Summary

An environmental technology transfer business assistance program is needed to encourage collaboration and technology transfer within the international community. This program helped to find appropriate mechanisms to facilitate the transfer of these technologies for use by DOE environmental restoration and waste management (ER/WM) programs while assisting U.S. private industry (especially small and medium size business) in commercializing the technologies nationally and abroad.

Activities

Ogden/MMES CRADA for Biosorption Technology

Ogden Environmental and Energy Services Company (Ogden) and Martin Marietta Energy Systems, Inc. (MMES) entered into a Cooperative Research and Development Agreement (CRADA) on December 7, 1992, for the development and demonstration of a biosorption technology to remove uranium and other heavy metals from waste streams. MMES's Oak Ridge National Laboratory (ORNL) will develop the technology and design the test module to be used in the demonstration. Ogden will build the test module and conduct the demonstration at a German government uranium mine, WISMUT, in Southeast Germany. The agreement is the first DOE Office of Environmental Management (EM) international CRADA.

A press ceremony for the Ogden/MMES CRADA was conducted on March 10, 1993 at the Ogden Fairfax, Virginia, Headquarters. The U.S. Secretary of Energy, the Honorable Hazel R. O'Leary, attended the ceremony and gave strong support for agreements between DOE, U.S. industry, and foreign entities for cooperative research, development and demonstration. The German government was represented at the ceremony by Dr. Klaus Schroeter, Science Counselor, U.S. German Embassy.
Ogden reported to DOE and MMES on September 28, 1993 that they were experiencing contract difficulties with WISMUT. DFA Consulting and Engineering Company of Germany, a company that supports WISMUT in the uranium mine cleanup, wants to obtain funding from the German Ministry of Science and Research (BMFT) to conduct its own biosorption development and demonstration at WISMUT. This activity could be counterproductive to the Ogden/MMES CRADA program.

**MIBRAG/Golder Agreement for In Situ Sealing Technology**

An East German coal company, MIBRAG, developed an in situ sealing technology using Monton Wax. It is available in the United States, but the emulsion technology needed to make the Monton Wax usable in environmental in situ sealing applications is held by MIBRAG. EM evaluated and expressed an interest in conducting demonstration projects to compare the Monton Wax against other technologies. Golder and Associates signed an agreement on April 2, 1993, with MIBRAG that allows Golder/DOE the use of the MIBRAG emulsion formula for the Monton Wax on a nondisclosure basis for demonstration purposes only. MIBRAG will provide the emulsion technology and consultant services to Golder in the use of the Monton Wax. The Subsurface Barriers Demonstration Program is a 3-year program with demonstrations located at the Hanford Site, Sandia National Laboratory (SNL), Idaho National Engineering Laboratory (INEL), and the Savannah River Site (SRS). Demonstration tests are being conducted at SNL and SRS with results due in a report in late FY94.

MIBRAG has no U.S. outlet for the Monton Wax/emulsion technology commercialization and is in the process of finding a U.S. partner. Several U.S. companies have been in discussion with MIBRAG about obtaining a technology transfer license to use the technology and process in the U.S. market.

**IEG Technologies Corporation and MMES Agreement**

DOE is interested in using IEG Germany to enhance the development of an in situ recirculation technology at ORNL. IEG Germany established a U.S. subsidiary, IEG Technologies, to make the technology available to DOE-EM programs. A Letter of Intent agreement between IEG Technologies and MMES, signed October 28, 1992, outlines the method where IEG would provide technology and equipment to ORNL at a reduced price for use at the Hanford Arid Integrated Demonstration Site. IEG will provide ORNL with design knowledge and consultation on the technology, in exchange for the test data results from its use at DOE demonstration sites. IEG received a procurement contract from the
Hanford Site on July 16, 1993, for pre-design services in support of the demonstration. As a result of regulatory problems at Hanford, the procurement contract between IEG Technologies and MMES, originally planned for August 1993, was delayed. IEG Technologies has established commercial marketing activities for their recirculation technology and will manufacture new equipment in the United States as the market develops. Reports on the technology tests from the DOE Hanford Arid Site Integrated Demonstration will be published quarterly.

**China National Nuclear Corporation**

A Chinese delegation, including Mr. Li Dingfan, Vice President and future new President of the China National Nuclear Corporation (CNNC), visited Oak Ridge, Tennessee, on March 25-27, 1993, and was hosted by MMES. The purpose of the visit was to promote the Chinese representatives' understanding of MMES capabilities in Low Level Waste (LLW) technologies and to visit with U.S. companies that could assist the CNNC with LLW activities related to China's nuclear power plant program.

MMES hosted a meeting for CNNC with the Oak Ridge Waste Management Association (ORWMA) on March 26-27, 1993. ORWMA is an industrial association with 80-90 member companies that deal with commercial EM projects. CNNC outlined their future needs to a large contingency of ORWMA companies. The companies subsequently conducted short individual presentations to CNNC about their capabilities. Private meetings between CNNC and the companies were conducted until CNNC left Oak Ridge on March 27, 1993.

**AEA Technology “WINWOX” Technology Transfer**

MMES organized a visit to the United States by the United Kingdom's Atomic Energy Authority (AEA) representatives. They met with several National Laboratories and DOE sites to review AEA/EM-related technologies and their wet oxidation WINWOX. A trip was arranged June 14-18, 1993, during which meetings were held at Rocky Flats, Lawrence Livermore National Laboratory (LLNL), Pacific National Laboratory (PNL), and Hanford. AEA presented several technologies of interest to the sites: WINWOX, Silver II, Cementation, and Decommissioning and Decontamination (D&D). Rocky Flats was interested in AEA's Cementation and WINWOX technologies; LLNL in AEA's WINWOX; PNL in AEA's Silver II and WINWOX; and Hanford in AEA's WINWOX, Silver II, and D&D.

A proposed Business Plan for the technology transfer of the AEA WINWOX technology was prepared and presented to LLNL August 4, 1993. The business
plan outlined several methods by which LLNL could work with AEA to obtain a WINWOX unit for use at the Mixed Waste Demonstration Project. Using the suggested business plan, LLNL developed a strategy to issue a procurement for a wet oxidation unit.

MMES also organized meetings for AEA to meet in Oak Ridge, Tennessee, with representatives of MMES and member companies of the ORWMA on September 7-10, 1993. Business and technical meetings with LLNL were held as well. Presentations were given to MMES on AEA's WINWOX, Silver II, and D&D technologies on September 7, 1993, with technical discussions continuing in several areas. On September 9, 1993, AEA met with ORWMA members and presented EM technologies that AEA is interested in providing commercially to the U.S. market. AEA has no business outlet in the United States. They plan to develop licenses and other business agreements with U.S. companies for the market. Four U.S. companies have contacted AEA requesting business discussions for their technologies.

On September 10, 1993, a meeting was held at LLNL where business and technical discussions were conducted. LLNL's technical group believes there is no other wet oxidation unit available that can meet the required needs of the Mixed Waste Demonstration Project. It was decided that LLNL would have to issue a Commerce Business Daily (CBD) announcement requesting interest in submitting a proposal for the wet oxidation unit. An announcement was drafted and placed in the CBD on October 1, 1993. LLNL's intention is to have a procurement in place as soon as possible so that the wet oxidation unit will be installed and operational before the end of FY95. It is believed that it will take approximately 1 1/2 years to design, build, and install a wet oxidation unit from a signed procurement contract. Should AEA win the procurement, it will be responsible for the design, oversight, and training required by the LLNL specifications but will sub-contract the fabrication and installation of the WINWOX unit to a U.S. company. AEA will actively seek a U.S. company through current discussions and a CBD announcement. The U.S. sub-contractor can be, but does not have to be, the technology licensee. LLNL will make procurement decisions as quickly as possible after the beginning of 1994, subsequent to the review of the CBD responses.

**Symposium/Conference Presentation and Industry Interaction**

*Budapest '92:*

MMES's International Program Manager attended the Budapest '92 International Symposium on Environmental Contamination in Central and Eastern Europe, October 12-17, 1992, in Budapest, Hungary. A paper was presented.
entitled "International Environmental Technology Transfer From The U.S. Department of Energy's R&D Laboratories." Direct interaction occurred with 24 individuals representing 20 environmental companies. Technology transfer data packages were mailed to all parties.

Colorado Center for Environmental Management (CCEM):

The CCEM is funded under a grant from EM-50 to interface with stakeholders and the EM industry in DOE-EM program activities. MMES’s International Program Manager was requested by EM-50 to become a member of the Technical Support Group of the CCEM for the Technology/Regulatory Integration Project (TRIP). The Technical Support Group meets every quarter to review planned, current, and past CCEM activities with stakeholder groups and industry.

Air & Waste Management Association Conference for Environmental Business Opportunities in Central and Eastern Europe:

MMES’s International Program Manager attended the Air & Waste Conference, March 15-17, 1993, in Budapest, Hungary. A paper was presented entitled "International Technology Transfer and the U.S. Department Of Energy's Programs." Direct interaction occurred with 16 individuals representing 12 U.S. companies/organizations and 30 individuals representing 24 foreign companies/organizations. Technology transfer data packages were mailed to all parties.

U.S. Environmental Technology Export Council (ETEC) Spring Conference:

ETEC is an environmental trade organization with approximately 80 member companies that promotes U.S. foreign business activities. MMES’s International Program Manager attended the ETEC Spring Conference on June 9-11, 1993, in San Diego, California. A paper was presented entitled "DOE's Environmental International Technology Transfer Program." The presentation outlined the EM-523 International Technology Exchange Program and how it supports U.S. industry.

Oak Ridge DOE Industry Forum:

The DOE Industry Forum is hosted each month by MMES in Oak Ridge, Tennessee, to keep local industry informed about new activities, programs, and technologies available from the DOE National Laboratories. MMES’s International Program Manager attended the forum on August 19, 1993, and made a presentation outlining the EM-523 International Technology Exchange Program. Twenty-eight company representatives attended the meeting, and information data packages were provided to all.
The 9th Annual Oak Ridge Model Conference:

The Oak Ridge Model Conference on Waste Management & Environmental Restoration was held in Oak Ridge, Tennessee, on August 24-27, 1993. MMES's International Program Manager attended and presented a paper entitled "DOE's International Technology Exchange Program and Major Accomplishments." Technology transfer data packages were made available to all attendees.

Environmental Technology Export Promotion Stakeholders Meeting:

The stakeholder meetings were a series of four public meetings at selected sites across the United States, sponsored by the White House Office of Science and Technology, DOE, the Department of Commerce, the Environmental Protection Agency and the Export-Import Bank. The purpose of the meetings was two-fold. First was to hold open discussions with private citizens and local company representatives on how these government agencies were supporting the U.S. environmental industry's access to world markets. The second purpose was to obtain recommendations from stakeholders on areas for improvement. MMES's International Program Manager attended one of the meetings held on August 31, 1993, in Dallas, Texas, and was part of a panel that discussed international technology transfer and problem areas in doing international business.

U.S. Environmental Technology Export Council (ETEC):

ETEC is a 2-year old, fast-growing environmental industrial organization that was established to support U.S. companies' environmental exports. EM-523 requested that the MMES International Program Manager join ETEC in developing interaction with industry to promote international technology transfer. Subsequently, MMES/ORNL became a member with the International Program Manager as the representative. The International Program Manager has since been elected to the ETEC Board of Directors.

Accomplishments

- Monthly and quarterly reports were provided to EM-523.

- An informal business plan was prepared for MMES/ORNL in November 1992 for the MMES/IEG Agreement.

- A formal business plan was completed on August 4, 1993, and presented to LLNL/EM-523 for the LLNL/AEA wet oxidation technology transfer.
- Three international technology transfers were completed in FY93: MMES/Ogden, MMES/IEG, and Golder/MIBRAG.