October 17, 1997

FOR: The Commissioners

FROM: L. Joseph Callan /s/ Executive Director for Operations

SUBJECT: PLAN FOR INCREASED COOPERATIVE RESEARCH WITH INDUSTRY AND OTHER FEDERAL AGENCIES (DSI-22)

PURPOSE:

To describe staff plans for increased cooperative research with industry, the Department of Energy (DOE) and other Federal Agencies, as requested in the March 28, 1997 SRM on COMSECY-96-066 (DSI-22)

BACKGROUND:

The staff has, in the past, entered into many cooperative research programs involving other Federal Agencies, international partners, and, on occasion, industry when such cooperative programs were in the best interest of the Commission. In general, best interest referred to obtaining needed research results with fewer NRC resources, due to cost sharing and eliminating duplication. But in many cases cooperative research also led to a better research program due to the exchange of ideas among partners and more available resources, which allow programs to be run that would otherwise be prohibitively costly. A good example of such a current program is the Melt Attack and Coolability Experiment (MACE) program in which large scale (2 ton) tests using prototypic materials (UO_2) have been run to determine the coolability of core debris in the reactor cavity by an overlying pool of water. These tests are jointly funded by NRC, the Electric Power Research Institute (EPRI), DOE and 10 other international organizations at approximately $1.0 million dollars each. These tests would not have been likely without a cooperative program. Currently, RES is participating in a number of cooperative research programs at an annual cost to NRC of approximately $7 million, where the annual cost of the programs themselves exceeds $50 million. With the reduced research budget at NRC, it is appropriate that cooperative research programs continue to be used to the extent possible, where there is benefit to the NRC. Accordingly, "Staff Requirements - COMSECY-96-066-Research (DSI 22)," discussed cooperative research, and the March 28, 1997, SRM directed that:

"The staff should explore the option of performing cooperative research with both industry, and the DOE, so as to minimize duplicative work - where appropriate. Legal ramifications, independence, and public perception should be considered when exploring any cooperative research program. The staff should also examine the feasibility of improving access to research information during the early phases of the work."

DISCUSSION:

Over the past year, the staff has been exploring ways to increase cooperative research. This has involved discussions with EPRI, DOE, the U.S. Geological Survey (USGS) and international partners.

EPRI: We currently have a cooperative research program with EPRI in the area of:

- severe accidents (MACE and in-vessel molten core cooling)

DOE: To increase cooperative research with the industry, a draft memorandum of understanding (MOU) between NRC and EPRI has been developed to better coordinate and facilitate increased cooperative nuclear safety research between NRC and the industry (Attachment 1). Under this MOU, EPRI will act as the point of contact for the reactor industry and coordinate their participation. The MOU provides an overall framework for cooperation, including a management board consisting of NRC and EPRI personnel to address the selection, prioritization and management of cooperative research projects, with specific cooperative research projects being documented as addenda to the MOU. In addition, the MOU addresses the issues of independence, conflict of interest and dissemination of information within the context of the sometimes differing interests of NRC and EPRI. The MOU also has a provision to allow other partners (domestic or international) to participate in specific cooperative projects. It is our intent to put the existing cooperative programs under the framework of this MOU. In addition, nine other areas have been identified as candidates for cooperative research under this MOU (Attachment 2) with specific proposed programs in the areas of Steam Generator Tube Integrity, High Burnup Fuel, and Direct Measurement of Reactor Vessel Degraded Properties in the final stages of formulation. It is our plan to explore the remaining areas for specific cooperative work and initiate such work if it is in the best interest of the NRC.
Last year NRC and DOE's Office of Nuclear Energy, Science and Technology jointly initiated a study to assess the nuclear power research capabilities at DOE's National Laboratories with the goal of identifying those areas where the laboratories have unique capabilities that should be maintained. It was also recognized that cooperative research projects between NRC and DOE would help maintain this capability; the following four areas for potential cooperation were identified.

- High burnup fuel
- Advanced NDE approaches to steam generator tube integrity
- Molten core in-vessel retention
- Reactor physics and thermal hydraulics

Discussions regarding cooperation in these areas were initiated; however, uncertainty regarding DOE's future nuclear energy budget has prevented the initiation of any cooperative work in the above areas. We will resume these discussions as circumstances permit. DOE is preparing a draft report documenting this study.

USGS: In September 1997, the USGS hosted the annual meeting between NRC and USGS to review projects being conducted under

the current Interagency Agreement (IAA). Topics covered included: seismic hazards, recurrence of large pre-historic earthquake in the central and eastern United States (New Madrid, Wahash River, Charleston and others), strong motion modeling, fault segmentation, etc. The IAA has been in force and associated meetings have taken place for about 20 years. The relationship has been very productive for both agencies and is expected to remain so for the foreseeable future. In August 1997, RES hosted a coordination meeting with the USGS to initiate the implementation of the recently renewed MOU research and cooperation on low-level waste issues. This MOU builds upon a longstanding relationship of cooperative research in the earth sciences. The MOU facilitates cooperation and coordination on technical issues facing the NRC related to the behavior of radionuclides in the environment--in particular, issues related to site remediation, site decommissioning, uranium "*in-situ*" mining, and uranium mill tailings. Of particular interest are the USGS field and laboratory studies of water and radionuclide transport at arid sites and field testing of surface complexation models of radionuclide sorption. It was agreed to share information in these areas. The continued interactions between NRC and USGS will benefit the research programs of both agencies in the areas of geochemistry and hydrogeology.

INTERNATIONAL: Through our participation in the Organization for Economic Cooperation and Development/Nuclear Energy Agency (OECD/NEA) and the International Atomic Energy Agency (IAEA) and through bilateral agreements, we continue to cooperate and share information in a number of areas related to nuclear safety. It is anticipated these will continue and most likely expand in the future, as more countries recognize the benefits of cooperation. In addition to continuing our existing cooperation, the Office of Nuclear Regulatory Research (RES) has initiated an international cooperative research program on Probabilistic Risk Assessment (PRA). The purpose of this program is to share PRA methods, applications and experience. Partners can either contribute their research results to the program or provide cash in exchange for program participation. The cash will be used to help fund our PRA research program. Currently, approximately 20 organizations have expressed interest in the program; the initial meeting is scheduled for October 27-29, 1997, in Bethesda, Maryland.

As requested in the March 28, 1997, SRM, RES is exploring ways to make available research information at the earliest practical time. This is currently being done through issuing interim reports on specific aspects of the research (e.g., experiment results), conducting the annual Water Reactor Safety Meeting where NRC research programs and their results are discussed and by publishing papers in journals or conference proceedings on research programs. Staff plans to provide the Commission a separate paper in November detailing additional plans in this area.

RESOURCES:

The work to explore and develop cooperative agreements can be done with existing resources. The FY98 and FY99 budget requests currently assume cooperation with EPRI in the high burnup fuel, steam generator tube integrity, and direct measurement of reactor vessel integrity areas, and continued cooperation with USGS. The budget requests also assume continuation of our existing cooperative programs (domestic and international) under their current terms and conditions. However, if appropriated funds are not consistent with our budget requests, there are provisions in each of the agreements that allow our withdrawal. If and when new cooperative programs are proposed that are beneficial to NRC and that require additional resources, these resources will either be reprogrammed or requested as part of the budget process.

COORDINATION:

The paper has been coordinated with OGC and they have no legal objection. The Office of the CFO has also reviewed and concurred in this paper.

CONCLUSION:

Staff has entered into and will continue to enter into cooperative research programs both domestically and internationally, when there is benefit to the NRC and subject to the availability of funds. Staff intends to sign the MOU with EPRI (Attachment 1) and to maintain contact with DOE and NRC's international partners regarding potential future cooperation.

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Attachments

1. Draft MOU between NRC and EPRI
2. Potential Areas for NRC/EPRI Cooperative Research

ATTACHMENT 1

MEMORANDUM OF UNDERSTANDING
between
U.S. NUCLEAR REGULATORY COMMISSION
and
ELECTRIC POWER RESEARCH INSTITUTE
on
COOPERATIVE NUCLEAR SAFETY RESEARCH

PURPOSE

The NRC and the nuclear industry each conduct research on nuclear reactor safety. Although the goals of this research may, in some instances, be different, the basic data contributing to the research, and the technical information resulting from the research, can be useful to both parties. Accordingly, to conserve resources and to avoid duplication, it is in the best interest of both parties to cooperate and share information and costs related to such research, whenever such cooperation and cost sharing can be done in a mutually beneficial fashion.

Because several industry organizations are involved in reactor safety research, it is useful to both NRC and industry to have one point of contact for industry R&D. The Nuclear Power Group (NPG) of the Electric Power Research Institute (EPRI) (the electricity industry's research arm) carries out research and development activities to improve the safety, reliability, and economy of nuclear plants, through networking and partnership with nuclear utilities and other nuclear utility-sponsored organizations. EPRI's NPG will serve as the point of contact for coordinating the industry R&D activities with NRC.

The MOU between NRC and EPRI describes the conditions under which cooperative research programs between NRC and EPRI-NPG (representing the nuclear industry's research programs) will be conducted. Individual cooperative research projects are described in addenda to this document.

PRINCIPLES OF COOPERATION

Article 1--Responsibility of the Parties

1.1 Management of Cooperative Research Programs

- NRC and EPRI will mutually coordinate, integrate, prioritize, review and manage cooperative research programs. The overall coordination, integration, prioritization and management will be done through a management board consisting of two representatives from each party. One of the two NRC representatives shall be the Director of the Office of Nuclear Regulatory Research, and one of the two EPRI representatives shall be the Vice President, NPG. This board will conduct business as needed throughout the year, but will formally meet together at least once per year to:
    - review the status and progress of ongoing cooperative research programs;
    - review potential new candidate cooperative research programs;
    - agree on priority, terms and conditions of new cooperative research initiatives; and
    - provide direction on continued work, termination or other matters, as necessary.
- Management board decisions will be by mutual agreement.
- Once approved by the management board, individual research projects will be documented via addenda to this MOU that address project;
    - goals and objectives,
    - scope and plan,
    - technical requirements,
    - cost and schedule, and
    - resource commitment for each party.
- Technical oversight of individual research projects will be accomplished by a technical review group established for each active area of cooperation, consisting of representatives assigned from each party.
- The management board may terminate a cooperative research project at any time due to unsatisfactory contractor performance, lack of funds, changes in priority, or any other valid reason.
- Other parties (including both international and domestic organizations) may be invited to participate in any cooperative program, if mutually agreeable, and may serve on the corresponding technical review group.

1.2 Selection of Potential Cooperative Research Topics

- Potential cooperative research programs will be identified and priorities established, considering factors such as;
    - mutual interest in research topic,
    - usefulness of end product of research,
    - contribution to risk reduction,
    - cost-effectiveness, and
    - timeliness.
- Cooperative research programs will be conducted if;
    - mutually acceptable technical requirements (e.g., objectives, scope, approach, QA requirements, etc.) can be agreed upon;
    - mutually acceptable contract terms, roles and responsibilities for each party (e.g., contracting responsibility, financial contribution, payment arrangements, documentation of results, management, terms, etc.) can be agreed upon; and
    - the program can be conducted in accordance with the guidelines discussed in (2) below.

Article 2--Guidelines for Cooperative Research

2.1 Cooperative research programs shall be structured so as to avoid conflict of interest among the parties. In general, this shall be accomplished by having the cooperative programs focus on basic data needs, and not on solutions to specific regulatory issues or conclusions as to the application of the data to regulation. This shall be done independently by the parties.

2.2 All non-proprietary data or results produced by the cooperative program shall be shared by all participants, and each party shall be free to disseminate them to whomever they choose. Proprietary information supplied to support conduct of the research will be protected in accordance with applicable rules and regulations.

2.3 NRC and EPRI shall be free to publish the data or results from cooperative research programs in reports, journals or conference proceedings as they judge appropriate. Publication of data or results from cooperative research programs in reports, journals or conference proceedings by contractors shall require approval of the management board.

2.4 On a project basis, the parties will jointly determine if patents generated by the cooperative program should be obtained. Any patent rights will be allocated consistent with applicable laws and practices and as agreed to by the parties.

2.5 Either party shall have access to visit the facilities, separately or jointly, and review the data associated with the project at their request.

2.6 Either party can, at their own expense, conduct additional research beyond the scope of the cooperative agreement using the contractor /facility if they so desire.

2.7 The cost of the cooperative program to each party shall generally be proportional to the value of the results to the party. Cash contributions as well as the value of services (e.g., contracting, program management) or other contributed work can be considered in the cost sharing arrangements. These can include cooperative projects where each party contracts for, manages and conducts research, and shares results.

Article 3--Terms of Agreement

3.1 This agreement shall commence on October 1, 1997, and end on September 30, 2000.

3.2 Either party may terminate this agreement at any time, by giving a three-month written notice.

3.3 Any party may withdraw from an individual cooperative research program (covered in addenda) upon written notice to the other party or parties and payment of reasonable terminations costs. The remaining party(s) may continue the program at its own expense, if it so chooses, and all data generated subsequent to the withdrawal of a party shall not be subject to the provisions of this MOU.

AGREEMENT

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Malcolm R. Knapp, Acting Director Office of Nuclear Regulatory Research U.S. Nuclear Regulatory Commission	Robin Jones, Vice President Nuclear Power Group Electric Power Research Institute

ATTACHMENT 2

Potential Areas for New NRC/EPRI Cooperative Research

Fuel Performance

Steam Generator Tube Integrity

Fire Protection

Human Performance

Digital Instrumentation and Control

Direct Measurement of Reactor Vessel Degraded Properties

Containment Protective Coatings Integrity

Spent Fuel Dry Storage

Environmental Qualification - Power Cables