, & H₂ chemical cell monitoring of the vent off-gas. CMST pursued the question of in-tank head-space H₂ monitoring with the TFA in 5/96 and found no apparent need at Hanford.

- There is a potential application for this technology in the Mixed Waste Focus Area for incinerator off-gas monitoring.
- *Mass Spectrometric Fingerprinting of Tank Waste Using Tunable Ultrafast Infrared Lasers* by Dr. Haglund (Vanderbilt University) and Dr. Wayne Hess (PNNL)

Questions:

- Can it be made quantitative?

TFA Recommendation:

- The usefulness of this tool is for quantitative (molecular species) measurements of organics in solids.
- *Electrically Driven Technologies for Radioactive Aerosol Abatement* by O.A. Ezekoye (University of Texas)
 - No linkage found within the TFA.
 - Potential end-users of this technology might be found in the following areas: calcine off-gas, vitrification, and spent nuclear fuel.
 - Other potential applications, such as medical applications, might be found by reviewing the proceedings of the Nuclear Air Cleaning Conference.
- *Precipitation and Disposition of Aluminum-Containing Phases in Tank Waste* presented by Jun Liu representing the collaboration of Baskron, Virden, Wang, and Keefer from PNNL with Hobbs from SRTC and with Dabbs and Aksay from Princeton.

The TFA asked Jun if he could/would analyze a specimen of the 101 SY tank crust, if he had it. The TFA, Randy Kirkbride, Andy Felmy, and Jun engaged in a discussion about the ability to get this data into the form of information that could be used in the ESP model.

- *Solution Effects on Cesium Complexation with Calixerene Crown Ethers from Liquid to Supercritical Fluids* presented by Chien Wai of the University of Idaho.

Most of the subsequent discussion centered on the viability of a process that operates at 75 atmospheres in a nuclear environment. This concern has hampered efforts to employ this type of technology in other waste management arenas such as mixed waste. The TFA contends that it is not likely to pass the safety analysis reviews in the foreseeable future. Chien Wai indicated that he would refocus the program to use his experiments to elucidate dissolution mechanisms.

- *Graduate Students* was presented by Yasuo Onishi (PNNL) representing a large number of collaborators: Felmy, Rustad, Recknagle, Michener, Fann (PNNL); Jordon (IBM); Liu (CRAY-SGI Research); and Yuen (University of Minnesota).

TFA asked if differing tank geometries could be included in the model and was reassured that this was the case. TFA indicated that they had funded some tank settling tests for C-106, C-107, and S-106 and would like this data to be used in the model. TFA indicated a desire to have Onishi collaborate with Florida International University in their upcoming line plugging tests.

**Characterization, Monitoring and Sensor Technology
Crosscutting Program (CMST-CP) Annual Review
March 8-11, 1999
Gaithersburg, MD**

Thirty-three people attended the EMSP Presentations during the CMST-CP Annual Review. Eighteen attendees were associated with the EMSP and 15 others were from CMST-CP, Focus Areas (FAs), the Nuclear Regulatory Commission, and FETC. There was much interest in the EMSP research by CMST and the FAs.

Eleven EMSP projects and one Wolf-Broido project were presented. There were four research projects on the subject of laser ablation — the researchers were knowledgeable about what the other researchers were doing in the area and formed their own collaborations. A fact sheet describing each project scheduled for presentations was prepared for each EMSP presenter and made available to the CMST-CP Review prior to the presentations. The FA/CP personnel read the information on the fact sheets prior to the EMSP presentations so that they would have some background on the projects and could decide which presentations they wanted to attend. Boris Fabyschenko from LBL distributed a press release on the application of chaos theory to fractured media. Andrew Pipino from NIST displayed a poster on the Evanescent Wave Cavity Ring-Down Miniature Spectrometer in the back of the meeting room. Mark Pickrell from LANL addressed transfer of his mature research project, which has developed a neutron source; two commercial partners have subsequently applied for a license. Four laser ablation research projects were presented (Rick Russo, Scott Goode, Mike Anderson, and Mike Pellin) and CMST expressed interest in perhaps integrating these projects into a follow-on technology development effort.

The banquet was well attended (28 people) and there was a lot of interchange during dinner. The reception afterwards at the hotel provided an opportunity to meet with the researchers and learn more about how to transition their research.

The Environmental Measurements Laboratory (EML) visit was informative and a good opportunity to get to know the DOE/NV CMST manager, the EML personnel, and EMSP researchers and learn about the research conducted by EML. EML will be performing quality assessments and project facilitation for CMST. Close contact between the CMST PIs and the project facilitators keeps the CMST projects on track and aligned with FA/Crosscut needs.

***Subsurface Contaminants Focus Area (SCFA) Mid-Year Review
April 26-29, 1999
Augusta, GA***

An EMSP room was set-up and over 20 PIs presented posters of their vadose zone work. The poster sessions were well attended. PIs had the opportunity to attend presentations by site personnel discussing current vadose zone cleanup activities.

A special session was held for PIs that was attended by the program manager of the EMSP, Mark Gilbertson, and Tom Hicks from SCFA. Discussions centered around general project descriptions, the SCFA path forward for incorporating EMSP projects in the Focus Area, and PI feedback to Mark Gilbertson. Several of the PIs voiced their support of the recent EMSP research integration efforts including the topical workshops and participation with the Focus Areas.

**Deactivation and Decommissioning Focus Area (DDFA)
Mid-Year Review
May 25-27, 1999
Morgantown, WV**

At the request of the DDFA, the Environmental Management Science Program (EMSP) attended and participated in the DDFA Mid-Year Review. Chester Miller of the DOE-HQ made presentations for 21 of the 22 EMSP projects related to DDFA. Dr. Bernard Cooper of the University of West Virginia attended and presented his project. Posters for 8 EMSP DDFA related projects were displayed.

Dr. Cooper indicated that his project is now at a point that he needs someone as a “broker” to help progress it to the next step. He feels that the next step will be to perform field-testing. He is also interested in testing his methods on plutonium/uranium samples.

Dr. William Stone of NIST expressed interest in Dr. George Xu’s presentation on “Real-Time Identification and Characterization of Asbestos and Concrete Materials with Radioactive Contamination”. He was provided with a copy of Dr. Xu’s presentations, poster and contact information.

The EMSP Staff met with Robert Vagnetti from the DDFA to establish a dialogue on how the EMSP could best support the DDFA in the future and how to make our gap analyses more useful. Mr. Vagnetti indicated that he would be willing to review our current gap analysis and help in efforts for possible research integration.

American Chemical Society (ACS)
August 22-26, 1999
New Orleans, LA

The EMSP will have a strong presence at the ACS Meeting with 120 presentations in 8 technical sessions dedicated to EMSP projects. There will also be 2 tutorials, a plenary session, and 2 poster sessions. A poster on research integration for the EMSP will be presented by EMSP staff. This will provide a forum for researcher interaction among EMSP researchers and non-EMSP funded researchers. A large fraction of the EMSP portfolio addresses research that deals with actinide chemistry issues faced by DOE.

**Oak Ridge Operations Environmental Management
Science Program Workshop
September 22, 1999
Oak Ridge, TN**

The purposes of this workshop were to inform EMSP principal investigators of the Oak Operations Office's (ORO) environmental cleanup needs, introduce end-users to EMSP projects that have relevance to ORO needs, and to cultivate collaborations and other relationships between the participants. More than seventy attendees participated in the workshop, including: EMSP researchers; representatives from the Site Technology Coordination Group, Subsurface Contaminants Focus Area, state regulators, and public stakeholder groups; end-users from the major sites administered by the Oak Operations Office; and EMSP staff.

The day's activities began with a short bus tour of two of the three sites that encompass the Oak Ridge Reservation (ORR), the East Tennessee Technology Park and Y-12 Site. The group reconvened at the conference center for a warm Tennessee welcome by the Oak Ridge Operations Office, an introduction to the EMSP, and presentations by the various end-users about their site problems. The sites discussed included the Paducah Gaseous Diffusion Plant, the Portsmouth Gaseous Diffusion Plant, the Y-12 Site, the Oak Ridge National Laboratory (ORNL), and the East Tennessee Technology Park (ETTP, formerly the K-25 Site). After lunch, the participants were guided into one of four breakout sessions where researchers presented their work and discussions about how it related to site needs ensued. The breakout session topics were: 1) D&D Characterization, Decontamination, and Recycle; 2) Soil and Groundwater Treatment; 3) Subsurface Imaging and Characterization; and 4) Bioremediation. Researchers were selected to present their work based on their project's relevancy to ORO cleanup needs.

Interactions between PIs and end-users included the following:

- Dr. A. J. Francis (Brookhaven National Laboratory) and Dr. Gary Halada (SUNY at Stony Brook) began discussions with Gary Person about testing their D&D techniques on materials at ETTP. Their project is titled "Mechanisms of Radionuclide-Hydroxycarboxylic Acid Interactions for Decontamination of Metallic Surfaces."
- Dr. Sherman Ponder started discussions with Jerry Harness, representing the Efficient Separations Crosscutting Program, about possible use of Dr. Ponder's unique separations technology. Dr. Ponder's project is titled "Removal of Technetium, Carbon Tetrachloride, and Metals from DOE Properties."
- Dr. Ernest Majer's presentation, "Subsurface High Resolution Definition Of Subsurface Heterogeneity For Understanding The Biodynamics Of Natural Field Systems: Advancing The Ability For Scaling To Field

Conditions”, sparked interest by the Subsurface Contaminants Focus Area DNAPLs Product Line Manager, Elizabeth Phillips. They will continue discussions in an effort to collaborate in the future on some bioremediation work.

The site tour generated further interest in seeing more detail about ORNL’s subsurface contamination and decontamination and decommissioning projects. A follow-on tour is now being arranged for ORNL principal investigators to meet with team leads for these projects.

***Nuclear Materials Focus Area EMSP Actinide Chemistry Workshop
November 9-10, 1999
Albuquerque, NM***

This workshop brought EMSP principal investigators in contact with representatives and researchers from the Nuclear Materials Focus Area, Nuclear Materials Lead Laboratory, Seaborg Institute, and the Plutonium Center. Research presented during this two-day workshop was designed to highlight current activities related to actinide chemistry of plutonium stabilization, actinides in the subsurface, and actinides solution separations.

Twelve EMSP oral presentations were made, and approximately 20 posters were displayed representing other EMSP research. Topical sessions included in this workshop were:

- Program Overviews
- Clean-up/Decontamination Methods
- Behavior in Groundwater and Soils
- Actinide Behavior in High-level and Other Wastes
- Surveillance, Monitoring, Characterization, and Sensor Development
- Actinide Separations Chemistry and Techniques.

The workshop was attended by more than 40 registered individuals, and due to the close proximity with Sandia National Laboratory, Los Alamos National Laboratory, and The University of New Mexico, numerous non-registered attendees came to selected sessions. As an added activity, attendees were given the opportunity to comment on the EMSP program. At least 10 specific action items were recommended for program improvement.

The workshop ended on a positive note with all participants agreeing that meetings of this type were beneficial and provided opportunities for information exchange related to program needs and areas of promising research and technology development.

***Kickoff Workshop for the 1999 Environmental Management
Science Program Vadose Zone Research Awards
November 16-18, 1999
Richland, WA***

These proceedings document the Kickoff Workshop for the 1999 Environmental Management Science Program Vadose Zone Research Awards. The workshop attendees were comprised of researchers, Focus Area representatives, EMSP staff, and science and technology endusers. Three integration teams were formed: (1) Waste/Sediment Lab Experiments and Process Models, (2) Vadose Zone Transport Field Studies, Advanced Characterization, and Transport Modeling, and (3) Monitoring and Remediation at Hanford and Across the Complex. The researchers had the opportunity to listen to talks given by Focus Area representatives, EMSP staff, and science and technology endusers and to present their proposed research plans. The purpose of holding the workshop at the outset of the award process is to give the PIs critical information necessary to direct their research towards the most useful avenues, make available existing data and models, involve the PIs in plans for future vadose zone activities, encourage collaboration among researchers and with endusers, and provide feedback to maximize the benefit of the research. The nucleus of each of these three integration teams will be kept intact through a series of follow-on workshops.

**Second Environmental Management Science Program
National Workshop
April 24-28, 2000
Atlanta, GA**

The second Environmental Management Science Program (EMSP) National Workshop was held in Atlanta, GA, from April 24-28, 2000, in order to capitalize on Department of Energy (DOE) investments in environmental science and technology by bringing together environmental management-targeted basic research scientists with Environmental Management Focus Area personnel, site end users, private industry, and other interested parties. EMSP chose the theme “*Science Advancing Solutions*” for this workshop to underscore its commitment to transferring EMSP research results to other Office of Science and Technology programs for further development and ultimate deployment.

The National Workshop brought EMSP Principal Investigators (PIs) together to allow scientists to showcase their research to other scientists, thereby facilitating research synergy. PIs also had the opportunity to meet and interact with DOE site operations and other related Environmental Management Office of Science and Technology (OST) programs personnel (e.g., Focus Areas and Cross-cutting Programs).

The National Workshop was structured with an opening plenary session, followed by breakout sessions, poster sessions, and closing plenary sessions for breakout session summaries and closing remarks. A tour of the Savannah River Site was offered as part of the National Workshop. As a side benefit, a training course on Monitored Natural Attenuation was sponsored by EMSP and presented by the DOE National Environmental Training Office.

One of the most significant goals of the National Workshop was to create research integration opportunities. To achieve this goal, breakout sessions were coordinated and conducted with the Focus Areas and other related programs. The following breakout sessions were conducted:

- Deactivation and Decommissioning Focus Area
- Mixed Waste Focus Area
- National Spent Nuclear Fuel Program
- Nuclear Materials Focus Area
- Subsurface Contaminants Focus Area
- Tanks Focus Area
- Long Term Stewardship
- Low Dose and Risk
- CRESP

Each session chairperson set the agenda for their respective breakout session. Session chairpersons reviewed the EMSP project portfolio, and identified specific projects that contained relevant research with the highest potential for technology development activities. The session chairpersons invited PIs from those projects to present their research to the potential end-users and other PIs.

***Sensor Initiative Workshop
June 19-20, 2000
Idaho Falls, ID***

A workshop co-sponsored by the Environmental Management Science Program (EMSP) and Long-term stewardship Program was held at the Idaho National Engineering and Environmental Laboratory (INEEL) on June 19 and 20, 2000. The goal of the workshop was to identify research opportunities for sensor development for long-term stewardship. The workshop involved participation, both at the INEEL and via tele-video links, by INEEL, Argonne National Laboratory (ANL-West and ANL-East), Fernald, Oak Ridge National Laboratory (ORNL), Pacific Northwest National Laboratory (PNNL), Paducah, Portsmouth, the Savannah River Site (SRS), Sandia National Laboratories (SNL), Nevada, the CMST crosscutting program, and researchers representing twelve EMSP projects. Sensor needs for monitoring and validation applications were identified, functional requirements for the sensors were specified, national laboratory and EMSP research and capabilities were presented, and opportunities for collaboration between the national labs and the EMSP were assessed. The workshop participants agreed to have subject matter experts at their respective sites review and validate the information contained in this report. An overwhelming consensus recommended that a working group be formed to address sensor requirements for long-term stewardship and participate in the roadmap development.