



RELEASED TO THE PDR	
4/26/93	ADB
date	initials

POLICY ISSUE

(Information)

April 9, 1993

SECY-93-094

For: The Commissioners

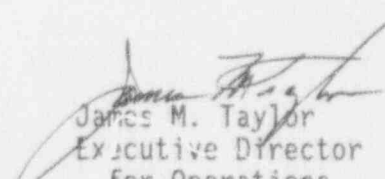
From: James M. Taylor
Executive Director for Operations

Subject: STATUS OF US-USSR NUCLEAR SAFETY COOPERATION

Purpose: The purpose of this memorandum is to provide the Commission with the documents created during the Meetings of the Joint Coordinating Committee for Civilian Nuclear Reactor Safety (JCCCNRS) which took place in Kiev, Ukraine, March 30-31, 1993.

Discussion: The JCCCNRS held its Fifth Annual Meeting in Kiev, Ukraine, on March 30-31, 1993. An extensive record of meeting was finalized and signed at this meeting. The record outlines the action plans for each cooperative working group and direct assistance projects and summarizes major additional discussion points. A copy of this record is enclosed.

This annual JCCCNRS meeting was significant in that it marks the first joint meeting of the U.S.-Russia and U.S.-Ukraine Joint Coordinating Committees for Nuclear Reactor Safety. The meeting officially recognized the establishment of two separate JCCCNRSs, meeting annually on a trilateral basis, the designation of Co-Chairmen from each country and the joint participation in cooperative and other selected activities. In addition, all parties agreed to extend the Memorandum of Cooperation in the Field of Civilian Nuclear Reactor Safety for another 5 years.


James M. Taylor
Executive Director
for Operations

270032

Enclosure:
Record of the Fifth Meeting
of the JCCCNRS

NOTE: TO BE MADE PUBLICLY AVAILABLE
IN 10 WORKING DAYS FROM THE
DATE OF THIS PAPER

930415 0245

4/28

D502

DISTRIBUTION:

Commissioners

OGC

OCAA

OIG

OIP

OPP

EDO

SECY

RECORD OF THE FIRST JOINT MEETING
OF THE U.S.-RUSSIA AND U.S.-UKRAINE JOINT COORDINATING COMMITTEES
FOR CIVILIAN NUCLEAR REACTOR SAFETY

MARCH 30 - 31, 1993, KIEV, UKRAINE

A joint meeting of the U.S.-Russian Federation and U.S.-Ukraine Joint Coordinating Committees for Nuclear Reactor Safety (JCCCNRS) was held in Kiev, Ukraine on March 30-31, 1993.

The JCCCNRS was established in accordance with the Memorandum of Cooperation (MOC) in the Field of Civilian Nuclear Reactor Safety between the United States of America (U.S.) and the Union of Soviet Socialist Republics (USSR), signed on April 26, 1988 in Washington, DC. This MOC was carried out under the Agreement between the U.S. and the USSR on Scientific and Technical Cooperation in the Field of Peaceful Uses of Atomic Energy. Four meetings of this JCCCNRS were held. Since the dissolution of the USSR, the U.S. science and technology cooperation has continued with the Russian Federation (RF) and Ukraine as formal successors to the USSR. Other new states from the former Soviet Union may also become participants in the future as mutual interests warrant.

A. Restructuring of JCCCNRS

1. Joint Activities

There are now two JCCCNRSs from a legal standpoint, one between the U.S. and the Russian Federation and one between the U.S. and Ukraine. The three parties agreed that there will be joint participation in cooperative and other selected activities, as well as jointly conducted annual meetings. This arrangement will be chaired by Russia, Ukraine and the U.S.

The three parties agreed that in the area of assistance activities involving Operational Safety, Training Centers, and Risk Reduction, the operating organizations will involve their respective regulatory authorities in the process at appropriate times.

All parties agreed that it was important to implement the Emergency Operating Instructions at the Novovoronezh Nuclear Power Plant (VVER 440/230) as soon as practicable. This is the first set of Emergency Operating Instructions to be completed and will be the basis for the Emergency Operating Instructions being developed for the VVER 440/213, VVER 1000, and RBMK designs under the Lisbon Initiative. The operating organizations currently have plans to complete the Emergency Operating Instructions by June 1993. Upon receipt of the appropriate documents, GAN will give a high priority to review and approval of implementation of the Emergency Operating Instructions at Novovoronezh.

The Russian and Ukrainian representatives described the nature of two cooperative agreements, the May 8, 1992 "Agreement on Cooperation Between the State Committee for Supervision of Nuclear and Radiation Safety and the Ukraine State Committee on Nuclear and Radiation Safety" and the January 14, 1993 "Agreement Between the Government of Ukraine and the Government of the Russian Federation on Scientific, Technical and Economic Cooperation in the Field of Nuclear Energy". The parties agreed that elements of these agreements and of the JCCCNRS could be mutually reinforcing in furthering cooperation in nuclear safety.

2. Cooperative Exchange Program

The three sides decided to reduce the number of working groups that had been originally established under the JCCCNRS. This is appropriate because the activities of some of the groups were either complete, of lower priority or subsumed by the projects sponsored by the Lisbon Initiative. Ukraine will participate in the remaining working groups. These are:

- WG-3: Radiation Embrittlement, Structural Integrity and Life Extension of Reactor Pressure Vessels and Support
- WG-6: Severe Accidents
- WG-7: Health Effects and Environmental Protection Considerations
- WG-12: Nuclear Power Plant Aging and Plant Life Extension

Working groups which have completed their tasks or have been discontinued are:

- WG-2: Analysis of the Safety of Nuclear Power Plants in the USSR and the U.S.
- WG-5: Modernization/Backfitting
- WG-4: Fire Safety
- WG-10: Erosion/Corrosion Destruction of Piping and Components

Working groups whose activities have been subsumed by the U.S. Nuclear Reactor Safety Initiative are:

- WG-1: Safety Approaches and Regulatory Practices
- WG-8: Exchange of Operational Experience (following its last meeting in December 1992)
- WG-9: Diagnostic, Analysis Equipment and Systems for Supporting Operations
- WG-11: Initiative on Operational Safety of Civilian Nuclear Power Plants

Reports on the status of the activities of the working groups since the last annual meeting (December, 1991) are included as Attachment 1a. A summary of the accounting for host country

payments is included as Attachment 1b.

3. Lisbon Initiative

It was agreed that the U.S. Multilateral Nuclear Reactor Safety Initiative will come under the overall operations of the JCCCNRS, along with the cooperative exchange program. This Initiative was announced at the Lisbon

Conference on May 23, 1992 by Secretary of State James A. Baker and contains four elements:

- 1) establishing two regional training centers, one each in Russia and Ukraine, to serve as focal points for training and for establishing comprehensive safety management systems in existing reactors;
- 2) providing immediate operational safety enhancement;
- 3) providing risk reduction measures for RBMKs and VVER 440/230s;
- 4) assisting regulators in developing consistent and effective safety standards and procedures.

Summaries of the status of funded projects undertaken to implement these four elements are contained in Attachment 2. The Russian and the Ukrainian representatives assured the U.S. that the order of priority of the projects as described in the Attachment is appropriate, given the limits of U.S. funding. The Russian Federation and Ukraine have provided additional priorities for new funding.

Inasmuch as the Lisbon direct assistance program and the scientific exchanges involve both nuclear safety regulation and nuclear power plant operations, it was agreed that each country would appoint co-chairmen of the JCCCNRS, one representing each area.

Russia appointed the Deputy Minister of Atomic Energy for Nuclear Power, Victor Sidorenko, and the First Deputy Chairman of the Federal Nuclear and Radiation Safety Authority (GOSATOMNADZOR), Alexander Gutsalov.

Ukraine appointed the First Deputy Chairman of Goscomatom Nur Nigmatulin and the Chairman of the State Committee on Nuclear and Radiation Safety Nicolay Steinberg.

The U.S. appointed the Deputy Assistant Secretary of Energy for Nuclear Energy, Frank Cole, and the Executive Director for Operations of the Nuclear Regulatory Commission, James Taylor.

Because the U.S. effort involves several agencies, a U.S. coordinating committee has been formed to coordinate U.S. Government activities under the JCCCNRS. The committee is

chaired by the Department of State and includes the Agency for International Development, the Department of Energy and the Nuclear Regulatory Commission.

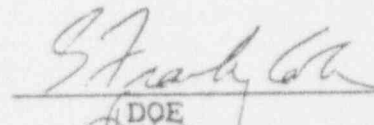
The parties agreed that each could appoint a scientific advisor to evaluate technical aspects of the program. The function of the advisor is to provide independent advice to his respective JCCCNRS co-chairmen regarding overall effectiveness of the cooperative and direct assistance efforts. Should the co-chairmen of a country wish to provide information received from a scientific advisor to another country, the information will be sent by these co-chairmen to the co-chairmen of the other country.

B. Memorandum of Cooperation in the Field of Civilian Nuclear Reactor Safety

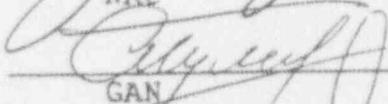
The parties noted the success of the cooperative program over the last five years, and that the existing MOCs between the U.S. and the RF will expire on April 26, 1993. Accordingly, the parties agreed to extend the MOCs for an additional five years. This will be accomplished through exchanges of diplomatic notes. The MOCs expressly allow for joint activities. The proposed notes and the original MOC is included as Attachment 4).

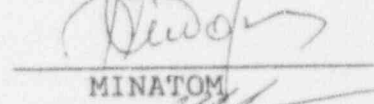
United States


NRC

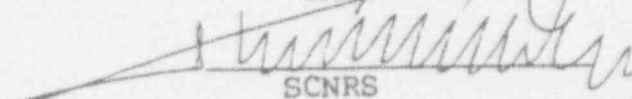

DOE

Russian Federation


GAN


MINATOM

Ukraine


SCNRS


DERZKOMATOM

WORKING GROUP 1
SAFETY APPROACHES AND REGULATORY PRACTICES

In accordance with the December 1991 Meeting Record, a meeting of Working Group 1 was held in Moscow, Russia on May 11-15, 1992 with representation from the U.S., Russia and Ukraine, during which the following topics were covered:

Regarding USNRC:

- Major legal aspects of the licensing and regulatory functions of the USNRC
- USNRC process for promulgating regulations and guidance documents
- Regulatory interfaces between the USNRC and other governmental agencies
- Comparison of the U.S. regulation of military and civilian activities
- Evolution of the U.S. regulatory process and the "one step" licensing process
- The role of the USNRC in nuclear insurance
- Public participation in the regulatory process of the USNRC

Regarding Russia:

- The December 3, 1991 Presidential Decree and Ordinance of December 31, 1991 maintaining GOSATOMNADZOR's (State Committee for Supervision of Nuclear and Radiation Safety) direct reporting responsibility to the Russian President.
- The development of the new Law of the Russian Federation for Use of Nuclear Power.
- The event at Leningrad #3 in March 1992.
- Cooperation agreements between the Russian Federation and the regulatory bodies of the other former Soviet republics with nuclear energy sites.
- The scope and structure of GOSATOMNADZOR (GAN)
- Similarities and differences between the current draft Russian law and the U.S. Atomic Energy Act of 1954 as amended

- The proposed new Russian licensing process
- Russian permits for design firms
- Procedure for review of new license applications in Russia
- Application review of a new 600 megawatt passive pressurized water reactor in Russia
- Classification and analysis of events at nuclear power plants in Russia
- Division of responsibilities in Russia

Regarding Ukraine:

- The current framework for regulation of the uses of nuclear technology in Ukraine
 - Proposed charters, structures and laws
 - Aspects of the future law
 - Public participation in the regulatory process in Ukraine
- Division of responsibilities in Ukraine
- Ukrainian research organizations
- The Ukrainian draft law on the uses of nuclear power

Future Activities

The First Deputy Chairman of GOSATOMNADZOR, Alexander Gutsalov, stated that the time is appropriate for a change in the direction of Working Group 1 activities since there has been sufficient exchange in the area of NPP inspection. GOSATOMNADZOR would now like to stress considerations such as the legal basis and licensing authority of regulatory activities.

The U.S. side responded by emphasizing the important reasons for all of our exchanges to focus on topics and activities which will result in safety improvements at the reactor sites in Russia and Ukraine. It was also noted that material control and accounting is being addressed in a separate U.S. Government initiative in which the regulatory body of Russia will be invited to participate.

The Russian delegation made the following proposals for future activities of Working Group 1:

1. Experience in the development and implementation of licensing procedures.

2. Economic liability of the licensee.
3. The details of the imposition of sanctions on licensees by the NRC.
4. Analysis of the Russian laws on nuclear energy.

The U.S. delegation made the following proposals for future activities of Working Group 1:

1. Exchange correspondence in the time between now and the next meeting on participation by plant level personnel or other ideas to better translate the results of discussions into safety improvements at the reactor plants.
2. Include control of plant design and design changes in future discussions (a subject that might include the participation of reactor plant personnel).
3. Consider further discussions on emergency preparedness.

These proposals have largely been subsumed under the Nuclear Reactor Safety Initiative. WG-1 therefore has been discontinued.

WORKING GROUP 2
ANALYSIS OF THE SAFETY OF NUCLEAR POWER PLANTS

There has been no activity for Working Group 2 since the December 1991 JCCCNRS meeting. This working group is discontinued.

WORKING GROUP 3
RADIATION EMBRITTLEMENT, STRUCTURAL INTEGRITY AND
LIFE EXTENSION OF REACTOR PRESSURE VESSELS AND SUPPORTS

In accordance with the December 1991 Meeting Record, Working Group 3 held its fourth meeting in Russia on September 24-October 2, 1992. In accordance with the agreement reached at the December JCCCNRS Meeting, changes were made in the title and scope of WG-3 to clarify the sole responsibility of WG-3 for cooperative work on the pressure vessel.

The topics addressed stressed the significance of the issues towards enhancing safety and providing a scientific basis for life extension of light water reactors. The topic areas especially emphasized were:

- studies of fracture parameters for reactor vessel steels;
- evaluation of radiation embrittlement of vessel steels for U.S. LWR and Russian PWR-VVER reactor types;
- the role of copper, phosphorus and nickel in radiation embrittlement;
- the effect of shallow cracks on fracture of vessel steels; and
- results of testing programs of U.S. and Russian laboratories.

Current cooperative activities are summarized below.

- Continued cooperation on research using U.S. and Russian steels; specifically, irradiation of and annealing comparisons from testing in each other's reactors, and a round robin exercise on J-R curve testing in U.S. and Russian laboratories.

STATUS: The cooperative research to exchange materials and to irradiate those materials is underway. Materials from the U.S. are being irradiated in the Novovoronezh Unit 5. The Russian materials are being included in a U.S. test reactor irradiation experiment that will begin in mid-1993. Results from these efforts will be available in late 1994. Planning for the J-R testing round robin exercise is just getting underway.

- Complete examination of Russian steels using fine-scale microscopic techniques.

STATUS: The Russian steels were examined by researchers from the University of California at Santa Barbara, including a visiting scientist from the Kurchatov Institute, using the Small Angle Neutron Scattering (SANS) equipment at the U.S. National Institute for Standards and Technology (NIST) in 1992, and the results have been published. Researchers at the Oak Ridge National Laboratory are preparing samples for examination

using an Atom Probe Field Ion Microscope (APFIM). That work should be completed by the fall of 1993.

- Arrange for a one-year assignment of a Russian metallurgist to the Oak Ridge National Laboratory.

STATUS: A visiting scientist from the Kurchatov Institute began working with scientists at the Oak Ridge National Laboratory in early 1993. The assignment will continue for one year.

- Continue tripartite cooperation in neutron dosimetry at NRI-Rez, Czech Republic.

STATUS: Cooperative efforts by U.S., Russian, and Czech scientists in the area of neutron dosimetry has continued with analysts performing calculations to predict the results of a spherical source experiment conducted by the Czech researchers. Results of the calculations were discussed during a meeting held in March 1993.

- Encourage Russian participation in the CSNI FALSIRE-2 program for fracture mechanics structural analysis of reactors.

STATUS: Researchers from the Kurchatov Institute currently are planning to participate in the CSNI FALSIRE-2 program. However, this participation will not be in conjunction with Working Group 3 activities.

- Obtain Russian data base for embrittlement analysis by the U.S.

STATUS: The U.S. has provided the Power Reactor Embrittlement Data Base (PR-EDB) to the Russian participants. However, the corresponding Russian data have not been provided to the U.S. participants.

Proposals for continuing information exchanges and discussions, and for future activities are summarized below.

- Continue exchanges and discussions on shallow-crack testing.
- Continue exchange of information on annealing.
- Continue exchange of information on regulatory positions on embrittlement and annealing.
- Continue the study of fracture mechanics parameters and test methods of interest, and consider examination of new test methods, including notched, round bar tests for determining K_{Ic}.

WORKING GROUP 4
FIRE SAFETY

The last meeting of Working Group 4 occurred September 13-21 1991. The next meeting was scheduled for June, 1992. However, the meeting was canceled upon request of the Russian participants. The two sides concluded that Working Group 4 has completed its tasks.

WORKING GROUP 5 MODERNIZATION/BACKFITTING

In accordance with the December 1991 meeting Record, Working Group 5 held its second meeting on June 24-30, 1992 in Russia. Activities took place in Desnogorsk (including the Smolenskaya Power Plant), Kalinin (including the Kalininskaya Power Plant) and Moscow.

The following topics were discussed at the Moscow meeting:

- rule-making and backfitting considerations, including specific examples of each.
- modifications being considered for RBMKs and VVERs
- risk reduction activities, including probabilistic safety assessments and accident sequence estimations.
- risk-based regulations and individual plant examinations, focusing on anticipated transients without scram and station blackout.
- the NUREG-1150 risk analysis of five U.S. reactors with different containment designs.
- NRC activities on low power and shutdown accidents.
- The Ukrainian situation.

In summation, the Parties agreed that the most important factor of backfitting and modernization is one of priority. A method of prioritization is needed, and probabilistic safety assessments, even simplified methods, can be used for this purpose.

Future Activities

Topics for the next meeting were to be:

- Detailed performance assessment and regulatory implementation of one or two backfit topics.
- Consider upgrading ECCS, either in VVER or RBMK; describe the largest pipe rupture and the analysis of events following this rupture.
- Level one risk assessment of core damage frequency.

This working group is being discontinued in light of the U.S. Nuclear Reactor Safety Initiative.

WORKING GROUP 6 SEVERE ACCIDENTS

In accordance with the December 1991 Meeting Record, Working Group 6 held a meeting in Russia on June 13-25, 1992. In addition to holding detailed discussions of the delegates' respective activities in the area of severe accidents at Kurchatov in Moscow, the USNRC delegation visited: the Konevits Island on Lake Ladoga for a tour of the experimental facilities dealing with issues relating to hydrogen combustion/detonation; Semipalatinsk in Kazakhstan; and Dimitrovgrad in Russia for a tour and inspection of experimental facilities dealing with various aspects of core melt phenomena and associated experiments.

June Meeting:

Meeting at Konevits Island

Working Group 6 visited the Scientific Research Station (SRS Vargos) on Konevits Island, Ladoga Lake, northeast of St. Petersburg. The working group witnessed the performance of large-scale hydrogen combustion experiments.

The following topics related to the ongoing agreement with the Russian Scientific Centre at Kurchatov Institute were discussed in detail.

1. HMS Code Assessment
2. Theoretical Analysis and Numerical Simulation
3. Hydrogen Deflagration and DDT Experiments
 - a. Investigation of combustion behavior as a function of mixture composition;
 - b. Determination of the conditions for the onset of detonation by hot turbulent jets;
 - c. Effect of scale on hot turbulent jet detonation initiation; and
 - d. Verification of theoretical models of DDT and spontaneous detonation possibilities.

Meeting in Moscow

On June 18 the USNRC delegation visited the Institute of Safety Development of the Russian Academy of Sciences to discuss its work in the area of severe accidents, its relationship to Kurchatov and other programs in support of nuclear safety related activities in Russia and other republics of the Former Soviet Union.

Meeting in Semipalatinsk

On June 21-23, the US delegation, with delegations from France, Germany and the Russian Federation, met with the officials of the Semipalatinsk Test Facility in Kazakhstan.

Meeting topics and activities included:

- Description of the change in purpose of the facility from nuclear weapons testing to research on nuclear power.
- Visits to the EWG-1, RA, and IGR reactors to evaluate full-melt testing.

Meeting in Dimitrovgrad, Russia

On June 23 and 24 the US delegation visited the Research Institute of Atomic Reactors at Dimitrovgrad in the Ulyanovsk Region to discuss, observe, and assess the Institute's programs and capabilities in the areas of nuclear reactor safety and especially severe accident research. Items of note include:

- a tour of several research reactors
- a tour of the hot cell chambers, showing damaged fuel rods in a hot cell.
- a preliminary analysis of fuel behavior studies done for Kurchatov (the fuel was manufactured in Podolsk and at RIAR, tested in Semipalatinsk and is being examined in Dimitrovgrad).

Meeting at Kurchatov Institute, Moscow

Discussions continued on a number of technical issues relating to the lower head failure program. Topics included:

1. Condition of Lower Head Loading
2. The RASPLAV Facility
3. Natural Convection Support Experiments
4. Melt Technology Experiments
5. Materials Interaction and Properties Experiments

Future Activities

The JCCCNRS agreed with the WG-6 recommendations that the Working Group should:

- Continue the experimental and theoretical investigation of the combustion behavior of hydrogen-air mixtures and the validation of the HMS (hydrogen migration and mixing studies) computer code by the Russian Research Center at Kurchatov;

- Increase cooperation between laboratories in the USA and Russia by the exchange of personnel, e.g., between the Laboratory of Induced Chemical Reactions (Kurchatov and S.R.S. Vargos) and the Explosions Dynamics Laboratory (RPI, Troy, New York);

- Intensify interactions with the Russian Research Center at Kurchatov and the Institute of Safety Development of the Russian Academy of Sciences, concerning lower-head molten fuel structure experiments in RASPLAV experimental program and

related theoretical studies;

- Continue the validation and development of enhanced models of the CORCON-MOD3 code by the Institute of Safety Development of the Russian Academy of Sciences.

Based on discussions between the Russian Research Center at Kurchatov, the Academy's Institute of Safety Development, the USNRC and the OECD's Nuclear Energy Agency, it was agreed that because of the wide interest by a number of countries in the RASPLAV Program, NEA would consider a proposal by Russia to broaden the RASPLAV Program into an international collaboration project. This would allow more financial and technical resources to be made available to the program and thus enhance its scope, applicability, and schedule. A meeting has been set in Paris during the week of April 5 to discuss this with the interested NEA member countries.

Dr. N. N. Steponoy and Mr. J. M. Taylor signed the agreement extending the Research Arrangements on severe accidents between the USNRC and the Russian Research Center (I.V. Kurchatov Institute) and the Russian Academy of Sciences for 3 years. The agreement involves research to be conducted in Russia and includes (1) participating in a series of lower head molten-fuel interaction experiments to be conducted in the RASPLAV experimental program in Moscow, (2) participating in a program to validate hydrogen behavior codes and develop a scaling methodology for spontaneous detonations, and (3) participating in a program to validate the core concrete interaction code, CORCON-MOD3, against available experimental data. The total funding level for these three activities totals \$375K for 1993.

The RF side proposed that the USNRC computer code SCDAP/RELAP be used to evaluate/predict the recently performed experiment in the German CORA facility which involved VVER type of fuel. USNRC would consider this proposal after it evaluates the funding needed to accomplish this. In parallel, the USNRC would propose that this evaluation/prediction be made into an NEA/CSNI standard problem and thus utilize other codes, in addition to SCDAP/RELAP, to do the evaluation, e.g., the French ICARE code as well as the equivalent German code.

WORKING GROUP 7 HEALTH EFFECTS AND ENVIRONMENTAL CONSIDERATIONS

In accordance with the December 1991 Meeting Record, Working Group 7 held a series of meetings in Russia, Ukraine, and Belarus on April 24-May 8. Subsequently, a re-evaluation of the program was undertaken. This re-evaluation is discussed below.

BACKGROUND/PROGRAM DEVELOPMENT

Two sub-working groups were organized under this Task to gain unique information from the Chernobyl accident on the biomedical consequences of exposures from radionuclides and their environmental behavior. One of these subworking groups is concerned primarily with environmental transport of radionuclides. The other group is focussing on health effects. U.S. management responsibility for Working Group 7 resides with the Department of Energy with support from the Nuclear Regulatory Commission. Because of a re-organization within the Department of Energy, the responsibility for the support and management of these activities was transferred from the Office of Energy Research to the Office of Environment, Safety, and Health in July, 1991.

The first meetings of the sub-working groups under Task #7 were held in Moscow (7.1 - Environmental) and Kiev (7.2 - Health) in September of 1989. At these meetings, the goals of each group were outlined, and lists of projects to achieve these goals were drafted. Sub-working group 7.1 on environmental transport had two primary goals: (1) to develop validated terrestrial, atmospheric, and aquatic transport models to assure rapid projection of doses for any future reactor accident and (2) to develop enhanced methodologies to reconstruct effective doses for populations exposed due to the Chernobyl accident. The primary goal of sub-working group 7.2 on health effects was to develop joint biological and health effects research projects to better understand the observed and projected human health effects of radiation exposures from the Chernobyl accident. The Department of Energy and the Nuclear Regulatory Commission provided funding for a trial period to assess the prospects for productive collaboration related to Chernobyl. Under each working group a series of pilot projects were identified. The purpose of the pilots was to determine the feasibility of conducting long-term cooperative projects.

Because many of the pilot projects have reached a stage at which it is important to decide long-term commitments, the U.S. side has evaluated the overall program and proposes that some of these pilots be completed soon or dropped, while others should be expanded. The U.S. proposals are based on the success of the pilot projects, a review of the overall program and our priorities for the program's future. Although many of the pilot projects were designed to address interesting scientific

questions, the U.S. side suggests that the emphasis of the program be shifted to focus primarily on the human health effects of the Chernobyl accident in selected populations. Thus we propose to support traditional epidemiologic studies that address specific questions regarding human health and continued transport model assessments and validations designed to support the reconstruction of doses for the populations being studied.

Since June 1, 1990, many exchange visits have taken place, and there have been many productive scientist to scientist interactions on the pilot projects initially identified; however, little or no progress has been made on some of the projects. Summaries of the progress and of 1993 plans and proposals for each of the activities is in Attachment 3.

WORKING GROUP 8
EXCHANGE OF OPERATIONAL EXPERIENCE

Working Group 8 met December 7-12 in Russia. Topics discussed were:

- Application of Markovian processes in plant system reliability estimation;
- Severe accident sequence precursor program;
- Shutdown risk;
- NPP performance indicators;
- Human factors
- Analysis of separate events, common cause failures

It was agreed that WG-8 had fulfilled its commitment, and while there was a need for continued exchange of information regarding operational experience, it should be considered under the Lisbon Initiative. Specific subjects for further discussion would include:

- Exchange of views between experts (including consultant meetings) on analytical methods and applications in the Accident Sequence Precursor program;
- Insights gained from evaluation of operator response (human factors and trending of human error rates) to abnormal events; and
- Exchange of operational experience and lessons learned.

WORKING GROUP 9
DIAGNOSTICS, ANALYSIS EQUIPMENT AND
SYSTEMS FOR SUPPORTING OPERATIONS

No meetings of Working Group 9 occurred since the Fourth JCCCNRS Meeting. The activities of Working Group 9 will be subsumed by the Lisbon Initiative.

WORKING GROUP 10
EROSION/CORROSION DESTRUCTION OF PIPING AND COMPONENTS

Working Group 10 has had no activity as of the December 1991 JCCCNRS meeting. This working group completed its tasks in 1991.

WORKING GROUP 11
INITIATIVE ON OPERATIONAL SAFETY OF
CIVILIAN NUCLEAR POWER PLANTS

The activities of Working Group 11 have been subsumed by the second element of the U.S. Multilateral Nuclear Reactor Safety Initiative, Operational Safety Enhancement, and is being carried out with the U.S. Department of Energy.

In accordance with the October 1990 Record/Protocol, Working Group 11 has continued its work in three distinct areas: operating instructions, training, and management and control.

The subgroup on operating instructions met in the United States on October 15-20, 1990, at the Northeast Utilities Training Center at the Millstone nuclear power station. At the meeting, symptom-based emergency operating instructions (EOIs) were demonstrated to the Soviets. The subgroup on management and operational controls met in the United States November 5-10, 1990, at the Vermont Yankee plant. The group reviewed the use of operator logs and work control systems. The subgroup on training also met in the Soviet Union December 10-14, 1990, at the Novovoronezh Training Center. The United States provided additional information on job and task analysis methodology to the Soviets. A meeting of the Executive Steering Committee for the initiative was held on November 19, 1990, at which time the action plans for the three subgroups were approved.

All three subgroups met at the Soviet Union's Novovoronezh nuclear power station March 24-28, 1991. For the subgroup on operating instructions, the main topics addressed at this meeting were preparation of EOIs for the steam generator tube rupture, reactor trip diagnostic, and critical safety function monitoring. For the subgroup on training, the main topics discussed at the meeting were the Soviet prepared material for the steam generator tube rupture EOI, the use of the simulator for testing the EOI, and procedures for development of a systematic approach to training. For the subgroup on management and operational control, the main topics discussed at this meeting were control room logs, the organizational structure of Novovoronezh Units 3 and 4, the functions of a shift technical advisor, and the work control process.

All three subgroups met again at the Novovoronezh station during the period July 21-27, 1991. For the subgroup on operating instructions, the main topics discussed at the meeting were the EOIs and the accident management system which is to be used by the Soviets for transferring system-based precepts to other Soviet reactor types. For the subgroup on training, the main topics discussed at the meeting were the training materials

for the EOIs and administrative instructions for performance based training; simulator exercises were conducted for two EOIs. For the subgroup on management and operational control, the topics discussed at this meeting were work control processes, organizational structure of Novovoronezh Units 3 and 4, and processes for review of plant incidents and deviations.

The subgroups on operating instructions and on training met in the U.S. during the period October 28-November 4, 1991. For the subgroup on operating instructions, the main topics discussed were the Soviet-developed EOIs and supporting documents. For the subgroup on training, the main topics discussed were training of operators on the loss of AC power EOI and draft procedures for performance-based training, as well as the U.S. system for accrediting nuclear training.

Considerable discussion was held regarding implementation schedules for the EOIs. The Soviet side has prepared an integrated implementation plan that shows implementation occurring in the control room at Novovoronezh Units 3 and 4 by March 1993. Critical to achieving this schedule will be the timely review and approvals of several organizations including Soviet regulatory authorities.

A meeting of the Executive Steering Committee (ESC) was held on December 19, 1991 in Washington, DC. Both the Russian and American sides concluded good progress was being made. The ESC approved the plans of actions of the three subgroups for 1992 and agreed that the implementation of the EOIs at Novovoronezh Units 3 and 4 should be planned for March 1993.

The ESC discussed a recommendation made at the December 2-3, 1991 meeting of the JCCCNRS for U.S. regulatory authorities to assist Soviet regulatory authorities on methods for reviewing EOI. The ESC concluded that rather than being part of the DOE/Russian Initiative, the appropriate way for this to occur would be under the auspices of the JCCCNRS Working Group #1 on Safety and Regulatory Practices.

The subgroup on management and controls met in the U.S. January 9-18, 1992 to review and discuss the U.S. programs of independent assessment of nuclear safety, independent auditing of plant performance, quality control inspections and quality assurance.

The two subgroups on operational instructions and training met in Moscow and Novovoronezh respectively on February 10-15, 1992. All the general guidelines for development of the EOIs have been completed. Completion of EOIs is on schedule. Seminars for operations personnel on the EOI concept are being conducted. In addition to the EOIs, the Russians have drafted a normal plant start-up procedure.

The three subgroups met in Russia, May 11-16, 1992.

Development of the EOIs is close to being on schedule. Plans for verification and validation are proceeding. Validation of EOIs for EOIs beyond the capability of the Novovoronezh simulator will be performed by walk-through techniques. The subgroups were informed that Rosenergoatom had begun planning to develop EOIs for all nuclear stations in Russia.

The three subgroups met at three different plants in the United States, July 13-17, 1992. All EOIs and technical basis documents have been completed and are undergoing the initial stages of verification and validation. Nearly half of the simulator exercise guides and training lesson plans have been completed. Formal operator training is planned to begin in October 1992. A seventh shift of operators is being organized to permit continuing training of operators after EOIs have been implemented. Training and qualification of personnel have been completed for a new control room supervisory position.

All three subgroups met at the Novovoronezh plant November 16-20, 1992. Because of the extensive comments on the EOIs from the U.S. subgroup members and the Novovoronezh plant staff, the schedule for implementation of the EOIs at Novovoronezh has been delayed until November 1993. Training and qualification of new control room supervisors have been completed. Simulator demonstrations of EOIs showed improved teamwork and communications among Russian operators. The normal plant start-up procedure had been implemented at Novovoronezh.

A special meeting of selected Novovoronezh control room operators and training instructors was held in the U.S. on November 30-December 5, 1992 to demonstrate the use of EOIs to these people. It was expected that exposure of these personnel to how EOIs are used in the U.S. would influence them to carry the message on the advantages of EOIs to other operators and instructors at Novovoronezh.

A meeting of the ESC was held in Moscow on December 8, 1992. The slippage of the implementation schedule from May 1993 to November 1993 was discussed. The Russian side stated they felt November was a realistic date. With regards to the Russian regulator being involved in subgroup meetings, the Russian side stated they would obtain the necessary regulatory agreements without the regulator being involved in subgroup meetings. The ESC approved the plans for 1993 which involved combining the two subgroups on operating instructions and training, disbanding the subgroup on operational controls since it had completed its work, and planning two meetings at Novovoronezh to follow implementation of EOIs.

Additional Future items

The combined subgroup on operating instructions and training plans to meet in Novovoronezh on March 29 through April 2, 1993 to review the status of verification and validation and operator

training. A second meeting is tentatively planned for later in 1993 to observe operator training.

WORKING GROUP 12
NUCLEAR POWER PLANT AGING AND PLANT LIFE EXTENSION

March 30-April 3, 1992

The second meeting (92-1) of Working Group 12 was held in Rockville, Maryland, USA, March 30-April 3, 1992. The working group also participated in the USNRC-sponsored Plant Aging Research Information Conference held on March 24-27, 1992 in Rockville, MD. Both sides gave presentations according to the scopes developed at the initial organizational meeting in Moscow, June 1991. The scope of the responsibilities of Working Groups 3 and 12 and the need for increased cooperation and communication between the two working groups were discussed.

Future Activities

The following activities were approved:

- A. The scope of WG 3 will be revised to deal with all degradation mechanisms and their effects on the properties of the reactor vessel and will not be limited to only the embrittlement mechanisms. W.G. 3 will also be responsible for the diagnostics, management, monitoring and trending of the reactor vessel material properties caused by all identified degradation mechanisms, and for reactor vessel materials residual life prediction. WG 3 will also be responsible for non-destructive examination aspects of primary system components.
- B. Since the additional responsibilities in (A) recommended above for assignment to W.G. 3 are identical to Tasks 2, 3, and 4, on aging management and residual life prediction for which Working Group 12 is now responsible, the methodology to be used by both groups should be that of W.G. 12 to achieve consistency between the two groups. W.G. 12 will be responsible for the aging management and life extension of all components, equipment, and structures with the exception of the reactor vessel material.
- C. Working Groups 3 and 12 will meet jointly to improve communications and cooperation of the groups to integrate vessel material analyses with vessel component analyses. The responsibility for vessel material analyses will remain with the W.G. 3. W.G. 12 will be responsible for all components and interfaces within the overall vessel boundary.

October 12-16, 1992

The third meeting (92-2) of Working Group 12 was held in Moscow, Russia on October 12-16, 1992. The scope and responsibilities of Working Group 12 were discussed. There were visits to NIKIET laboratories, VNIIAES and TSNIIITMASH. A workshop on Nuclear Power Plant Aging and Life Extension was held October 19-21, 1992.

The status of the six tasks of Working Group 12 were summarized as follows:

Task 1: Equipment Selection and Data - The Working Group considers this task to be complete after the U.S. side receives from the Russian Federation side the listing of major VVER-1000 components.

Task 2: Degradation Mechanisms - Effects on Properties or Performance -

The U.S. and R.F. sides agreed that Task 2 will be complete upon exchange of additional information on degradation mechanisms and their effects on priorities and performances for pumps, valves, cables, and containment structures.

The RF agreed to provide additional information related to the effect of degradation mechanisms on properties or performance.

Task 3: Diagnostics, Management, Monitoring, and Trending - The U.S. and R.F. sides agreed that Task 3 will be complete upon exchange of the additional information related to the diagnostics and monitoring of pumps, valves, cables and containment structures.

The RF agreed to provide additional information related to diagnostics, management, monitoring and trending.

Task 4: Residual Life Prediction - Working Group 12 considers this task to be important and continuing. Information will continue to be exchanged regarding (1) surge tanks, (2) vessel-piping, and (3) cables.

The RF agreed to provide data on VVER-1000 stress-strain temperature measurements useful for a PWR piping system and age-related data for surge tanks. Both the U.S. and the RF will discuss effects of shallow cracks on future characteristics of steel structures.

Task 5: Data Collection and Record Keeping - The Working Group considers this task complete upon the delivery by the U.S. side of the final NRC (NUREG/CR) report on recordkeeping to the R.F. side.

The U.S. side will provide NUREG/CR-5848 on recordkeeping needs to mitigate the impact of aging degradation prior to the next Working Group 12 meeting.

Task 6: Aging Considerations for ALWR Designs - The Working Group believes that this task should continue. Both sides agree that additional information exchanges should take place during the next two meetings.

The Working Group co-leaders decided that the next meeting should be held during the Fall of 1993 in the United States and in conjunction with the meeting of Working Group 3. The technical scope and tasks should be consistent with those identified in Memorandum of Meeting 92-2.

In addition, the RF agreed to provide an organizational structure describing the expertise of various participating institutes in the activities of the Working Group.

The Working group co-leaders agreed that the next meeting would be held in conjunction with the Water Reactor Safety Meeting tentatively scheduled for October.

The RF (letter of Sidorenko to Taylor) requested a detailed comparison of Russian and American codes and standards for nuclear power plant components as part of WG 12 activities. The USNRC believes that this is an important activity and would consider this request.

Mr. Taylor will respond to Mr. Sidorenko's letter on funding this activity and provide recommendations on its implementation.

Host Country Payment Status

Most of the expenses for the visits of the working groups under the cooperative program have been paid by the country sending the visitors. However, a number of the working groups have been authorized by the JCCCNRS to have expenses paid by the host country. The current status of the working group balances as described in the following table:*

HOST COUNTRY PAYMENT - SUMMARY
(Approximate mandays)

		<u>Credit Balance</u>	
	<u>RF</u>		<u>US</u>
WG 1	Inspector exchange	in balance	
WG 3	65		
WG 4			21
WG 6			15
WG 12	10		
TOTAL:	75		36
<u>RF NET CREDIT</u>	<u>39</u>	<u>Man days</u>	

* WG 7 US pays virtually all expenses both ways because of difficult financial conditions.

WG 11 Although the host country payment principle applies, it was never intended to be necessarily reciprocal. The explanation is that most of the work has been performed in one country (the former Soviet Union) and there was a special congressional appropriation to fund the majority of the work.

A. SUMMARY OF OPERATIONAL SAFETY & RISK REDUCTION PROJECTS
UNDER LISBON

The first three elements of the Lisbon Initiative were discussed at meetings on August 5-7 and September 7-11, 1992 in both the Russian Federation and Ukraine. The U.S. delegation, comprised of representatives of the Department of State, the Department of Energy, the Agency for International Development and the Nuclear Regulatory Commission, met with representatives of the concerns Rosenergoatom and Ukratomenergoprom. Schedules were outlined for various groups of specialists from the Russian Federation, Ukraine and the United States to study, analyze and prepare detailed suggestions for the implementation of the first three elements of the Initiative. The memorandums of those meetings appear below.

**LISBON NUCLEAR SAFETY INITIATIVE
EXPERT WORKING GROUPS 1 THRU 4
OPERATIONAL SAFETY IMPROVEMENTS**

ACCOMPLISHMENTS

On November 21, 1992 a meeting was held in Moscow with Ukrainian and Russian representatives to prepare a proposal for the project scope and organization of the operational safety subgroups. Four subgroups were formed; one for operating instructions and training for each of the following reactor types: VVER-440 (230), VVER-1000, RBMK. A fourth subgroup was formed for organization and operational controls. It was also agreed that the priority for work would be on development and implementation of symptom-based emergency operation instructions (EOIs) and associated training, and on nuclear power plant management control. The second priority would be on normal operating procedures and quality assurance activities.

The charter for the operational safety subgroups was approved by the management committee on February 3, 1993. The charter (copy attached) includes the project scope and organization of the subgroups.

A meeting of the subgroups was held March 1-5, 1993 in the U.S. at both a PWR and BWR plant. Because of problems with visas and passports, all the Ukrainian and several of the Russian plant personnel were unable to attend. The Russian members of the subgroups for VVER 440 (230) and VVER-1000 presented general schedules for implementation of EOIs at Kola, Rovno, Balakovo and Zaporozhye (copies attached). U.S. plant use of EOIs was demonstrated for all subgroups and the subgroup for RBMKs discussed which approach (flow chart or text) should be used for RBMKs.

FUTURE ACTIVITIES

Subgroup meetings are planned for April, July and October at nuclear plants in Ukraine and Russia. Plans are in preparation for an extra meeting in the U.S. to demonstrate use of EOIs to the Ukrainian and Russian subgroup members who were unable to attend the March 1993 meeting.

LISBON NUCLEAR SAFETY INITIATIVE
EXPERT WORKING GROUP 5
RUSSIAN TRAINING CENTER
BALAKOVO NPP

ACCOMPLISHMENTS

The Expert Working Group for the Russian Training Center to be located at the Balakovo NPP held initial meetings in Moscow on February 17 and 18 1993. During this meeting, an Charter and Memorandum of Understanding was agreed to by all members of the working group. This Charter described the basis for the training program that will be developed and emphasized the implementation of an integrated program based on the Systematic Approach to Training.

As part of this joint program, the Russian technical representatives have indicated that several activities will be completed by the NPP staff. Included in these activities are the construction of the training center, delivery of the required auxiliary systems to support the training center, and procurement of other equipment that is manufactured in Russia.

The U.S. Expert Working Group has initiated the development of a plan for the implementation of the training program at the Balakovo site. Currently, negotiations are under way with a U.S. company to design and begin the implementation of the training program. An important aspect of this program will be the transfer of the technology of the programs implemented to the Russian NPP staff. It is anticipated that the participation of the NPP staff will increase as the program develops; it is a goal of this program to develop an NPP staff capability for continued training program implementation at the Balakovo site and at other Russian NPP sites.

FUTURE ACTIVITIES

The next meeting of the Expert Working Group is scheduled for April 19 and 20 1993 in Moscow. At this meeting, the U.S. company that will initiate the training program development will be introduced to the Russian NPP staff and plans will be made to begin the program. It is anticipated that the work will begin immediately following this meeting.

The U.S. Expert Working Group has developed a list of training center equipment that is considered appropriate for delivery to the Balakovo site during the beginning of the training program development. This equipment includes personnel computers, software, and a several office machines. Delivery will be arranged to support the site training program needs.

A series of three training courses in simulator hardware maintenance are being planned for the Balakovo NPP site. In addition, to support the simulator maintenance activities, a set of tools is being procured for the NPP staff. It is planned to deliver the tools during the presentation of the training courses.

LISBON NUCLEAR SAFETY INITIATIVE
EXPERT WORKING GROUP 6
UKRAINE TRAINING CENTER
KHMELNITSKY NPP

ACCOMPLISHMENTS

The Expert Working Group for the Ukraine Training Center to be located at the Khmelnytsky NPP held initial meetings at the NPP site on December 19 and 20 1992. During this meeting, a agreement was reached by all members of the working group that described the basis for the training program that will be developed. This agreement emphasized the implementation of an integrated program based on the Systematic Approach to Training that included modern hardware, software, and training methodologies. In addition, it was also agreed that a full-scope simulator for a VVER-1000 would be obtained for the Khmelnytsky site and integrated into the training program.

As part of this joint program, the Ukrainian technical representatives have indicated that several activities will be completed by the NPP staff. Included in these activities are the construction of the training center, delivery of the required auxiliary systems to support the training center, and procurement of the control room panels for the full scope simulator. In addition, the Ukrainians have supplied certain detailed technical information that is important for the specification that is being developed by the U.S. representatives to support the procurement of the simulator.

The U.S. technical representatives have initiated the development of a plan for the implementation of the training program at the Khmelnytsky site. Currently, negotiations are under way with a U.S. company to design and begin the implementation of the training program. An important aspect of this program will be the transfer of the technology of the programs implemented to the Ukrainian NPP staff. It is anticipated that the participation of the NPP staff will increase as the program develops; it is a goal of this program to develop an NPP staff capability for continued training program implementation at the Khmelnytsky site and at other Ukrainian NPP sites.

FUTURE ACTIVITIES

The next meeting of the Expert Working Group is scheduled for April 15 and 16 1993 in Kiev. At this meeting, the U.S. company that will initiate the training program development will be introduced to the Ukrainian NPP staff and plans will be made to begin the program. It is anticipated that the work will begin immediately following this meeting.

An additional joint working group meeting will be held at Brookhaven National Laboratory on April 22 and 23 1993. This subject of this meeting will be the procurement of the full scope simulator. U.S. simulator manufacturers will be available to discuss the preliminary specification for the simulator with both the Ukrainian and U.S. representatives of the working group.

A series of three training courses in simulator hardware maintenance will be presented at the Zaporozhye NPP site. These courses will be presented coincident with the delivery of the maintenance tools that are being procured for the NPP staff.

**LISBON NUCLEAR SAFETY INITIATIVE
EXPERT WORKING GROUP-7
NEAR TERM RISK REDUCTION (VVER-440/230 REACTORS)**

ACCOMPLISHMENTS

The U.S. NTRR EWG was formed in late December 1992. The first joint meeting of the US and Russian members of EWG-7 was held at VNIIAES in Moscow on February 14 & 15, 1993. The Charter for the VVER NTRR EWG was agreed to and signed by the co-chairs at this meeting. A Meeting Memorandum was also agreed to and signed by the co-chairman containing description of candidate risk reduction projects for further development and consideration.

The initial draft of a VVER NTRR Work Plan is currently being prepared based on the list of candidate projects from the Meeting Memorandum.

A second meeting in Russia is currently planned for the second half of April to further define the scope and requirements for the candidate projects and also to obtain sufficient information for development of preliminary engineering design solutions, assessment of technical feasibility, estimates of cost and schedule, among other information needed at this stage of project development. This meeting will feature walkthru's at a Russian VVER-440/230 unit.

Ebasco has been contracted to provide engineering support to EWG-7 for design solutions, feasibility, and cost and schedule assessments of the various candidate projects.

FUTURE ACTIVITIES

Near term actions, in addition to the late April meeting in Russia, include:

- completion of draft Work Plan for discussion and agreement at next meeting (4/93)
- screening of candidate projects on the basis of engineering assessments, feasibility, cost and schedule information prepared by Ebasco personnel (6/93)
- initiate procurements for simple agreed-upon startup projects (6/93)
- initiate specifications for procurement of projects (6/93)

LISBON NUCLEAR SAFETY INITIATIVE
EXPERT WORKING GROUP-8
NEAR TERM RISK REDUCTION (RBMK REACTORS)

ACCOMPLISHMENTS

The U.S. NTRR EWG was formed in late December 1992. The first joint meeting of the US and Russian members of EWG-8 was held at RDIPE in Moscow on February 16 & 17, 1993. The Charter for the RBMK NTRR EWG was agreed to and signed by the co-chairs at this meeting. A Meeting Memorandum was also agreed to and signed by the co-chairman containing description of candidate risk reduction projects for further development and consideration.

The initial draft of an RBMK NTRR Work Plan is currently being prepared based on the list of candidate projects from the Meeting Memorandum.

A second meeting in Russia is currently planned for the second half of April to further define the scope and requirements for the candidate projects and also to obtain sufficient information for development of preliminary engineering design solutions, assessment of technical feasibility, estimates of cost and schedule, among other information needed at this stage of project development. This meeting will feature walkthru's at a Russian RBMK unit.

Ebasco has been contracted to provide engineering support to EWG-7 for design solutions, feasibility, and cost and schedule assessments of the various candidate projects.

FUTURE ACTIVITIES

Near term actions, in addition to the late April meeting in Russia, include:

- completion of draft Work Plan for discussion and agreement at next meeting (4/93)
- screening of candidate projects on the basis of engineering assessments, feasibility, cost and schedule information prepared by Ebasco personnel (6/93)
- initiate procurements for simple agreed-upon startup projects (6/93)
- initiate specifications for procurement of projects (6/93)

LISBON NUCLEAR SAFETY INITIATIVE FIRE SAFETY IMPROVEMENTS

ACCOMPLISHMENTS

The fire safety program implemented for the Zaporozhye and Smolensk plants commenced in May of 1992. The initial fire safety activities included the development of a generic evaluation of the fire protection/detection capabilities at NIS reactors based upon available literature and personal interviews with participants in prior U.S. fire safety evaluation programs. The intent of the initial pre-conceptual design effort was to identify general problem experienced at NIS reactor sites to be able to focus subsequent activities and resources in areas with the greatest potential for improvement.

The results of this initial study were presented in September of 1992 to representatives of Rosenergoatom and Ukratomenergoprom in Moscow and Kiev respectively. As a result, representatives of these organizations agreed with the importance of improving fire safety and the general findings of the initial report.

After these meetings, a group of U.S. fire safety experts performed a limited walkdown of select units and areas at two nuclear stations, Zaporozhye in Ukraine and Smolensk in Russia, for the purpose of further definition of the areas to be upgraded and to obtain some preliminary plant information in order to develop a preliminary plan of action.

Subsequent evaluation of the walkdowns resulted in the preparation of Preliminary Fire Hazards Analysis Reports (PFHAR) for each plant. The PFHARs identified specific areas of improvement and provided preliminary budgetary estimates based upon three levels of improvement: full plant upgrade in safety related areas, single unit upgrade in safety related areas, and limited budget prioritized improvements for selected safety related areas.

The plant specific PFHARs have been discussed with representatives of both Rosenergoatom/ Ukratomenergoprom and Smolensk/Zaporozhye. The results of these face to face meetings resulted in minor modifications to the PFHAR findings for each plant in the area of limited budget prioritized improvements, and a general consensus that the improvements recommended in the reports were correct, could be implemented, and were of value.

FUTURE ACTIVITIES

The detailed design for the improvements in the fire safety program at the two facilities is planned to proceed during April. It will involve the immediate procurement and delivery of protective gear for each plant's control room operations staff. It will also involve a visit to both plants to develop detailed plans for the design, procurement, delivery, and installation of fire safety equipment as well as the testing of sample components (detectors, cabling, etc.) for acceptability at both sites prior to procurement.

The detailed design phase is scheduled to be completed within five months of its start with the delivery of all equipment to both plants completed before October of this year.

B. SUMMARY OF REGULATORY PROJECTS UNDER LISBON

The fourth element of the Lisbon Initiative was discussed when the senior regulators of the USNRC, GAN of Russia and the SCNRS of Ukraine met on July 20-24, 1992 in Rockville, Maryland to create and prioritize the regulators' safety proposals. A list of seven priorities was agreed to for GAN of the Russian Federation and sixteen for SCNRS of Ukraine. The USNRC has secured funding from the U.S. Agency for International Development for most of these projects and has begun the implementation.

A Russian GAN team visited NRC in December 1992 to negotiate implementation schedules for the Russian projects. Similarly, a Ukrainian SCNRS team visited in March 1993 on the implementation of Ukrainian projects. Summaries of the progress on the funded projects follow.

RUSSIAN PROJECTS

Russia 1. Licensing Basis and Safety Analysis

Project Description:

Provide on-the-job training and technical assistance on NRC's practices and process for licensing nuclear power plants, research reactors and facilities utilizing radioactive materials.

Accomplishments:

Senior Representatives from the USNRC and Gosatomnadzor (GAN) of Russia met at NRC Headquarters in Rockville, Maryland during December 14-18, 1992 to reach agreement on plans to implement the six Russian Priorities funded by AID under the Lisbon Initiative. Russian Priority 1 while unchanged in purpose, was extensively revised during this meeting to specify the details of training activities and to identify the knowledge to be transferred. A small group of GAN executives met with the NRC in Rockville, Maryland during the period March 15-26, 1993. The discussion included the following topics: NRC's regulatory structure and licensee corresponding organization; civilian licensing principles as applied to reactors, the fuel cycle and materials; licensing legal basis and process; utility organizational relationships. In addition, the GAN executives identified goals for future groups.

The first week's concentration on commercial nuclear reactor licensing issues, included a one-day visit to Virginia Power corporate headquarters to study corporate and site operating organization relationships. The second week concentrated on fuel and materials facility licensing issues, and included a one-day visit to Westinghouse Electric's Commercial Nuclear Fuel Division Fuel Fabrication Facility to study corporate and site operating organization relationships.

Projected Schedule and Plans:

Under Russian Priority 1 (Licensing Basis and Safety Analysis) nine teams of GAN representatives are scheduled to visit the U.S. from March 1993 through FY 1994 (6 groups in 1993 and 3 in 1994). Activities include: studying reactor and fuel cycle and material licensing processes, financial fees collection, NRC licensing information software and hardware, reactor license renewal, and visiting the Watts Bar nuclear reactor site. The first team completed their efforts March 26, 1993.

The next Russian Team 1.2-93 will begin training April-May for two weeks. This two man team will receive an overview of regulatory documents and industry standards and their use by the NRC.

Russia 2. Inspection Program Activities

Project Description: Provide training and technical assistance on the NRC's inspection program.

Accomplishments:

Senior Representatives from the USNRC and Gosatomnadzor (GAN) of Russia met at NRC Headquarters in Rockville, Maryland during December 14-18, 1992 to reach agreement on plans to implement the six Russian Priorities funded by AID under the Lisbon Initiative. Russian Priority 2 while unchanged in purpose, was extensively revised during this meeting to specify the details of training activities and to identify the knowledge to be transferred. It is currently expected that Russia 2 will commence in June 1993 and continue for a two year period.

Projected Schedule and Plans:

Under future Inspection Program Activities, two teams of GAN representatives are scheduled to visit the U.S. from June through December 1993. Also under Russian Priority 2, two teams of NRC representatives are scheduled to visit Russia in FY 1994. While in the U.S. GAN representatives will study the NRC inspection process and participate in inspections at commercial power and research reactor sites, fuel facilities, material licensees, and vendor companies. While in Russia NRC representatives will consult with GAN on development of the Russian inspection program and participate in a joint inspection of a Russian nuclear power plant.

In summary, the NRC and GAN have arrived at 4 training teams, 3 in 1993 and a 4th in early 1994. The 4th team will involve the joint participation in a pilot team inspection at a Russian NPP.

Russia 3. Creation of an Emergency Support Center in Russia

Project Description: Provide assistance in establishing incident response programs over a period of three years.

Accomplishments:

During GAN's December meeting with their NRC counterparts the following objectives were satisfied: achieving a general approach to the project; identifying basic documents to be exchanged; discussing US and Russian concepts of operation for emergency response; and defining milestones and a tentative schedule for 1993.

GAN specialist visited the US from February 20 to March 6, 1993 and participated in discussions with the NRC. The GAN specialist observed NRC response activities at its regional office in King of Prussia, Pennsylvania, during a full-scale exercise at Susquehanna NPP. Demonstrations of HF communications, functions and capabilities of the Oconee NPP Emergency Response Facility and capabilities of the NRC Headquarters Operations Center were witnessed by the GAN personnel. Based on these discussions GAN and NRC agreed on a phased approach in developing the Emergency Support Center in Moscow which would include a prototype phase to validate operational concepts and procedures, the establishment of minimum effective response capability and finally, the creation an integrated fully operational emergency center. The discussions resulted in the

identification of training on the use of the RASCAL code, a visit by a USNRC working group to GAN in May 1993 and the tentative schedule for GAN specialist to observe a full-scale exercise at NRC Headquarters in late summer 1993.

The following documents were provided to GAN:

- o NRC Incident Response Plan (NUREG-0728, revision 2)
- o Motorola HF-SSB Radio Operations Manual
- o NRC Concept of Operations (Draft NUREG-1471)
- o Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants (NUREG-0654; FEMA-REP-1, revision 1)
- o Federal Radiological Emergency Response Plan (FRERP)
- o NRC Response Technical Manual (RTM-92), Section D "Use of RASCAL" (NUREG/BR-0150, Volume 1, revision 2)
- o Code of Federal Regulations (CFR) Title 10, part 72 and Appendix E
- o Response Management Procedures
- o Summary of Headquarters Operations Officer procedures
- o Site notebook for a Westinghouse plant

Projected Schedule and Plans:

A US team visit is tentatively scheduled to visit Russia in the second quarter of FY 1993 to study potential infrastructure issues and observe incident response operations related to the emergency support center development. An additional Russian team visit in 1993 is tentatively scheduled for August to observe NRC exercises.

Russia 4. Analytical Support Activities

Project Description: Provide assistance in implementing and applying analytical methodologies in performing safety analyses.

Accomplishments:

During the December meeting with GAN in Rockville, MD., the NRC and GAN came to an agreement on the computer codes to be provided to the Russian regulators and the level and method of conducting basic training on fundamentals of safety philosophy and analyses. The code training has been divided into two sessions to be conducted at the NRC headquarters and the appropriate National Laboratory Sites. A third Russian team will visit the NRC in 1993 to study NRC management practices in effectively utilizing technical assistance to perform audit calculations and technical reviews.

Projected Schedule and Plans:

The NRC has recently posted a notice with Commerce Business Daily soliciting technical contractor support for the procurement and installation of engineering/scientific workstations. The workstations will be used by the regulator to perform severe accident analyses using the US computer codes which will be modified for the Russian nuclear power plants. In addition, an agreement has been reached with a national laboratory to provide some of the analytical code training.

Russia 5. Establishment of Regulatory Training Program

Project Description: Assistance would be provided to Russia in establishing a regulatory training program in Russia over a period of two or three years.

Accomplishments:

A planning meeting was conducted in Moscow, Russia November 16-19, 1992 to develop a realistic plan to implement the ideas pertaining to the Establishment of Regulatory Training Program. There was agreement that technical assistance would be provided to address the highest priority training needs in 1993. Longer term programs to address continuing technical training needs will be pursued as resources permit.

A meeting December 14-18, 1992 between GAN of Russia and NRC resulted in some changes in the Memorandum of the Meeting previously negotiated during the November 1992 trip. These changes, requested by GAN, reduced the length of time for the various Russian assignments at the USNRC Technical Training Center in Chattanooga, TN to three weeks maximum.

Projected Schedule and Plans:

Projected for the next quarter, a group of five Russian GAN personnel will have a three week assignment at the NRC Technical Training Center during July 1993. The Russian personnel are typically the managers who are responsible for implementing the programs that will be discussed. They will receive technical training and briefings on subjects that include the ideology and methodology of technical training conducted for NRC personnel and teaching methods and course materials that may be used for training of GAN specialists. A second group of GAN personnel are scheduled to visit the NRC Technical Training Center in Chattanooga, TN in August 1993. This group, comprised mainly of the personnel responsible for implementing technical training programs, will review the use of training aids including simulators and the necessary equipment to support the development and presentation of training programs. The third group identified will be assigned to the NRC Technical Training center in November 1993. This group is sub-divided into three smaller focused groups of radiation protection specialist, engineering support specialist and operator licensing examination personnel. The radiation specialist will study site access training, radwaste management, safety aspects of industrial radiography, transportation of radioactive materials, safety aspects of well logging, irradiator technology, advanced radiological environmental monitoring, radiological emergency response, radiological emergency planning and radiological accident assessment. The engineering support specialist will be briefed on fire protection for power plants, welding technology and codes, nondestructive examination and inservice inspection. Operator licensing examination personnel will receive training on examination techniques and the operator licensing examination program. In addition all three specialist sub-groups will participate in NRC courses on Fundamentals of Inspection, Inspecting for Performance and Incident Investigation Team Training.

Equipment necessary to support GAN's training capability will be acquired.

The NRC provided the following documents to GAN:

- Syllabus of Technical Training Center Courses for Fiscal Years 1993-1994
- Schedule of Technical Training Center Courses for Fiscal Years 1993-1994
- NRC Manual Chapter 1245, Inspector Qualifications
- Generic Qualification Journal for PWR Operations Inspector
- Course Outline for Welding Technology and Codes Course
- Course Outline for Eddy Current Testing Course
- Course Outline for [Current] Fundamentals of Inspection Course
- Course Outline for [Revised] Fundamentals of Inspection Course
- Course Outline for Inspecting for Performance Course
- Course Outline for Leading NRC Inspection Teams Course
- Course Outline for Effective Communication for NRC Inspectors Course
- Course Outline for Gathering Inspection Information through Interviews Course
- Course Outline for Incident Investigation Team Training Course
- Course Outline for Root Cause/Accident Investigation Course

GAN of Russia provided the following documents to the NRC:

- GAN of Russia Organization Structure
- Legislative Base for Activity (including RSFSR Presidential Ordinance No. 249 of December 31, 1991, On The Reorganization of the Government Supervision of Nuclear and Radiation Safety in RSFSR; Competent Authorities of the State Committee for the Supervision of Nuclear and Radiation Safety under the President of the Russian Federation; Approval of the Statute of the State Committee for the Supervision of Nuclear and Radiation Safety under the President of the Russian Federation; Government Regulation of Nuclear and Radiation Safety Within the Territory of the Russian Federation; and Gosatomnadzor Organization
- GAN Information Bulletin Number 1
- Statute of Department of Supervision over Nuclear and Radiation Safety of NPPs (RD-01-04-92)
- Regulations for Ensuring Adequate Professional Skill of Executives and Specialists of GAN
- Individual Training Program for a State Inspector for Complex Inspections in the Don Region of GAN of Russia
- Individual Training Program for a Specialist in the Don Region of GAN of Russia

Russia 6. Creation and Development of Materials Control and Accounting System

Under the Safe and Secure Dismantlement (SSD) program, the U.S. has offered Russia a U.S. assistance Program as requested by GAN.

Russia 7. Fire Protection Support

Project Description: Provide technical assistance for development and review of fire protection inspection methodology and the implementation of this methodology at Russian power reactors.

Accomplishments:

During the December 1992 NRC/GAN meeting, Russian Priority 7 was revised. It was determined that this project should continue to encompass the development of a historical fire protection and post-fire safe shutdown licensing analysis document which describes the typical approved U.S. licensing approaches to fire protection and post-fire safe shutdown, the bases for licensing decisions, the regulatory documents under which the NRC reviews were conducted, and the unique approaches which the NRC found acceptable and for which the NRC staff granted licensing exemptions. It was also determined that GAN specialists will interact with NRC fire protection specialists.

Projected Schedule and Plans:

The NRC will develop a historical fire protection and post-fire safe shutdown licensing analysis document.

Upon completion of the first document the NRC will provide it to GAN of Russia for their review, comment and use in preparation for future activities. Approximately 2-3 months after completion the historical fire protection/safe shutdown licensing document, two or three GAN specialists will come to the U.S. to interact with NRC and regional fire protection specialists for the purposes of learning about NRC fire protection regulations, fire protection and safe shutdown licensing practices and procedures, and NRC fire protection and safe shutdown inspection methodologies. The GAN representatives will be briefed on the training sessions and experiences available from or with various U.S. sources.

The GAN representatives will return to Russia and consult with GAN management. GAN will then propose further training, experiences and regulatory document developmental activities, and pilot fire protection and post-fire safe shutdown licensing and inspection activities to be conducted under Russian Priority both in the U.S. and Russia.

UKRAINIAN PROJECTS

Ukraine 1. General Program on the Development of SCNRS of Ukraine

Project Description: Provide assistance in development of the Ukrainian State Committee for Nuclear and Radiation Safety.

The NRC will provide assistance in the Ukrainian development of the Ukrainian State Committee for Nuclear and Radiation Safety. This project provides for overall discussion of the direct assistance program to evaluate the direction and effectiveness of the assistance effort.

Accomplishments:

The SCNRS Chairman visited the NRC in March 1993 to discuss the Ukrainian direct assistance efforts. The Chairmen requested an NRC presence at SCNRS to assist in the overall direction of USNRC efforts to development the appropriate regulatory organization and to provide recommendations where further assistance may be needed in the development and structuring of SCNRS.

Projected Schedule and Plans:

The NRC plans to have further discussions with SCNRS to identify the appropriate level of expertise needed to assist the SCNRS development.

Ukraine 2. Establishment of Regulatory Training Program

Project Description: Provide assistance in establishing a regulatory training program in Ukraine over a period of three years.

Accomplishments:

A planning meeting was conducted in Kiev, Ukraine November 9-13, 1992 to develop a realistic plan to implement the ideas pertaining to this Ukrainian project. There was agreement that technical assistance would be provided to address the highest priority training needs in 1993 as identified in the Memorandum of the Meeting.

A group of five Ukrainian SCNRS personnel completed a six week assignment at the USNRC Technical Training Center, Chattanooga, TN from February 1 - March 12, 1993. The Ukrainian personnel, participating in this program were the managers responsible for implementing the technical training programs at SCNRS. The briefings included discussions on technical training programs conducted by U.S. utilities, structure and content of technical training provided to NRC personnel, inspection fundamentals and techniques, and the process and methodology of conducting operator licensing examinations in the U.S.

Projected Schedule and Plans:

Current plans are for a group of six SCNRS personnel to visit USNRC Technical Training Center for a period of three or four weeks in the April-May time frame. This group will be comprised of personnel responsible for the actual implementation of the technical training programs. The technical training topics to be covered during this assignment period will

include use of the Code of Federal Regulations, regulatory guidance, NRC Inspection Manual, updated safety analysis report in the development of NRC inspections, fundamentals of inspection and the methods and process for conducting licensing examinations of operators in the U.S.

Arrangements will be made for an SCNRS individual to attend very specialized courses or specific technical briefings in the U.S. during 1993. These course may include the following:

- o Welding Technology and Codes Course
- o Nondestructive Examination and Codes Course
- o Eddy Current Testing Course
- o Inservice Inspection Course

In addition, future plans include providing the necessary microcomputers to support a computer based training program and equipment needed in the development and presentation of the SCNRS technical training program. Also, an analytical simulator for a VVER-1000 will be procured for SCNRS when funding is made available.

The following documents were exchanged during the meeting:

by USNRC

- Syllabus of Technical Training Center Courses for Fiscal Years 1993-1994
- Schedule of Technical Training Center Courses for Fiscal Years 1993-1994
- NRC Manual Chapter 1245, Inspector Qualifications
- Generic Qualification Journal for PWR Operations Inspector
- Course Outline for Welding Technology and Codes Course
- Course Outline for Eddy Current Testing Course
- Course Outline for [Current] Fundamentals of Inspection Course
- Course Outline for [Revised] Fundamentals of Inspection Course
- Course Outline for Inspecting for Performance Course
- Course Outline for Leading NRC Inspection Teams Course
- Course Outline for Effective Communication for NRC Inspectors Course
- Course Outline for Gathering Inspection Information Through Interviews Course

by SCNRS of Ukraine

- SCNRS of Ukraine Organization Structure
- Main State Nuclear and Radiation Safety Inspectorate Organization Structure
- Typical Program for Progressive Training of Regional Specialists of GAEN for Oversight of Safe Operation of Nuclear Power Installations, USSR, 1986
- Typical Program for Preparation of an Oversight Inspector of Nuclear Safety at Nuclear Stations, USSR, 1989
- Typical Plan for Study for Preparation of a Newly Selected Inspector of GAEN of USSR, USSR, 1990
- Rule on Methods of Conducting Technical Training in the Main State Inspectorate, SCNRS of Ukraine, 1992

Ukraine 3.1. Program for Development of a System for Safety and Licensing of Nuclear Power Plants

Project Description: Provide training and technical assistance on the NRC's process for licensing nuclear power plants with particular emphasis on the NRC's safety analysis process.

Accomplishments:

From January 15 to March 12, 1993 an SCNRS representative visited the NRC to study the NRC organization, Part 50 and 52 licensing processes, and to tour Comanche Peak. This included familiarity with the use of regulatory requirements, codes and standards, regulatory guides, bulletins, generic letters, and the standard review plan.

Projected Schedule and Plans:

The priority was revised in March 1993 and may include extensive licensing and safety analysis training for approximately ten SCNRS technical specialists.

Under this project, the NRC will host an SCNRS representative for 2 to 2 1/2 months commencing approximately July 21, 1993 to provide experience in the responsibilities and activities of a licensing project manager. In addition, NRR will host an SCNRS specialist in the area of Reactor Systems and Containment for 1 1/2 months beginning approximately June 9, 1993.

The NRC agreed to consider the feasibility of the following:

A two months duration continuation of the licensing project manager visit in FY 1994.

Hosting eight SCNRS technical specialists for 1 1/2 months each beginning in Fall 1993. The specialties include: construction, instrumentation and control, electrical engineering, plant systems/balance of plant, nuclear fuel core/spent fuel, radioactive waste management, radiation protection, mechanical engineering/materials.

A 2 to 2 1/2 months duration visit to Kiev early in CY 1994 by an NRC licensing project manager to consult on the completeness and implementation practices of the Ukrainian Nuclear Power Reactor Licensing System.

Ukraine 3.2. Program for Development of a System for Safety Analysis and Licensing of Nuclear Power Plants

Project Description: Provide assistance in implementing and applying analytical methodologies in performing safety analyses.

Accomplishments:

Development of the statements of work for contractor support and finalization of specifications for the workstation has been completed.

The objective of this project is to provide the Ukrainian regulatory organization, State Committee for Nuclear and Radiation Safety (SCNRS), assistance in: 1) implementing and applying analytical methodologies in performing safety analyses, and 2) the development of research support for regulatory activities. More specifically, this assistance will include:

- . Training and technical assistance in analytical methodology, computer codes and safety analysis, and the Regulatory process.
- . Computer codes and the necessary manuals and related literature for: thermal hydraulic analysis; severe accident analysis (with core melt); and consequence analysis (spread of activity); and
- . A work station and personal computers needed to implement the program.

Projected Schedule and Plans:

The NRC has recently posted a notice with Commerce Business Daily soliciting technical contractor support for the procurement and installation of engineering/scientific workstations. The workstations will be used by the regulator to perform severe accident analyses using the US computer codes which will be modified for the Ukrainian nuclear power plants.

In order for the NRC to meet the objectives of this project and within a reasonable time frame, and since the NRC's own staff resources are limited, it is planned to utilize technical organizations in Russia, and also organizations in the United States to provide some of the support needed to implement the program.

NRC will provide SCNRS with the following computer codes and related documentation: ORIGEN-2, RELAP5/MOD3, CONTAIN 1.11, CORCON/MOD3, MACCS and VICTORIA. NRC plans to provide basic training on fundamentals of safety philosophy/analyses in such areas as: safety criteria [fuel cladding, fuel enthalpy, vessel/primary system pressure limits, etc.], accidents/transients selected for analyses and selection basis; codes utilized for different analyses, and the basis and limitations of the various models in these codes; system ESF modeling; single failure; the parameters to be varied, interpreting the results and identifying and understanding the significance of uncertainties. In order to accomplish the above, NRC will provide support to SCNRS for its technical staff to train in the United States during 1993. It is projected that two teams made up of 2-4 technical specialists will visit NRC headquarters and various laboratory sites for this purpose.

A team comprised of SCNRS technical specialists will participate in training for 2 weeks. This will cover basic training on fundamentals of safety philosophy as indicated in the above paragraph. During this assignment, code training will be provided on CORCON/MOD3. The second team of SCNRS technical specialists will be assigned for 2-3 weeks to receive basic training on fundamentals of safety philosophy as indicated in the above paragraph and code training on RELAP5/MOD3, CONTAIN 1.11 and VICTORIA.

In addition to the technical issues discussed above, NRC will provide information and assistance to the SCNRS staff in the use and in management of technical assistance contractors by NRC to perform technical reviews and related audit calculations including the use of NRC developed computer codes. A senior technical SCNRS manager will study NRC management practices in the development of regulatory research needs and priorities, familiarization with computer codes used by NRC to conduct audit evaluations, and also in utilizing technical assistance contracts.

Ukraine 4. Joint Inspection of Ukrainian Nuclear Power Plants for Assessment and Development of Inspection Procedures of SCNRS

Project Description:

The objective of this project is for the NRC through participation in joint team inspections with the Ukrainians to assess and provide recommendations for improvements to Ukrainian nuclear power plant inspection practices.

Accomplishments:

During the period October 3-22, 1992, the NRC participated in the preparation for, conduct of, and documentation of a team inspection with the Ukrainian State Committee for Nuclear and Radiation Safety at the Khmel'nitsky NPP. The purpose of this trip was to assess SCNRS inspection practices and identify areas which may need increased inspection emphasis, and to identify inspection techniques and procedures which may be used to enhance team and individual inspector effectiveness.

The NRC representatives met both with SCNRS managers in their national headquarters in Kiev and with SCNRS inspectors at the Khmel'nitsky NPP. This effort provided a foundation for subsequent activities under Ukraine 4 and Ukraine 5.

Projected Schedule and Plans:

The NRC team report will serve as a basis for Ukraine 5, Development of Ukrainian Nuclear Power Plant Inspection Activities Based on the Results of Joint Inspections.

Under this Ukrainian priority, the NRC agreed to a visit to the Ukraine by NRC representatives for 1 1/2 months in March 1994 to observe and consult on the implementation of the Ukrainian inspection program.

Ukraine 5. Development of Ukrainian Nuclear Power Plant Inspection Activities Based on the Results of Joint Inspections

Project Description:

The NRC will assist the Ukrainians in applying the information gained from the joint team inspection efforts under Ukraine 4, in the development and planning of Ukrainian nuclear power plant inspection activities. Specific recommendations will be offered on the development of a reactor facility performance assessment process (similar to the USNRC SALP process) and methods to incorporate the results into inspection planning.

Accomplishments:

Under this priority one SCNRS representative studied the inspection results from Priority 4, NRC inspection program, Systematic Assessment of Licensee Performance, plant performance review, and enforcement, in beginning to formulate the Ukrainian inspection program. This was achieved in the U.S. from January 18, 1993 to March 12, 1993.

Projected Schedule and Plans:

Four groups of Ukrainian representatives and a group of U.S. representatives may visit the U.S. and Ukraine respectively in late 1993 or early 1994, in the implementation of inspection program development activities.

The NRC is considering the feasibility of the following:

Two SCNRS team visits from May - July, 1993 for the purpose of familiarization with NRC regional inspection planning and conduct.

A visit by an experienced NRC regional inspector to Ukraine from July to September 1993 for approximately 2 to 2 1/2 months to consult on the development of the Ukraine inspection program.

Four SCNRS team visits from September 1993 through January 1994 to participate in the conduct of the NRC core reactor inspection program at reactor sites.

Ukraine 6. Program on the Enforcement Regulations

Project Description:

The objective of this project is to provide assistance in the development of enforcement legislation to support the ability for the SCNRS to take appropriate enforcement action and severity levels to characterize the safety and regulatory significance of inspection findings

for purpose of developing enforcement actions.

Initial efforts were begun to provide pertinent legal guidance that may be significant in the development of nuclear legislation, currently being considered by the Ukrainian parliament. Additional practical guidance on NRC enforcement issues will be provided in the future.

Accomplishments:

During the period December 7-17, 1992, the Director of the Office of Enforcement, USNRC met with the Chairman of the SCNRS, and its legal and inspection staff in Kiev, Ukraine. This was a joint meeting on Ukraine 6 and 13. The Assistant General Counsel for Rulemaking and Fuel Cycle, USNRC, participated in this meeting to discuss issues associated with Ukraine 13. The Memorandum of the Meeting (Attachment 6.0) provides additional detail.

The following accomplishments were achieved during the two week visit to Kiev:

- o SCNRS provided a briefing on the current state of their enforcement program.
- o Initial briefings were provided on the NRC enforcement program.
- o Draft comments were provided for civil penalty provisions in the draft law to set up a regulatory agency in Ukraine.
- o Arranged for weekly conference calls with the Ukrainian enforcement contact.
- o Conducted joint meetings with Ukraine 13 personnel, Legal Framework, to understand the legal system in Ukraine and provided comments on the draft law.
- o Briefed Ukrainian Parliamentary Commission on fundamental considerations in establishing a nuclear regulatory agency.

An obvious significant issue stemming from this effort was the critical need to establish a legal foundation for the SCNRS in the Ukraine.

In addition, discussions and training on enforcement systems in US and in Ukraine and on NRC's Severity Levels was completed in December 1992, January 1993 and March 1993. Discussions will continue on severity levels as the NRC continues to provide assistance in this area. The NRC has provided comments on article 79 of the Draft Ukrainian Nuclear Law.

Projected Schedule and Plans:

Near term future support will consist of weekly telephone calls to address legal questions pertaining to the legislation, translation of NRC Enforcement Policy and briefs of Ukrainian personnel visiting the US. Arrangements for future meetings will be developed and, if possible, held in Kiev.

After the implementation of the Ukrainian law on the utilization of atomic energy and during the process of developing regulatory requirements, the NRC will provide assistance in the development of a program on enforcement regulations.

In March 1993, SCNRS came to NRC for further training and discussions. The SCNRS is developing severity levels for their violations as well as changes to their legislation to be able to issue civil penalties against the license holders. A visit by SCNRS staff to the U.S. is expected in August and NRC is expected to visit in Kiev in October.

Future implementation plans:

- o A review of the draft national law (Ukrainian Nuclear Law) to determine what changes are needed to permit the SCNRS to take appropriate enforcement action (article 79 of the Draft Ukrainian Nuclear Law)
- o Provide assistance in support of the determination of the enforcement philosophy for the SCNRS- type of sanctions, amounts of penalties, process to impose penalties, appeal etc.
- o Support a review of existing Administrative, Civil, and Criminal Codes to see where changes are needed in establishing Ukrainian Nuclear Law.
- o Assist SCNRS in the development of changes in the codes in coordination with other interested parties to achieve the enforcement philosophy of the SCNRS.

Ukraine 7 & 8. Program on the Physical Protection Regulation and Program on the Safeguards and Nonproliferation Regulation

Under the Safe and Secure Dismantlement (SSD) program, the U.S. has offered Ukraine a U.S. assistance Program.

Ukraine 9. Program on the Waste, Spent Fuel and Nuclear Materials Management Program

Project Description: Provide the Ukrainian SCNRS with the information to establish regulatory control over radioactive wastes and spent fuel.

This effort will focus on management and disposal of radioactive waste and spent fuel. The objective of the activity will be to provide the Ukrainian SCNRS with the information it needs to establish regulatory control over radioactive wastes and spent fuel within its territory. This work will provide an expert review and assessment of the past and current regulatory program in Ukraine, and will then offer specific recommendations to the SCNRS on how to best improve regulatory control. Of particular importance in this work will be identifying measures that can be implemented within the fiscal and technical constraints under which the SCNRS necessarily operates.

Accomplishments:

Work on this project was initiated during the Fall of 1992. The principal activities and accomplishments involved efforts necessary to obtain contractor support. Early in February 1993, initial discussions were held with the Ukrainian SCNRS, including an exchange of views regarding the scope of work to be undertaken by NRC and its

contractor and the Ukrainian SCNRS. A meeting to formalize the action plan was held in Washington, DC, during March 1993.

Projected Schedule and Plans:

The following plan, consisting of six tasks, is designed to achieve the program objective. Accomplishing this will require close collaboration between NRC and its contractor on the one hand and SCNRS on the other.

SCNRS input will be particularly important for determining the regulatory environment, regulatory resources, radwaste inventory and effects of past practices in Ukraine. The specific tasks include:

- o SCNRS will determine the current statutory and regulatory environment regarding the treatment, storage and control of radioactive waste and spent fuel in Ukraine.
- o SCNRS will identify existing regulatory resources. This would consider enabling legislation, if any, current and projected levels of regulatory personnel, availability of outside technical support, technical and administrative strengths, computer facilities, other physical facilities.
- o SCNRS will assess effects of past regulatory practice. This would be a qualitative survey that would address past incidents involving radioactive waste and assessments of how such incidents might have been prevented or mitigated by changes in the regulatory program.
- o SCNRS will identify and evaluate the current waste and spent fuel inventory in Ukraine, including quantities, location, physical and chemical characteristics, condition from a hazards standpoint, organization responsible for managing the waste, and additional quantities being generated each year.
- o NRC will develop, in consultation with SCNRS, recommendations for waste management in Ukraine, including regulatory issues that should be addressed, specific regulations needed to address these issues, applicability of analogous IAEA, US or other standards, needed technical staff resources, and required staff training. Present these recommendations to SCNRS.
- o NRC will deliver computer equipment needed to implement recommendations and train SCNRS staff in its use.

The NRC agreed to develop a draft radwaste survey questionnaire and provide computers and software for radwaste inventory. SCNRS Scientific and Technical Centre agreed to initiate the radwaste and regulatory survey. SCNRS and the NRC will jointly develop statement of work for SCNRS support the activities above and a draft regulatory questionnaire.

The next meeting is planned for Kiev during May.

Ukraine 10. Fire Protection Support

Project Description: Provide technical assistance for development and review of fire protection inspection methodology and the implementation of this methodology at Ukrainian power reactors.

Accomplishments:

Funds have not yet been made available to support this project.

In March 1993, the NRC met with the Ukrainian SCNRS to outline implementation plans should funds become available in the near term. The NRC proposed to modify the original SCNRS request (agreed to in the Memorandum of Meeting signed July 24, 1992) to provide technical assistance to SCNRS in their development and review of fire hazard methodology and the implementation of this methodology at Ukrainian power reactors.

Projected Schedule and Plans:

When funded, the NRC will review the fire protection/safe shutdown licensing process for all of the nuclear power plants licensed by the NRC. The results of this review will be used to develop and deliver a detailed and comprehensive, historical NRC fire protection and safe shutdown licensing analysis document which describes the typical approved U.S. licensing approaches to fire protection and post-fire safe shutdown, the bases for licensing decisions, the regulatory documents under which the NRC reviews were conducted, and the unique approaches which the NRC found acceptable and for which the NRC staff granted licensing exemptions.

Upon completion the NRC will provide the final document to SCNRS of Ukraine for their review, comment and use in preparation for future activities. Approximately 2-3 months after completion the historical fire protection/safe shutdown licensing document, two or three SCNRS specialists will come to the U.S. to interact with NRC and regional fire protection specialists for the purposes of learning about NRC fire protection regulations, fire protection and safe shutdown licensing practices and procedures, and NRC fire protection and safe shutdown inspection methodologies. The SCNRS representatives will be briefed on the training sessions and experiences available from or with various U.S. sources.

The SCNRS representatives will return to Ukraine and consult with SCNRS management. SCNRS will then propose further training, experiences and regulatory document developmental activities, and pilot fire protection and post-fire safe shutdown licensing and inspection activities to be conducted under Ukraine Priority 10 both in the U.S. and Ukraine.

Ukraine 11. Creation of an Incident Response Center in Ukraine

Project Description: Provide assistance in developing an Incident Response Center and essential support capabilities in Ukraine.

Accomplishments:

Funds have not yet been made available to support this project.

Preliminary meeting with SCNRS management was held on March 11, 1993. It was agreed that initial working group meeting will be held in the U.S. once funding is formalized.

Projected Schedule and Plans:

Once funding becomes available, two major steps are envisioned. The first would be to develop general response concepts with the State Committee for Emergency Preparedness, including identifying the role of SCNRS and agreements with other organizations. The second step involves the development of the necessary support and communications to complete the system in a phased approach for adequate testing at each phase. Initially, development will begin with Zaporozhye and SCNRS Headquarters and then progress concurrently at NPP sites and SCNRS Headquarters.

Until funding becomes available, the NRC plans to provide planning and related documents for translation in Ukraine and the SCNRS intends to translate and provide similar documents to NRC. In addition, the NRC will exchange questions and answers with SCNRS while awaiting formal funding. If funds are available in Fall 1993, the first SCNRS team would visit NRC in about November 1993 to develop plans for the first phase.

Ukraine 12. Program on Developing a Incident Reporting System

Project Description: Develop an operating experience closed loop feedback system for the improvement of nuclear power plant safety.

Accomplishments:

Funds have not yet been made available to support this project.

Preliminary meeting with SCNRS management was held on March 11, 1993 to begin formulating implementation plans.

Projected Schedule and Plans:

Once funding becomes available, systems, standards, and methods for the reporting, collection, analysis, and evaluation of operating experience, utilization of results in probabilistic safety assessment, and feedback to power plants will be developed.

First priority will be the reporting and collection of information. This aspect will be to provide electronic means of communication, collection, storage, and analysis of data.

It is anticipated that questions and answers of both SCNRS and NRC will be periodically exchanged beginning in the Spring of 1993 in preparation for a Fall 1993 meeting. During the Fall 1993 meeting, the NRC will identify specific information needs, and propose information systems. It is anticipated that information systems will be needed for: (1) component, system reliability and failures modes; (2) event descriptions and sequences; and (3) human performance. Use of international information will also be considered. It is anticipated that training of Ukrainian specialist will begin in the winter of 1993.

Ukraine 13. Program on the Creation of a Legal Framework

Project Description: Provide assistance in developing a legal basis and in drafting legislation to establish the legal framework for the SCNRS.

The NRC's Office of General Counsel will provide assistance to the Ukrainian SCNRS in developing a legal basis for its regulatory authority and in drafting a legislation to establish the legal foundation for the state committee. Specific objectives are:

- o Develop a national law which provides a legal framework for SCNRS jurisdiction over entities to be regulated and provides SCNRS with the authority to accomplish its mission.
- o Develop supplemental national laws for specific areas related to nuclear regulation.
- o Develop a computer system to facilitate the rapid access of Ukrainian legal material and relevant international legal information.

Accomplishments:

During the period December 7-17, 1992, the Assistant General Counsel for Rulemaking and Fuel Cycle, USNRC met with the Chairman of the SCNRS, and its legal and inspection

staff in Kiev, Ukraine. This was a joint meeting on Ukraine 6 and 13. The Director of the Office of Enforcement, USNRC participated in this meeting to discuss issues associated with Ukraine 6.

SCNRS provided detailed discussions on the current status of the Ukraine legal system, current legal basis of the SCNRS, the status of the draft law and the relationship between SCNRS and other Ukrainian ministries and committees. Specific statutory concepts and provisions were reviewed.

While in Kiev, Ukraine, USNRC representatives met with and briefed a Ukrainian Parliamentary Commission on fundamental requirements for a regulatory agency. USNRC and SCNRS points of contact have been identified and a schedule of weekly phone call established to exchange information regarding ongoing activities.

In March 1993, representatives of the SCNRS came to NRC for further training and discussions on the draft nuclear law.

Projected Schedule and Plans:

NRC legal representative intends to visit Kiev in May or June after the Parliament provides its comments on the draft law. The current initiatives are as follows: Develop the regulatory philosophy and mission of the SCNRS; Review the draft national law and provide comments and assistance in developing the law's provisions; Assist in further revisions to the national law after the first reading in the Ukrainian Parliament.

In August, SCNRS legal representatives may come to US for training on NRC the legal program. In this regard, consideration is being given for the SCNRS to send a legal specialist to the U.S. for training within the NRC Office of General Counsel for approximately one month. This training will be coordinated with training activities conducted for a licensing specialist under Ukrainian priority 3.1 (Licensing of Nuclear Power Plants) and with training activities conducted for an inspector/engineer assigned to enforcement duties under Ukrainian priority 6 (Program on the Enforcement Regulations).

Assistance will be provided to SCNRS in developing the regulatory philosophy for the supplemental laws, in reviewing the relevant administrative laws and codes and in drafting appropriate language in coordination with other appropriate organizations and ministries.

In addition, SCNRS plans to identify legal material relevant to nuclear materials and facilities and to construct a computer data base for legal materials.

Ukraine 14. Program for the Development of Research Support for Regulatory Activities (Phase 1)

Project Description: Development of research support for regulatory activities.

Accomplishments:

Funds have not yet been made available to support this project.

Preliminary meeting with SCNRS management was held in March 1993 to begin

formulating implementation plans.

Projected Schedule and Plans:

When funded, the initial phase of this project will coincide with team 3.9-93. During this time a senior technical manager from SCNRS will develop, in conjunction with the NRC, future activities to be accomplished under this priority.

Ukraine 15. Program for Regulating Radioactive Sources Utilized in Industry and Medicine

Project Description:

The objective of this program is to assist the Ukrainian SCNRS in developing an appropriate regulatory program for the use of radioactive sources within its territory. This work will include a review of the extent of use of radioactive sources used in industry and medicine, an assessment of the past and current regulatory program for such sources and development of recommendations for an efficient and effective regulatory program to control such sources, taking into account the resources available to operate the program.

Accomplishments:

Funds have not yet been made available to support this project.

Preliminary meeting with SCNRS management was held in March 1993 to begin formulating implementation plans.

Projected Schedule and Plans:

The following plan is a preliminary one aimed at achievement of the program objective. It assumes that necessary funding will be provided. However, certain preliminary steps will be taken in advance. Priority 15 tasks include:

- o SCNRS will determine the current statutory and regulatory environment regarding the use of radioactive sources in the Ukraine. This would include identifying responsible government agencies; determining how they are organized and interact; determining what laws, policies, regulations, guides and standards exist and the extent to which they are applied; and specific regulatory concerns.
- o SCNRS will identify existing regulatory resources, such as current and projected levels of regulatory personnel, technical and administrative resources, availability of outside technical support, computer facilities, and other physical facilities, such as analytical laboratories.
- o SCNRS will assess the current extent of use of radioactive sources within the Ukraine, including the types, size and geographical distribution of practices as well as projections of future practices.
- o NRC will develop, in consultation with SCNRS, and considering the above factors, recommendations for an appropriate regulatory program to control the use of such sources.

Recognizing the limitations noted above, several near-term activities have been identified:

- o The NRC intends to develop a preliminary questionnaire to gain an initial understanding of the regulatory framework and use of radioactive sources in the Ukraine.
- o The NRC plans to develop a detailed questionnaire to obtain additional information on the regulatory framework and use of radioactive sources in the Ukraine.
- o SCNRS plans to provide copies of current laws, regulations, standards governing use of radioactive sources. Also provide information identifying appropriate organizations and their areas of responsibility.
- o SCNRS and NRC plan to meet in Ukraine in the fall to review project status and prepare a more detailed implementation plan.

Ukraine 16. Program on the Creation of a Competent Organ of Ukraine and of Regulations Governing the Transportation of Radioactive Materials

Project Description: Provide Ukrainian SCNRS the information it needs to establish regulatory control over the transportation of radioactive material, and to provide technical assistance to facilitate implementation of this regulatory program.

Accomplishments:

Funds have not yet been made available to support this project.

Preliminary meeting with SCNRS management was held in March 1993 to begin formulating implementation plans.

Projected Schedule and Plans:

The Ukraine does not have its own system for regulating the transportation of radioactive materials, but rather relies on the system developed by the former Soviet Union. This initiative would assist the Ukraine in developing its own regulatory system for transportation, and in developing technical resources to replace those that are no longer available to the Ukraine since the dissolution of the Soviet Union. Because of the lack of technical resources, and the complexities involved in creating a regulatory system for transportation, the Ukrainian SCNRS has suggested that the initiative be undertaken in a staged approach over a two year period.

The Ukrainian SCNRS stressed that one of their top priorities was the training of personnel to enable them to independently evaluate the safety of radioactive material shipping containers. Although the program would not formally start until funding becomes available. The NRC and the Ukrainian SCNRS agreed that it would be desirable to have a Ukrainian designee attend a two week training course on radioactive material shipping containers as soon as practicable. The next course is being given in California in August 1993. In addition, the parties agreed that the designee should be assigned to the NRC for a minimum of two months to observe the NRC's regulatory program for transportation.

It is anticipated that a detailed statement of work would be completed by 1993. The statement of work would be based on the results of a questionnaire compiled by staff to determine the present status and transportation needs, feedback from the Ukrainian designee assigned to the NRC, and on bilateral meetings between the NRC and Ukrainian SCNRS. No dates or times were set for the bilateral meetings.

During the meeting the NRC determined that the following may be helpful until funding can be made available:

- o The NRC intends to submit a questionnaire to the Ukrainian SCNRS on this topic. The questionnaire would be used to help define the existing status of the Ukrainian regulatory system for transportation, organizational responsibilities and resources, and to determine quantity, type and form of radioactive materials being shipped. The Ukrainian SCNRS plans to respond to the NRC questionnaire.
- o The Ukrainian SCNRS will make preparations for a designee to attend the two week training course on radioactive material shipping containers and arrange for the designee to be assigned to the NRC for a two month period to observe NRC's transportation program. In addition, the NRC provided the Ukrainian SCNRS with training schedules for its Technical Training Center and for the Lawrence Livermore National Laboratory (LLNL) training course on radioactive material shipping containers. Further pending funding decisions, the NRC has reserved two slots in the August 1993, LLNL course for Ukrainian participants.
- o NRC staff would provide information on computer codes used to analyze shipping containers, appropriate NRC regulatory guides, the Memorandum of Understanding between the NRC and Department of Transportation on the transportation of radioactive materials, and NRC's policy statement on responding to transportation incidents involving radioactive materials.

Ukraine Priority - General Institutional Strengthening of the SCNRS.

Project description:

Improve the general working capabilities of the SCNRS by upgrading the basic office equipment requirements in the SCNRS offices and facilities.

Accomplishments:

SCNRS has identified office computer equipment (document control system) needs. The NRC is evaluating the proposed office equipment package. The NRC plans to develop a consolidated hardware package that incorporates equipment identified under this priority.

Discussions with SCNRS management have been ongoing and were continued in March 1993 to begin formulating implementation plans.

Projected Schedule and Plans:

Implementation discussions to date have resulted in the following plans. SCNRS has identified office equipment needs to upgrade general office capabilities, as indicated above. NRC intends to review SCNRS identified needs and propose an equipment package to satisfy these needs. Following SCNRS review and agreement, NRC will purchase and provide the office equipment package to SCNRS. SCNRS will participate in the delivery process by responding to questions related to Ukrainian customs procedures, equipment delivery and support issues, local equipment interface requirements and other related issues.

SCNRS will provide NRC with list of desired basic office equipment such as facsimile machines, document copying machines, telephones and other equipment. NRC will evaluate this request based on existing constraints and initiate procurement of this equipment accordingly.

WORKING GROUP 7:
SUMMARIES, PROGRESS AND PLANS

RESEARCH ON ATMOSPHERIC DISPERSION MODELING

Summary

This pilot was designed to develop methodology for integrating radiological measurements with model predictions; develop improved turbulence parameters for atmospheric dispersion models; evaluate dispersion models using tracer and actual accident data; and integrate models and data bases with computer systems.

Progress and Current Status

Several exchange visits took place. Excellent progress was made on a new technique of altering atmospheric model results in real time as measured data are acquired. A scientific paper on this technique was submitted for publication in Nuclear Technology. The use of tracer-data sets to validate U.S. and [Soviet] models of atmospheric transport was extensively explored, and initial results were very useful in detecting weakness in current models.

Proposed Plans for 1993

This pilot project will be completed in 1993. The number of years post-accident and access to additional data limits the productivity of continued work. The U.S. side recommends no further work, except to complete publications.

WIND-DRIVEN RE-SUSPENSION OF TOXIC AEROSOLS

Summary

The purpose of this project was to conduct experimental measurements of re-suspension and to develop a definitive model for the re-suspension of toxic aerosols.

Progress and Current Status

Several exchange visits took place. Ukrainian and U.S. scientists completed a major experiment in August-September, 1991, on determining secondary contamination by re-suspended aerosols at two sites within the 10-kilometer zone of the Chernobyl Nuclear Power Station. Results of the re-suspension experiment are the subject of one publication submitted to the Journal of Aerosol Science. Several of the scientists involved in this task participated in the Fifth Annual Conference on Precipitation Scavenging and Atmosphere-Surface Exchange Processes held in Richland, Washington in July, 1991. Four papers have been published in the peer-reviewed proceedings of this Conference.

Proposed Plans for 1993

This pilot project is complete. The U.S. side recommends that no further work on this

project is necessary at this time. Further validation of the re-suspension models may be appropriate at a later date.

EXTERNAL EXPOSURE AND DOSE FROM DEPOSITED RADIONUCLIDES

Summary

The goal of this project is to improve models of forecasting doses and dose commitments from external exposure and to validate the models.

Progress and Current Status

Several informal discussions took place; however, no significant progress was made in initiating this project. A small workshop to assess the validity of external dose-projection models was proposed. The plan was to assemble modelers and compare models with actual data from locations impacted by the Chernobyl accident. The group would develop a consensus model, make predictions for the next five to ten years, and then hold another workshop at that time to compare predictions and measurements.

Proposed Plans for 1993

No activity is proposed by the U.S. side for 1993. A workshop for 1994 is proposed.

TRANSFER OF RADIONUCLIDES THROUGH TERRESTRIAL FOOD CHAINS AND THE RESULTING DOSE TO MAN

Summary

The purpose of this project was to improve models of dose from direct contamination of food crops, to improve models of dose from secondary contamination and soil-root transfer, to develop remedial measures to reduce exposure, and to validate the models.

Progress and Current Status

Many exchange visits took place. In Vienna, scientists from the U.S. and former Soviet Republics are working with other international scientists on food-chain model-validation methods. It was determined that this project will be more successful if conducted as an international rather than bilateral project by advantage of the experience of many countries in taking environmental measurements following the Chernobyl accident. Important data on interception and initial retention of radionuclides by vegetation were assembled and evaluated in a draft report to be published by the International Atomic Energy Agency. Work was conducted on blind testing of models against existing data sets.

Proposed Plans for 1993

Continued participation in international activities to validate food-chain transport models is proposed.

LONG-TERM DOSE FROM THE CONTAMINATION OF AQUATIC FOOD CHAINS

Summary

This project was designed to improve models of dose from the contamination of aquatic food chains and to validate these models.

Progress and Current Status

Several exchange visits took place. Scientists from the U.S. and former Soviet Republics used existing models to predict the concentrations in aquatic food in the region of the Chernobyl cooling pond and the downstream aquatic systems. The calculations of both sides agreed very well and were in agreement with measured data. Two papers on these models were submitted for publication.

Proposed Plans for 1993

This pilot project is complete. The U.S. side recommends no further work, except to complete additional publications that are in process.

MODELING THE BEHAVIOR OF RADIONUCLIDES IN A SOIL-AQUATIC SYSTEM INCLUDING RIVERS AND RESERVOIRS

Summary

This project was designed to improve models of forecasting the movement of radionuclides in a soil-hydrosphere system and to validate the models.

Progress and Current Status

U.S. scientists modeled the transfer of radionuclides through the aquatic food chain at the cooling pond and through the Kiev Reservoir system and Pripjat River Flood Plain. The flood plain study involved consideration of radionuclide migration during flood events. One such flood took place during January to March 1991, and the concentration of ^{90}Sr in the Pripjat River increased from 10 pCi/L to 200 pCi/L. The necessary data to test U.S. model predictions against measured data have been received. The measured data compared well with model predictions. U.S. Landsat data were combined with [Soviet] data on radionuclide concentrations, topography, ground cover, and geological media to demonstrate the potential usefulness of such analysis to identify areas of major contribution of radionuclide influx to receiving waters. Two scientific papers were prepared for publication.

Proposed Plans for 1993

The U.S. side recommends additional tasks related to the current and future potential contamination of the Kiev Reservoir.

INTER-CALIBRATION OF METHODS FOR MEASURING RADIOACTIVE CONTAMINANTS IN THE ENVIRONMENT

Summary

This project had several goals including cross calibration of U.S. and [Soviet] systems of

airborne radiological measurements, cross calibration of U.S. and [Soviet] systems of measuring radionuclides in a variety of environmental media, and cross calibration of U.S. and [Soviet] systems of ground-based field spectrometry.

Progress and Current Status

No progress was made on this project. Activities were superseded by the International Chernobyl Project. Project leaders decided to reassess the need for cross calibration after evaluating the final report of the International Chernobyl Project.

Proposed Plans for 1993

No further activities are proposed for this project.

DOSE-RECONSTRUCTION ACTIVITIES TO SUPPORT EPIDEMIOLOGIC STUDIES

Summary

Several working group 7.1 scientists have begun participating in dose-reconstruction activities for the epidemiologic studies proposed by Working Group 7.2. Plans and progress are described under the 7.2 activities. Continued work under 7.1 should focus on dose-reconstruction activities to support epidemiologic studies of specific populations.

Pilot projects for sub-working group 7.2:

RECONSTRUCTION OF INDIVIDUAL DOSES FROM INTERNAL AND EXTERNAL SOURCES

Summary

A series of pilot projects were initiated to reconstruct individual doses from internal and external sources, especially thyroid and marrow; use existing biological dosimetry methods to better quantify doses to Chernobyl victims; develop, calibrate and validate new biological indicators of radiation exposure.

The first project involved developing and implementing a program of biologic assay using blood samples from irradiated persons. Initial focus was on glycophorin-A assays of red cells and chromosomal analysis of lymphocytes.

A second project was designed to develop and calibrate standard techniques to measure minimal detectable dose to human tooth enamel. Samples were to be exchanged between both sides. The feasibility of developing an *in vivo* non-destructive "dosimeter system" was to be evaluated.

The final project was to develop a rapid automated scanner for chromosomal analyses and to measure aberrations in a selected sub-population.

Progress and Current Status

A workshop on biological dosimetry was held in Moscow in September, 1991. Red blood cell samples from irradiated persons from St. Petersburg, Moscow, and Kiev were sent to the U.S. for glycophorin-A analysis. Collaborators concluded that the glycophorin-A assay

can be performed with sensitivity on large populations. Tooth enamel samples from [former] U.S.S.R. sources were sent to the U.S. for measurement of electron spin resonance; however, the sample fragments were too small to accurately estimate dose.

Proposed Plans for 1993

The principal investigator in the U.S. received a large grant from the National Institutes of Health to continue his work on glycophorin-A. His work does not directly support the epidemiologic studies being conducted by Working Group 7.0. Therefore, although this work will continue, the U.S. side recommends that it not be considered under the JCCCNRS Working Group 7.0 activities.

Although some progress was made on the tooth-enamel dosimetry project, the *in vivo* dosimeter has not been developed. This project may be valuable scientifically, however, it does not directly support the epidemiologic studies being conducted under Working Group 7.0. The U.S. side recommends that this project not be continued under Working Group 7.0 at this time.

The Department of Energy has an active program which is evaluating new advances in assessing chromosomal changes as a potential biologic dosimeter. These new techniques can be applied to Chernobyl victims and to dose reconstructions when the technology and ability to do rapid low-dose assessments are proven.

REVIEW, ANALYZE, AND SYNTHESIZE CLINICAL DATA BASED ON ACUTE RADIATION SYNDROME PATIENTS

Summary

This project was designed to review clinical and laboratory data of Acute Radiation Syndrome patients from Chernobyl; to develop severe radiation injury predictions; to evaluate therapy options and efficacy; to determine thresholds for Acute Radiation Syndrome effects; to determine radiation thresholds and risks to embryo/fetus; to initiate a training program on database management and analytical methods for the project; and to evaluate skin burn problems resulting from thermal and radiation exposure.

Progress and Current Status

No significant progress was made on this pilot project. The U.S. side is aware that Dr. Fliedner in Germany is currently involved in a collaborative effort to evaluate the Acute Radiation Syndrome data in Russia and does not desire to diminish its resources by duplicating research approaches.

Proposed Plans for 1993

The U.S. side recommends that this project be deferred until we ensure that there will be no duplication of Dr. Fliedner's work. The U.S. side may propose to collaborate on this effort if the Russian Federation advises that this is warranted.

COUNTERMEASURES TO REDUCE DOSE FROM CESIUM-137

Summary

This project was designed to review methods and models for internal dose projections for ingested Cs-137 in large populations; review principles for intervention levels to limit Cs-137 intake by the public; study internal dose from Cs-137 in the public and summarize findings and conclusions in a small workshop.

Progress and Current Status

No progress was made on this project. It was deferred pending a review of activities being conducted in Europe.

Proposed Plans for 1993

The U.S. side proposes that this project be canceled.

EVALUATE THE ROLE OF DOSE RATE ON LOW LINEAR ENERGY TRANSFER RADIATION-INDUCED STOCHASTIC HEALTH EFFECTS

Summary

The purpose of this project was to hold a bilateral workshop in the United States using the most recent estimates of stochastic risk to understand somatic effects of low-level radiation. Compiled data on the exposed populations from the South Urals region of Russia were to be reviewed as a part of the workshop.

Progress and Current Status

The workshop was held at the University of California, Davis, June 15-19, 1992; and a draft of the workshop proceedings has been prepared.

Proposed Plans for 1993

The project is complete; however, the workshop proceedings remain to be published. No further efforts are proposed.

DEVELOPMENT OF POPULATION REGISTRIES

Summary

The purpose of this project was to develop methods for implementing standardized data bases of populations exposed to the Chernobyl accident.

Progress and Current Status

A scientist from the All Union Center in Kiev visited the Oak Ridge Institute for Science and Education for training in the management of large scale databases for epidemiologic studies. No other progress was made on this project.

Proposed Plans for 1993

A proposal was recently submitted to the Department of Energy for the development of a registry of residents and workers in Ukraine who were exposed to ionizing radiation at the

time of, or subsequent to, the Chernobyl accident. The registry would include demographic and exposure data on all registered individuals. Selected populations in the registry would be medically monitored. The proposal was peer-reviewed and received a favorable review. The reviewers concluded that such a registry might be useful for conducting epidemiologic studies already proposed under the auspices of Working Group 7.0 as well as additional future epidemiologic studies. The U.S. side proposes that, in collaboration with Ukrainian scientists, a limited new pilot project be undertaken to determine the feasibility of developing this registry.

A second proposal submitted to the Department of Energy proposes to identify sources of information that could be used to estimate radiation doses from the Chernobyl accident to individual residents of the Bryansk Oblast of Russia. The project would also evaluate mechanisms to validate recorded dose estimates for liquidation workers. A second feature of this project would be to evaluate the feasibility of identifying large cohorts of exposed individuals for long-term epidemiologic studies in the Bryansk Oblast. This proposal also received a favorable review by a Department of Energy peer review group. The U.S. side now proposes a small pilot project to determine the feasibility of studying exposed populations in the Bryansk Oblast in collaboration with Russian scientists.

EPIDEMIOLOGIC STUDIES OF THYROID EFFECTS

Summary

The purpose of this project was to develop and implement a long-term epidemiologic study to detect thyroid disease among persons, particularly children, who were exposed to iodine radionuclides during and/or following the Chernobyl accident.

Progress and Current Status

A case-control study of thyroid cancer in Byelarus was initiated, and approximately 119 cases were identified from the Chernobyl Registry and other sources. The dosimetry effort is being guided by U.S., Russian, and Byelorussian dosimetry experts. Two approaches are being followed: (1) development of a preliminary "exposure index" based largely on environmental data; and (2) individual tissue doses based on all available information (1986 thyroid measurements, environmental measurements, food sources and food consumption patterns, and dose-reconstruction models).

A research protocol for the study of thyroid disease among approximately 15,000 children in Byelarus has been finalized by both sides, and will be submitted for peer review in the United States. Under this protocol, the children would receive annual thyroid examinations and tests for thyroid function. The radiation dose to the thyroid from iodine radionuclides would be individually reconstructed for each child based upon the child's dosimetric, residential, dietary and behavioral history. The protocol also provides for the establishment of a binational oversight committee. After the protocol has been reviewed, it will be submitted to the Department of Energy to be considered for funding.

A similar research protocol has been drafted to study as many as 70,000 children in Ukraine; however, additional information in a number of areas is needed before the document will be complete and acceptable for submission to scientific peer review. Two physician-scientists from the Institute of Endocrinology and Metabolism in Kiev received training in the U.S. in pediatric endocrinology and thyroid histopathology.

Proposed Plans for 1993

Peer review of the Byelarus protocol is expected to be completed by June, 1993, at which time the Department of Energy will make a determination regarding the availability of funds for the expanded long-term project. The project will be initiated accordingly. A similar protocol is expected to be finalized in Ukraine and submitted for peer review. The U.S. side recommends considering support for these long-term projects.

EPIDEMIOLOGIC STUDIES OF LEUKEMIA

Summary

The purpose of this pilot project was to develop a protocol for an epidemiologic study of post-Chernobyl leukemia among cleanup workers and evacuees in Ukraine. The study is aimed particularly at a better definition of the time-response function for radiation-induced leukemia, and at the influence of dose-rate on dose-response.

Progress and Current Status

A leukemia study group was formed. A research protocol for studying leukemia in Ukraine has been drafted. The project is conceived as an extension of the considerable amount of work that has been ongoing in Ukraine.

Proposed Plans for 1993

The research protocol for studying leukemia in Ukraine is expected to be finalized. An 18-month pilot phase is expected to be initiated to determine the technical feasibility and to lay groundwork for the main project. A binational meeting in the U.S. is proposed for late 1993.

SUMMARY

A. U.S. PROPOSALS

The U.S. side proposes that Working Group 7 activities in 1993 focus on the following projects:

7.1 Environmental Transport

- transfer of radionuclides through terrestrial food chains
- modeling behavior of radionuclides in soil-aquatic system
- dose reconstruction activities to support 7.2 health studies

7.2 Health Effects

- population registries
- initiate new pilot project for exposure registry in Ukraine
- initiate new pilot project for dose reconstruction

and cohort feasibility in Bryansk Oblast
• expanded epidemiologic studies of thyroid effects
(Byelarus, Ukraine, Russia)
• initiate new pilot project for epidemiologic studies of leukemia
in Ukraine

B. UKRAINE PROPOSALS:

7.1 Activities should be limited to ecological and environmental dosimetry projects.

7.2 Approximately 130,000 liquidators from 1986 currently live in Ukraine. Five to fifteen percent of these workers received a dose of 25 to 100 rem. An epidemiologic study of radiation-induced cataracts among these liquidators is proposed.

7.3 It is proposed that a new sub-working group be formed to conduct dosimetry in support of the epidemiologic studies conducted under 7.2. Chernobyl is unique with respect to the countermeasures taken after the accident. This sub-working group would also consider the effects of countermeasures on dose.

C. RF PROPOSALS:

7.1 Continue all activities on which there has been successful collaboration in the past.

7.2 Add KALUGA to the study proposed of the residents of Briansk Oblast.

New project to study the 1986 cleanup workers; proposal to be submitted to the U.S.

7.3 It is proposed that a new sub-working group be formed to evaluate the effects of countermeasures and of the level of intervention. A more detailed proposal will be submitted to the U.S. side.

The above proposals will be under discussion by all three sides during the next few months. Agreement on priorities will be reached by the next meeting of the JCCCNRS.

PROPOSED DIPLOMATIC NOTES

AND

MEMORANDUM OF COOPERATION

Draft Note to the Ukrainian Ambassador

Excellency:

I have the honor to refer to the Memorandum of Cooperation in the Field of Civilian Nuclear Reactor Safety Between the United States of America and the Union of Soviet Socialist Republics, signed at Washington on April 26, 1988 (the Memorandum).

I have the honor to propose: (1) that the Memorandum, which in accordance with its terms would terminate on April 26, 1993, be extended as between the United States of America and Ukraine for a five-year period, that is until April 26, 1998; (2) that all references in the Memorandum to the Union of Soviet Socialist Republics, to the U.S.S.R. State Committee for the Utilization of Atomic Energy (SCUAE) and to any other entity of the U.S.S.R. be deemed to be to Ukraine, to the State Committee for Atomic Energy and the State Committee for Nuclear and Radiation Safety jointly, and to the appropriate Ukrainian entities as notified by Ukraine in accordance with Article IV of the Memorandum respectively; (3) that the U.S. Nuclear Regulatory Commission and the U.S. Department of Energy shall jointly represent the United States of America as the implementing entities for the Memorandum; and (4) that the Joint Coordinating Committee for Civilian Nuclear Reactor Safety established between the United States and Ukraine under the Memorandum may meet jointly with the U.S.-Russia Joint Coordinating Committee for Civilian Nuclear Reactor Safety.

If the foregoing is acceptable to your Government, I have the further honor to propose that this note, together with your reply to that effect shall constitute an agreement between the United States of America and Ukraine, which shall enter into force on the date of your note.

Accept, Excellency, the renewed assurances of my highest consideration.

For the Secretary of State:

His Excellency
[Oleh H. Bilorus,
Ambassador of Ukraine].

[Suggested Text of Ukrainian Reply]

Excellency:

I have the honor to refer to your note of [date] ,
which reads as follows:

"I have the honor to refer to the
Memorandum of Cooperation in the Field of
Civilian Nuclear Reactor Safety Between the
United States of America and the Union of
Soviet Socialist Republics, signed at
Washington on April 26, 1988 (the Memorandum).

"I have the honor to propose: (1) that the
Memorandum, which in accordance with its terms
would terminate on April 26, 1993, be extended
as between the United States of America and
Ukraine for a five-year period, that is until
April 26, 1998; (2) that all references in the
Memorandum to the Union of Soviet Socialist
Republics, to the USSR State Committee for the
Utilization of Atomic Energy (SCUAE) and to any
other entity of the USSR be deemed to be to
Ukraine, to the State Committee for Atomic
Energy and the State Committee for Nuclear and
Radiation Safety jointly, and to the
appropriate Ukrainian entities as notified by
Ukraine in accordance with Article IV of the
Memorandum respectively; (3) that the U.S.
Nuclear Regulatory Commission and the U.S.
Department of Energy shall jointly represent
the United States of America as the
implementing entities for the Memorandum; and
(4) that the Joint Coordinating Committee for
Civilian Nuclear Reactor Safety established
between the United States and Ukraine under the
Memorandum may meet jointly with the
U.S.-Russia Joint Coordinating Committee for
Civilian Nuclear Reactor Safety.

"If the foregoing is acceptable to your
Government, I have the further honor to propose
that this note, together with your reply to
that effect shall constitute an agreement
between the United States of America and
Ukraine, which shall enter into force on the
date of your note."

I have the honor to confirm that these proposals are
acceptable to the Government of Ukraine and that your
note and this reply shall constitute an Agreement
between Ukraine and the United States of America, which
shall enter into force on the date of this note.

Accept, Excellency, the renewed assurances of my
highest consideration.

[s/ Ambassador]

The Honorable Warren Christopher,
Secretary of State
Washington, D.C.

Draft Note to the Russian Ambassador

Excellency:

I have the honor to refer to the Memorandum of Cooperation in the Field of Civilian Nuclear Reactor Safety Between the United States of America and the Union of Soviet Socialist Republics, signed at Washington on April 26, 1988 (the Memorandum).

I have the honor to propose: (1) that the Memorandum, which in accordance with its terms would terminate on April 26, 1993, be extended as between the United States of America and the Russian Federation for a five-year period, that is until April 26, 1998; (2) that all references in the Memorandum to the Union of Soviet Socialist Republics, to the U.S.S.R. State Committee for the Utilization of Atomic Energy (SCUAE) and to any other entity of the U.S.S.R. be deemed to be to the Russian Federation, to the Ministry of Atomic Energy and to the Federal Nuclear and Radiation Safety Authority jointly, and to the appropriate Russian entities as notified by the Russian Federation in accordance with Article IV of the Memorandum respectively; (3) that the U.S. Nuclear Regulatory Commission and the U.S. Department of Energy shall jointly represent the United States of America as the implementing entities of the Memorandum; and (4) that the Joint Coordinating Committee for Civilian Nuclear Reactor Safety established between the United States and the Russian Federation under the Memorandum may meet jointly with the U.S-Ukraine Joint Coordinating Committee for Civilian Nuclear Reactor Safety.

If the foregoing is acceptable to your Government, I have the further honor to propose that this note, together with your reply to that effect shall constitute an agreement between the United States of America and the Russian Federation, which shall enter into force on the date of your note.

Accept, Excellency, the renewed assurances of my highest consideration.

For the Secretary of State:

His Excellency
[Vladimir Pavlovich Lukin,
Ambassador of the Russian Federation].

[Suggested Text of Russian Reply]

Excellency:

I have the honor to refer to your note of [date] ,
which reads as follows:

"I have the honor to refer to the Memorandum of Cooperation in the Field of Civilian Nuclear Reactor Safety Between the United States of America and the Union of Soviet Socialist republics, signed at Washington on April 26, 1988 (the Memorandum).

"I have the honor to propose: (1) that the Memorandum, which in accordance with its terms would terminate on April 26, 1993, be extended as between the United States of America and the Russian Federation for a five-year period, that is until April 26, 1998; (2) that all references in the Memorandum to the Union of Soviet Socialist Republics, to the USSR State Committee for the Utilization of Atomic energy (SCUAE) and to any other entity of the USSR be deemed to be to the Russian Federation, to the Ministry of Atomic Energy and to the Federal Nuclear and Radiation Safety Authority jointly, and to the appropriate Russian entities as notified by the Russian Federation in accordance with Article IV of the Memorandum respectively; (3) that the U.S. Nuclear Regulatory Commission and the U.S. Department of Energy shall jointly represent the United States of America as the implementing entities for the Memorandum; and (4) that the Joint Coordinating Committee for Civilian Nuclear Reactor Safety established between the United States and the Russian Federation under the Memorandum may meet jointly with the U.S.-Ukraine Joint Coordinating Committee for Civilian Nuclear Reactor Safety.

"If the foregoing is acceptable to your Government, I have the further honor to propose that this note, together with your reply to that effect shall constitute an agreement between the United States of America and the Russian Federation, which shall enter into force on the date of your note."

I have the honor to confirm that these proposals are acceptable to the Government of the Russian Federation and that your note and this reply shall constitute an Agreement between the Russian Federation and the United States of America, which shall enter into force on the date of this note.

Accept, Excellency, the renewed assurances of my highest consideration.

[s/ Ambassador]

The Honorable Warren Christopher,
Secretary of State
Washington, D.C.

Declassified
Nuclear Safety

MEMORANDUM OF COOPERATION IN THE FIELD
OF CIVILIAN NUCLEAR REACTOR SAFETY BETWEEN
THE UNITED STATES OF AMERICA AND THE
UNION OF SOVIET SOCIALIST REPUBLICS

The U.S. Nuclear Regulatory Commission (NRC), as the representative for the USA, and the USSR State Committee for the Utilization of Atomic Energy (SCUAE), as the representative for the USSR, hereinafter referred to as the "Parties", desiring to establish close and long-term cooperation in the field of civilian nuclear reactor (CNP) safety;

Noting that fruitful cooperation on civilian nuclear reactor safety can enhance the safety of civilian power in the United States of America and the Union of Soviet Socialist Republics; and

In accordance with Article 2, paragraph 3 of the Agreement between the United States of America and Union of Soviet Socialist Republics on Scientific and Technical Cooperation in the Field of Peaceful Uses of Atomic Energy, signed on June 21, 1973; as amended, [hereafter "Peaceful Uses Agreement"]; and in accordance with the objectives outlined in discussions on this subject between the two countries in August 1986, March 1987 and October 1987;

Have agreed as follows:

Article I

The purpose of this Memorandum is to establish an arrangement for cooperation in the field of civilian nuclear reactor safety (CNRS) in furtherance of the Peaceful Uses Agreement in order to increase civilian nuclear reactor safety, and to improve the methods and practices of regulatory activity with regard to CNR's operated by the Parties of this memorandum.

Cooperation under this Memorandum shall be carried out as agreed on the basis of mutual benefit, equality and full reciprocity between the Parties.

Article II

The areas of cooperation under this memorandum will be as follows:

1. Policy and practices of regulatory activity regarding safety of civilian nuclear reactors (CNRS);

2. Problems of safety in design, construction, training, operation and management of CNRs;

3. Research directed at improving the safety of CNRs; and

4. Questions on health effects and environmental protection requirements arising from the use of CNRs.

5. For purposes of this Memorandum, CNRs can include nuclear reactor plants for civilian electric power generation, district heating, process heating, and other associated technologies as may be agreed to by both Parties.

Article III

1. In order to implement this Memorandum, there shall be established a Joint Coordinating Committee for Civilian Nuclear Reactor Safety (JCCCNRS).

2. The JCCCNRS shall consist of an equal number (6) of representatives from each party. All decisions taken by the JCCCNRS shall be reached by agreement of the Parties.

3. The JCCCNRS will coordinate and review all aspects of this Memorandum and shall take such action as is appropriate for its effective implementation.

4. The JCCCNRS will present its proposed programs, together with any recommendations for amendments if needed to add such programs to the Memorandum, for review and approval by the Joint Soviet-American Committee on Cooperation in the Peaceful Uses of Atomic Energy, established under the Peaceful Uses Agreement, in accordance with the laws and regulations of the Parties.

5. The JCCCNRS may organize, establish and arrange working groups, conferences and seminars of specialists for joint discussion and study of specific topics related to civilian nuclear reactor safety (CNRS) or its regulation and may also review and comment on the reports of such working groups, conferences and seminars. Specific projects and programs for nuclear safety cooperation, exchanges of scientific and technical safety information, personnel and equipment, and procedures for addressing and resolving questions of such matters as payment of costs under this cooperation, and patent/publications rights for joint activities

administered under the Memorandum, may be developed separately by the JCCCNRS, in accordance with laws and regulations of the Parties.

6. The JCCCNRS may assist in arranging transactions between or among organizations within or outside this arrangement for services contracted on a commercial basis, in accordance with national laws and regulations of the Parties.

7. Consistent with Article 1, such other forms of operation as the JCCCNRS recommends to its respective Governments may be added by agreement of the Parties.

8. The JCCCNRS will decide on its membership and meeting schedule. Generally, it will be convened once a year, alternately in the United States and the Soviet Union, unless agreed otherwise. Times and places for meetings will be agreed upon in advance.

Article IV

1. This cooperation may be conducted according to plans and programs of the following principal establishments and organizations as agreed to by the Parties in writing pursuant to Article 3.1 :

-- In the United States of America:
the Nuclear Regulatory Commission;
the Department of Energy;
national laboratories, academies, and institutes as appropriate; and
ther government departments and nuclear industry establishments and/or organizations as appropriate.

-- In the Union of Soviet Socialist Republics:
the State Committee for Utilization of Atomic Energy;
the Ministry of Atomic Energy;
the State Committee for Supervision of Safety in the Nuclear Power Industry; and
other ministries, organizations, institutes as appropriate.

2. Each Party may unilaterally adjust the list of its establishments and organizations participating in this cooperation, and will inform the other Party of any such adjustments.

Article V

1. Cooperation under this Memorandum will be conducted in accordance with the respective international obligations, national laws and regulations of the parties, and within the limits of available funds, on the basis of the fullest possible reciprocity in terms of equal access to facilities, information and personnel on both sides.

2. Any questions of interpretation and implementation relating to this Memorandum that arise during the period it is in force will be decided by agreement of the Parties.

Article VI

1. This Memorandum will enter into force upon signature, will remain in force for five (5) years, and is subject to extension of additional five (5) year terms by written agreement of the Parties following joint review at the end of each five-year period.

2. All joint projects and experiments being conducted when the effective period of this Memorandum ends will, if agreed, be continued to their conclusion in accordance with the terms of this Memorandum.

3. Either Party has the right to withdraw from this Memorandum of Cooperation on six (6) months' written notice.

DONE at Washington, D.C. on the twenty-sixth of April 1988,
in the English and Russian languages, both texts being equally authentic.

FOR THE U.S. NUCLEAR
REGULATORY COMMISSION

Lando W. Zeck Jr.

FOR THE USSR STATE
COMMITTEE FOR THE
UTILIZATION OF ATOMIC
ENERGY

[Signature]