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April 29, 1985

Mr. William J. Dircks
Executive Director For Operations
U.S. Nuclear Regulatory Commission
Washington D.C. 20005

OFFER OF TECHNICAL ASSISTANCE TO SUPPORT NRC'S REGULATORY POLICY FOR
ADVANCED REACTORS - Zan-58-85

Dear Mr. Dircks:

I take this opportunity to offer you the assistance of EG&G Idaho, Inc. in support of the Nuclear Regulatory Commission's (NRC's) effort to implement the Proposed Regulatory Policy For Advanced Reactors. We at EG&G Idaho applaud the Commission's receptiveness to advanced concepts and ultimate goal of licensing "complete standard plant designs." I encourage your consideration of using EG&G Idaho, in a leadership role, for providing technical assistance to the NRC's Advanced Reactor Group.

Anticipating the Commission's Advanced Reactor Group's planning, I believe we could, as a minimum, apply professional expertise to assisting in the following licensing activities:

- 1) Establishing the General Regulatory Guidance for all advanced reactor developers. This guidance could be in the form of top level safety criteria that minimize impacts on the health and safety of the public as well as the environment.
- 2) Developing the General Design Criteria for concepts that are submitted for licensing review.
- 3) Developing the basis for and selection of, an appropriate Design Basis Accident list for concepts submitted for licensing review.
- 4) Developing a basis for regulation of Beyond the Design Basis scenarios for concepts that are submitted for licensing review.
- 5) Establishing siting policy for Advanced Reactor Concepts.
- 6) Reviewing specific concept designs that are submitted for licensing review.

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- 7) Performing risk assessments for concepts that are submitted for licensing review.
- 8) Perform operational evaluations for concepts that are submitted for licensing review.
- 9) Identifying and prioritizing potential research activities for advanced reactors.

To demonstrate EG&G Idaho's technical capabilities and experience in the advanced reactor and regulatory field, the following brief resume and background statements are provided. They point out the valuable contribution that EG&G Idaho could make in support of the NRC's forthcoming advanced reactor activities.

General Licensing Background

Liquid Metal Cooled Reactors

- o Presently employs the former Clinch River Breeder Reactor Applicant Licensing Manager
- o Prepared the Probabilistic Risk Assessment for the CRBR Applicant.
- o Assisted the NRC on the CRBR Construction Permit Licensing Review. Specific support consisted of 1) CRBR Programs Office support, 2) instrument and electrical Standard Review Plan review, 3) structural review of the CRBR design and development of the high temperature code case review criteria, 4) mechanical review of sodium handling system and the cell liners, and 5) development of the sodium fire protection system design criteria.
- o Performed seven liquid-metal-fast-breeder-reactor fuel failure experiments and performed the safety analysis supporting these experiments as part of the Sodium Loop Safety Facility (SLSF) Program in the Engineering Test Reactor.
- o EG&G Idaho's reactor simulation and analysis expertise was applied to the Sodium Loop Safety Facility experimental program.

Gas Cooled Reactors

- o Performed an independent safety assessment of the Gas-Cooled-Fast Breeder-Reactor (GCFR) Preliminary Safety Information Document (PSID), amendment #10.

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- o Developed the PRA methodology for the GCFR Program
- o Member of the Gas Cooled Safety Program Review Committee for several years
- o Helped generate the safety testing requirements, and prepared the test facility design, and the test facility safety assessment for the GCFR Program
- o Developed the safety, fuel performance code, FRAP, for the GCFR Program
- o Developed the ACSL system safety code for the GCFR Program
- o Performed the independent review of the Large HTGR PRA
- o Prepared the test facility requirements document for the 2240 MW HTGR Lead Plant Program.
- o Assisted DOE in selecting the lead HTGR concept for the current HTGR Program.
- o Led the NRC research activity to evaluate the HTGR severe-accident, source term for the 2240 MW Lead Plant concept.
- o EG&G Idaho is currently developing recommendations to improve the ASME Code rules to enhance the in-service inspection effectiveness for application to the next generation of HTGRs.

Water Cooled Reactors

- o Our personnel have extensive experience in the licensing process and are knowledgeable about the advantages of, and difficulties with, the current licensing process. We have provided support to the NRC in reviewing safety requirements for LWRs; in resolving allegations and performing audits at the plant sites; in conducting examinations of reactor operations; and in providing recognized experts to serve on special evaluation teams.
- o A broad spectrum of technical activities have been supported for the NRC Offices of NRR, I&E, AEOD, and the five Regional Offices.

Specific Experience and Capability

Current Licensing Criteria Development

- o Our NRC Licensing Support Organizations have had extensive experience over the past several years in the application of NRC requirements and industry requirements to the licensing and continued safe operation of both LWRs and other reactor concepts. They also have significant design, analysis, and operating experience related to LWRs, and design and analysis experience related to LMFBRs and gas cooled reactors. They are currently involved in the review of the application of NRC regulations and guides in the development of safety criteria for the various designs being considered for the Secure Military Power Project (SMPP).

Operability Assessment

- o We are currently supporting the Regional Offices in assessing the adequacy of nuclear plant personnel training programs (maintenance, QA/QC, radiation protection, shift technical advisors, and non-licensed operators). In addition, some 16 EG&G Idaho reactor operator examiners administer reactor operator and senior reactor operator licensing examinations to nuclear utility personnel.
- o EG&G Idaho maintains an organization that routinely performs operational readiness reviews and evaluations for the DOE reactors that are operated at the INEL.
- o We maintain considerable expertise and experience in performing radiological assessments for LWRs and advanced reactor concepts. This organization pioneered the development of remote gamma ray monitoring, short-lived fission product measurements, and live-time computer analysis of gamma spectra during normal and accident reactor conditions.
- o We have an emergency action program that is in place and routinely tested. Emergency procedures are in place for radiological, operational safeguards and security, natural, and national emergencies.

Design Assessment

1) Membership in National Codes and Standards Committees

EG&G Idaho currently has representation on several professional code and standards committees. Examples are:

- o Chairman of the ASME Boiler and Pressure Vessel Code Working Group on Vessels
- o Member of the ASCE Seismic Analysis Committee for Nuclear Structures and Materials
- o Member of the Committee of ASCE Nuclear Standards for Seismic Analysis of Safety Class Structures
- o Member of the ASME, Section III Task Force on Elevated Temperature Design of Core Support Structures
- o Memberships on several national radiological Standards Organizations
- o An EG&G Idaho employee was formerly the National Health Physics Society President
- o Secretary of the ASME Code Subcommittee on Non Destructive Examination

2) Design Specification Preparation

- o Our personnel have had extensive experience preparing ASME Code Design Specifications for nuclear facilities including LOFT, PBF, ATR, experimental inpile test loops, and others. These specifications were generated, and formed the bases for design evaluation, with the rigor required by the ASME Code, IEEE Code, and DOE/NRC regulations.

3) Design Evaluation

- o EG&G Idaho's Physics Organization has been involved in the independent evaluation of the relative merits, safety and performance of proposed advanced reactor systems for the New Production Reactor and for the Secure Military Power Plant. Their evaluations have included the reactor cores in advanced water-cooled, gas cooled, liquid metal cooled, and TRIGA reactor systems.

- o Our Applied Mechanics Organization has over 20 years of experience utilizing state-of-the-art techniques in the design analysis of nuclear power plant equipment. Two specific examples are 1) dynamic response analysis for piping systems and seismic analysis and 2) elevated temperature design analysis utilizing the methods and criteria provided in the ASME, Section III Code Case N-47. In-house computer programs such as ADINA, NUPIPE-II, and SAP-IV have been used in most analysis activities.
- o Our thermal-hydraulic analysis capabilities include 1) one, two, and three dimensional finite element and finite difference heat transfer analysis (COUPLE, TRIPLE, MITAS, PHASE 1, etc.) including phase change, 2) coolant loop systems analysis (ACEL, RELAP, SSC-L), and 3) fuel pin behavior assessment, including accident conditions (FRAP, SAS and PLUTO).
- o EG&G Idaho has developed a detailed understanding of the fission product source terms for all phases of the fission product release, from reactor fuel overheating through the release from the containment, and transport and dispersion in the environment. The inhouse codes include RELAP, MESODIF, RSAC, and the FRAP code for both water cooled, zircaloy clad and stainless clad gas-cooled-fast-reactor fuels. EG&G Idaho personnel have been principal investigators for the NRC in calculating severe accident source terms for HTGRs.
- o Our materials expertise related to advanced reactors includes fracture mechanics and radiation damage. The fracture mechanics expertise has led to life extension of both ATR and PBF in-pile tubes. Analytical and experimental work in radiation damage has been performed at the INEL.

We have been supporting the NRC for the past five years in materials review of licensing safety reports. The experience gained in this area is of direct consequence to licensing issues for advanced reactors.

- o EG&G Idaho maintains extensive Nondestructive Evaluation capability, well suited for developing and reviewing inservice inspection plans for advanced reactors. The staff is directly involved with developing the ASME Code Section XI rules, and have been members of the working group on NDE. Our efforts have led to the first publication of NDE system qualification requirements in the Code.

- o EG&G Idaho has extensive overall plant system simulation capabilities to support reactor analysis. They have built on their well known expertise in simulation and analysis of LWR systems to include advanced reactor systems concepts. EG&G Idaho developed the RELAP4, RELAP5, TRAC-BWR, and SCDAP/RELAP systems analysis codes to support the NRC in their LWR licensing tasks. As an outgrowth of these codes, we have been developing a system analysis code which is capable of simulating any advanced reactor concept. The mission of this code is to provide a simulation of the complete reactor cooling and control system including the reactor heat exchanger, turbines, pumps balance of plant, and control systems for a variety of working fluids. Fluids already included in the code are water/steam, liquid metals, gases and hydrocarbons. The code is presently being used to analyze fusion reactors, reactors with two working fluids and candidate space reactors.
- o Our Quality Assurance/Quality Control capabilities include all facets required by the nuclear industry. An area of special interest is configuration management. We have provided to NRC consultation and investigative support in: resolution of quality assurance/quality engineering allegations at various nuclear power plants prior to low power licensing; comparison of the as-built condition of plants and documentation adequacy for conformance to design criteria; evaluation and resolution of safety allegations and generic implications; NRC audits of utility and contractor quality assurance programs. The organization also performs special studies for the NRC Vendor Program Branch.
- o EG&G Idaho has ASME Certifications of Authorization for N, NPT, and NA stamps for the design, fabrication, and installation of nuclear vessels and piping systems.

Risk Assessment

- o EG&G Idaho has a multi-disciplined capability in the development and application of a variety of reliability engineering, mathematical, statistical and computer techniques to probabilistic risk assessments (PRA). The associated capability for the analysis and evaluation of the operational data from these systems also exists.

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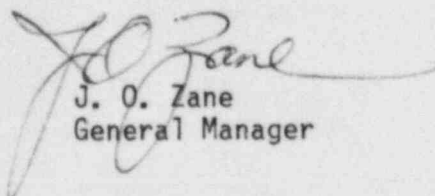
Since 1967 we have been engaged in the reliability/risk and statistical analysis of nuclear hardware systems and their associated data gathering efforts. This work has involved evaluating the frequencies of undesired events in nuclear power plants, nuclear safety systems, and in other hardware systems. These activities ranged from the design to the as-built stage. The goal of these work efforts is to insure sufficient inherent safety, redundancy, diversity, and reliability.

PRA studies have involved seven LWR plants and the WASH-1400 Study. We were responsible for DOE's review of the HTGR and GCFR accident initiation and progression analyses. They also had the lead technical responsibility for the CRBRP risk assessment. Reliability studies have also been conducted on EBR-II. Several reliability studies have also been performed on systems in nuclear test reactors and a chemical processing plant. Large data bases have been developed and are being maintained for NRC covering the analysis and evaluation of operational data from all operating LWRs reporting to the Licensing Event Reporting (LER), Nuclear Plant Reliability Data (NPRD), and Sequence Coding and Search (SCSS) systems. The analysis and evaluation of the information contained in these data bases provide the necessary component failure frequencies for the probabilistic calculations required in PRAs.

Our experience and capabilities form the basis by which we can independently assess advanced reactor system design innovations, inherent safety features and design simplifications, and evaluate the need for technology development.

In closing, I again offer the EG&G Idaho's staff of highly skilled professionals and 30 years of reactor related experience in support of implementing the NRC's Advanced Reactor Policy. At your convenience, our personnel are prepared to meet with you and your staff to discuss specific support roles and contributions that we might offer.

Very truly yours,



J. O. Zane
General Manager

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cc: T. E. Wade II, DOE-ID

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MAY 21 1985

Mr. J. O. Zane
General Manager
EG&G Idaho, Inc.
P. O. Box 1625
Idaho Falls, Idaho 83415

Dear Mr. Zane:

I wish to thank you for EG&G's offer of technical assistance in the area of advanced reactors, as provided in your letter of April 29, 1985.

At the present time we are in the initial stages of working with the U. S. Department of Energy on the scope and schedule of our future interactions on their advanced reactor programs. We hope to have our plans in this area developed over the next several months, and as part of developing these plans our technical assistance needs in the advanced reactor area will become more clear.

The expression of interest and description of EG&G's capabilities contained in your April 29, 1985, letter will be useful to us as we develop our advanced reactor plans and your offer of technical assistance will receive full consideration.

If you have any questions regarding the above or the status of our plans in the advanced reactor area, please contact Dr. Themis Speis, Director of the Division of Safety Technology.

Sincerely,

(Signed) Jack W. Roe

William J. Dircks
Executive Director
for Operations

cc: T. E. Wade II, DOE-ID