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International Corps on the Environment
Alabama TechnaCenter

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Project Title: Environmental Measurements and Technology for Non-Proliferation Objectives

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Project Description: To identify multi-disciplinary and single focus laboratories from the environmental and public health communities that can serve as technical center of opportunity for nuclear, inorganic and organic analyses. The objectives of the Office of Research and Development effort are twofold: 1) to identify the technology shortcomings and technologies gaps (thus requirements) within these communities that could benefit from state-of-the-art infield analysis technologies currently under development and 2) to promote scientist-to-scientist dialog and technical exchange under such existing US government internship programs (e.g. SABIT/USDOC) to improve skills and work relationships.

Scope Of work: To meet the programmatic objective, the project tasks are directed towards developing the working framework and deliverables to document the performance of laboratories in selected countries through a non-fault experimental samples and method exchange. The project is a multi-phase effort with DOE participation in the planning and preparation phases. The actual sample's exchange and analysis efforts should be administered by other international or US agencies. The goal of this effort is to evaluate laboratory capability and skills without compromising work relationships and to identify future steps to strengthen these relationships through better technology and

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information exchange. The results are used to encourage other US agencies, commercial business, and network sponsors to maintain or improve laboratory competencies. Although the data analysis will be focus on environmentally sensitive signatures and materials, the office of Research and Development wishes to further its nuclear non-proliferation objectives by assessing the current technical skill and ingenious analytical tools in less-developed countries so as to broaden the base of capability for multi-species measurement technology development.

Year 1 April 1995-March 1996***Task 1 Report on Fieldable detectors.***

- Developed a report describing available technologies for making environmental measurements in field conditions. Both hand-held and laboratory equipment suitable for analysis of samples returned from the field were included. This report was distributed to DOE laboratories, the intelligence community, and other federal agencies. The interagency MARSIM committee has included much of this material in its manual.

Task 2 Review of PNL project "Graphite Isotopic Ratio Method (GIRM)".

- A special review was conducted by Dr. Bill Martin of the University of Michigan of present development in this technology.

Task 3 Review of Technology for the Comprehensive Test Base Treaty (CTBT).

- A series of studies were conducted on the measurement technology developments and needs related to the CTBT. Mr. Richard Perkins formerly of the Pacific Northwest Laboratory conducted these studies. This included a Xenon radionuclides monitoring document. Meeting reports on radionuclides monitoring. New concepts for treaty verification. Technical briefing to the Intelligence community.

Year 1 - Related Work at no cost to the project

- Conducted a needs assessment for the Phase II of the International Quality Assurance Project (IQAP).
- Established contact with regional laboratories throughout the world including: Mexico, Hungary, Venezuela, Peru, and the Pan American Health Organization (PAHO).

Year 2 April 1996-March 1997***Task 1 Review of Technology for the Comprehensive Test Base Treaty (CTBT).***

- Same as for Task 3 above - Continued.

Task 2 Preliminary Work for Phase II Quality Assurance Study (IQAP).

- Drafted a preliminary plan for the studies. Obtained agreement with NIST, Washington, DC, RESL in Idaho, and EML in New York City to supply samples to our participants.
- Provided training in radiochemistry of one Russian scientist at NIST.

- Surveyed and received responses for over 40 laboratories in 30 countries that want to participate in the Phase II IQAP.
- Identified laboratories and networks that can be technical center for dual purpose (environmental/forensic).
- Identified reference materials and techniques that should be incorporated in the laboratory evaluation.
- Developed the reporting requirements for all participating laboratories.

Year 2 - Related work at No Cost to the project

- Hosted six Chinese scientists who visited from China EPA
- Hosted Russian Scientist that has participated in our Phase I IQAP project.
- Conducted a study on orientation to environmental monitoring for a group of 20 Ukrainian scientists.

Year 3 April 1997 - March 1998

Task 1 Assessment of Non-proliferation Technologies. Conduct a several component study of non-proliferative technology. Maintain knowledge of the state-of-the-art.

1. Identification and coordination of forensic information

- This task was essentially completed with the issuance of a final report from ICE/AUM to NN-20. The report addressed the capabilities of environmental analytical laboratories throughout the world. The Contractor assisted in guiding the content of the final report to address the specific concerns of NN-20 and was listed as a co-author.

2. Alternate nuclear materials critical experiment

- The planning for this experiment is still in progress due to the long lead-time to obtain a sufficient quantity of Np-237 in a form suitable for a critical experiment. The Contractor has worked with personnel from the Critical Experiments Facility (TA-18) at the Los Alamos National Laboratory in pursuing the experimental effort.

3. Support for the Radiation Detection Panel

- The task was worked with NN-20 by coordinating two meetings of the Radiation Detection Panel (RDP) and the identification of tasking for panel members including CdZnTe detectors, the Wide Area Tracking System, and the evaluation of Neutron Detecting Fibers as a Phase I program. A comprehensive file of presentations at the RDP Annual Meeting was prepared and summarized for NN-20.

4. Nuclear smuggling forensic exercise

- This task was essentially completed with a meeting of the participating laboratories. Assistance was provided with the planning and coordination of the exercise and participation in the final meeting.

5. Support for the Nonproliferation and Arms Control Technology Working Group

- This task resulted in the preparation and delivery of a formal report and the preparation, and delivery of a technical presentation to a plenary session. The final report will be summarized in a report to Congress.

6. Ad Hoc assignments as given by the Office of Research and Development

- As expected, this task took the majority of the time during the reporting period. Several presentations were prepared for delivery by DOE staff. The major assignment that came out of this task was support for a series of experiments at the Pantex Plant to demonstrate transparency/verification techniques to support the Strategic Arms Reduction Treaty (START) III. Served as the Executive Secretary of the formally constituted Peer Review Group which was established to oversee the program of experiments.

7. Contacts with universities and professional development

- The task supported professional development and participation in seminars on nuclear criticality safety, radiation dosimetry, and weapons physics. For example, two seminars were delivered at North Carolina State University on nuclear safety, and continued participation in the Criticality Safety Division and the Radiation Protection and Shielding Division of the American Nuclear Society and the Institute of Nuclear Materials Management.

Year 3 – Related Work at No Cost to the project

- Analysis is being conducted of two Ukrainian reactors that are partially constructed and standing idle. Safety and economic concerns are important to US EPA, US Treasury, and the World Bank.