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

June 19, 1989

PARTICIPANT: THE ORGANIZATION OF TEST, RESEARCH, AND TRAINING REACTORS (TRTR)

SUBJECT: SUMMARY OF MEETING TO DISCUSS REGULATORY ISSUES CONCERNING NON-POWER REACTORS (NPRs)

On June 1, 1989, representatives of TRTR and NRC staff met at NRC headquarters in Rockville, Maryland to discuss current issues of concern to the non-power reactor community. Enclosure 1 is a list of attendees. Enclosure 2 are hand outs provided by TRTR at the meeting.

TRTR opened the meeting by stating that the mission of NRC licensed NPRs is education, the conduct of research, and to provide public service. TRTR also stated that the foremost goal of the community is the protection of the health and safety of the public and the environment and that NPRs strive for excellence in their operations. TRTR believes that except for licensing, the NRC staff does not recognize and appreciate the difference between NPRs and power reactors. TRTR believes that the regulatory climate has contributed to the decision of some NPRs to decommission. A summary of TRTR's concerns and suggestions presented at the meeting are summarized below:

1. TRTR believes that the staff does not keep in mind that the Atomic Energy Act treats research reactors differently than power reactors. The inspection program, enforcement policy, and recent regulations are not imposing the minimum amount of regulation upon the licensees as the Commission finds will permit the Commission to fulfill its obligations under the Act.

2. TRTR stated that there is a "power reactor mindset" in NRC's inspection program. The result of this is inspectors that do not understand the difference in design, construction, operation, risk and regulation between power reactors and NPRs. Concern was expressed about inspectors pushing for increased written procedures and paper trails for all tasks, the use of inspection reports as a forum for making policy, and the use of team inspections at NPRs. TRTR suggested that the NPR inspection program be centralized at headquarters with a staff of NPR experts such as exists for NPR licensing.

3. TRTR believes that enforcement conferences, civil penalties, and the negative public interest that results from enforcement does not enhance safety, but detracts from safety by diverting manpower and resources away from solving problems and improving safety. TRTR can identify no instance where a NPR licensee has ignored a notice of violation or where a civil penalty was required to insure compliance. TRTR suggested that consideration be given to modifying the enforcement policy for NPRs.

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TRTR agreed to submit examples of NPR violations that they feel are appropriate for the various Supplements and Severity Levels. It is felt that the present severity level system does not recognize the reduced safety and environmental significance of specific types of violations at NPRs as compared to power reactors. A two tier enforcement system was also suggested by TRTR. The first tier would allow a NPR to correct problems with assistance from the community without a notice of violation. If first tier action could not solve the problem, the second tier would consist of NRC taking enforcement action. TRTR believes that this system would result in a positive approach to enforcement. The staff requested and TRTR agreed to provide additional detail about this suggestion.

4. TRTR reiterated their opinion that NRC administered requalification examinations are not required to maintain operator proficiency at NPRs. Small operating staffs that are involved in all aspects of operation and performance based requalification programs make NRC testing unnecessary. NRC can achieve the same level of confidence in NPR requalification programs by conducting inspections and audits which would consume less NRC staff resources. TRTR indicated that they will request that the Commission reconsider the necessity of these examinations.

5. Concern was expressed by TRTR about uncertainties concerning future fitness for duty programs.

The staff thanked TRTR for their views and indicated that they would give careful consideration to the suggestions and concerns put forth by the community.

Alexander Adams, Jr., Project Manager
Standardization and Non-Power
Reactor Project Directorate
Division of Reactor Projects - III, IV,
V and Special Projects

Enclosures:
As stated

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Enclosures:
As stated

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ENCLOSURE 1

MEETING BETWEEN TRTR AND THE NRC STAFF

JUNE 1, 1989

NAME	ORGANIZATION
Al Adams	NRC/PDSNP
A. Francis DiMeglio	TRTR R.I. Atomic Energy Comm
Tawfik M. Ruby	TRTR NIST
Charles McKibben	TRTR MURR Univ. of Missouri-Columbia
Jim Lieberman	NRC/OE
Gary M Holahan	NRR/DRSP
Ken Perkins	NRR/DLPQ/OLB
Les Rubenstein	NRR/ADIV
Jim Partlow	NRR/ADP
Sparle Cooley	NRR/DLPQ/OLB
SH Weiss	NRR
Janice Moore	OGC

MEETING BETWEEN TRTR AND THE NRC STAFF

JUNE 1, 1989

NAME	ORGANIZATION
Sher Bush	NRR/DRIS/RSGB
Donald Carlson	NRR/DRIS/RSGB
Jim Dyer	NRR/DRIS/~~NRR~~RSGB
Ted Michaels	NRR/PDSNP
Charlie Miller	NRR/PDSNP
H Wong	NRC/OE

THE ATOMIC ENERGY ACT OF 1954

CHAPTER 1. DECLARATION, FINDINGS, AND PURPOSE

...

Section 3. Purpose.--It is the purpose of this Act to effectuate the policies set forth above bv providing for --

a. a program of conducting, assisting, and fostering research and development in order to encourage maximum scientific and industrial progress;

...

CHAPTER 10. ATOMIC ENERGY LICENSES

...

Section 103. Commercial Licenses.--

a. The Commission is authorized to issue licenses . . . Such license shall be issued in accordance with the provisions of chapter 16 and subject to such conditions as the Commission may by rule or regulation establish to effectuate the purposes and provisions of this Act.

Section 104. Medical Therapy and Research and Development.--

...

c. The Commission is authorized to issue licenses . . . The Commission is directed to impose only such minimum amount of regulation of the licensee as the Commission finds will permit the Commission to fulfill its obligations under this Act to promote the common defense and security and to protect the health and safety of the public and will permit the conduct of widespread and diverse research and development.

University Research Reactors in the United States - their Role and Value

Prepared by the
Committee on University Research Reactors
Energy Engineering Board
Commission on Engineering and Technical Systems
National Research Council

NATIONAL ACADEMY PRESS
Washington, DC 1988

EXECUTIVE SUMMARY

THE NATURE OF THE PROBLEM

Over the past two decades the number of nuclear reactors used for research and education on university campuses has declined from about 76 to 40. Moreover, while some universities continue to maintain and even upgrade their reactors, further reductions are expected. The reasons for this include competition for limited university funds, poor external funding prospects, lack of growth in the nuclear power industry, and, in some cases, prolonged hearings and litigation associated with licensing procedures. In effect a vicious circle has developed in which reduced support leads to lower faculty and student interest, which leads to under-utilization, which leads to lower motivation for continued support and so on.

It was a premise of this study that, given the training, research, manpower development and other needs in the nuclear field, this trend should not be permitted to go too far. Policies that will limit closures and encourage modernization of a sustainable subset of existing reactors, sufficient in numbers and types to meet national and academic needs for research, education and service are clearly in the national interest.

To formulate such policies, the Committee addressed the following questions:

- What national interests (scientific, technical, medical and educational) are served by on-campus research reactors?
- What academic values derive from university reactors?
- Is federal financial support necessary or desirable to arrest current trends and assure the retention of an adequate population of university research reactors?
- What levels and types of federal support, if any, should be provided?
- What guidance can be offered to universities and to the federal government pursuant to reasonable and prudent licensing of university research reactors?

PRINCIPAL FINDINGS

Pursuant to the National Interest

The national interests served by university research reactors include:

- development of high-technology applications in fields such as materials sciences, fluid dynamics, and biomedical sciences, using reactors as sources of neutrons;
- research contributing to the future of nuclear power reactors, including the scientific basis for new concepts, for safeguards, and safety;
- education of personnel needed to operate, maintain and improve reactors and other facilities associated with national defense and nuclear power activities.

The Committee finds that the existing population of university research reactors, as a whole, does not adequately fulfill these national interests, particularly with respect to the use of neutrons in the development of high technology. Moreover, in several important research areas the U.S. is not currently on a par with Europe and Japan.

Deficiencies at U.S. university research reactors, stemming in part from inadequate financial support, include inadequate peripheral research equipment such as spectrometers, cold sources, and radiographic equipment. The effects of these deficiencies would be reduced by better access for university-based researchers to major national facilities which are better equipped. But opportunities for such access are now inadequate.

The Committee is concerned that a failure to correct these deficiencies, coupled with a continuation of the trend in reactor closures, will serve to widen an existing gap of U.S. neutron science capabilities.

The Committee is also concerned that future national needs for nuclear engineers and scientists trained in the neutron sciences may not be met if the current negative trends continue.

However, selective reduction in the number of university research reactors will not of itself damage the national interest, provided that a healthy core of on-campus and off-campus research and educational reactor facilities is retained.

Pursuant to Academic Values

The Committee finds that on-campus research reactors contribute to academic values through research and education at the university, and through service to off-campus user constituencies:

Research: University research reactors are the focus of multi-disciplinary research with contributions to physics, chemistry, biology, medicine, epidemiology, environmental sciences, material sciences, fluid mechanics, geology, archaeology, paleontology, forensic sciences, and other fields in addition to nuclear engineering research and reactor physics. The three principal reactor research techniques are neutron activation analysis, neutron scattering, and neutron radiography. The latter two are largely confined to reactors of one megawatt and higher power. Research reactors in the United States constitute unique and essential research tools in several aspects: structural determinations of materials including superconductors and biological, ultrasensitive analysis for traces of elements, radiological display of physical phenomena, and introduction of radioisotopes for medical diagnostics and research (See Chapter 2).

Education: On-campus reactors have been a traditional focus of educational programs for nuclear engineers. In addition, on-campus reactors are increasingly used as laboratories by students in the non-nuclear fields listed above. Educational uses are made of even the smallest fractional watt on-campus reactors. Beneficiaries include graduate and undergraduate students, nuclear power plant operators, secondary schools and the general public through outreach programs (See Chapter 3).

Service: University reactors, particularly those of one megawatt and larger, serve a range of off-campus constituencies: the medical community, industrial organizations, and government agencies. These clients use irradiated materials, materials analysis, trace element detection and radiographic analysis of objects and processes. By providing such services, managers of university research reactors establish beneficial links to off-campus users, expose faculty and students to commercial applications of the nuclear sciences, and earn revenues to help support reactor programs (See Chapter 4).

The Committee finds that U.S. university research reactor facilities must be upgraded and provided with modern equipment if they are to meet their intended objectives and become world-class research and educational facilities. Needs include modern instrumentation, low temperature irradiation facilities, cold neutron capabilities, modern spectrometers, radiographic equipment, increased power and neutron flux and other enhancements.

University administrators, in weighing the future of on-campus reactor programs take into account the following factors:

- academic benefits in terms of research, education, and service
- costs of achieving these benefits including the costs of safety and safeguards as well as dealing with legal actions and protests
- the availability of resources from federal and other sources to defray these costs
- competition from other on-campus research facilities for limited financial and other resources.

The academic benefits associated with university research reactor programs are summarized above and are discussed in detail in Chapters 2, 3 and 4. On-site reactors clearly enhance the educational and research missions of a university. Properly equipped and managed on-campus reactors offer unique advantages in terms of hands-on education and research experience in running small scale experiments which would not be practical at larger off-campus reactors. However, it cannot be concluded that every on-campus research reactor is essential to these missions. This depends on the particulars of the educational program, and on the nature of access to off-campus research reactors.

Pursuant to Procedures for Safety and Safeguards

The Committee observes that the safety and safeguard records of on-campus reactors have been excellent. Nevertheless, a growing concern for reactor safety as well as the potential for sabotage and for theft of nuclear materials have led the Nuclear Regulatory Commission to upgrade the requirements for the protection of all reactors from the large 3500 MW (thermal) electric power facilities down to the smallest university reactor. Committee does not take issue with the Commission with respect to these concerns. However, the Committee finds that some of the procedures of the Nuclear Regulatory Commission associated with improving safety and safeguards at university reactors can result in costs out of proportion to the improvements achieved. A particular concern is that relicensing procedures associated with reactor safety and safeguard upgrades can in some cases unnecessarily expose the universities to costly hearings and litigation. Committee is also concerned that existing rules and procedures for the licensing of university research reactors have at times lent themselves to abuse by intervenor group who use the opportunity to assert their larger political opposition to nuclear power and defense activities (See Chapter 6).

PRINCIPAL RECOMMENDATIONS

The federal government, in partnership with the universities and the national laboratories, should develop and implement a national research reactor strategy, the elements of which should include:

- development of university and national laboratory centers of excellence in specific areas of the neutron sciences and reactor technology for world-class research as well as for education
- anticipation that as some university reactors are upgraded and a user's network is created (see below), others are likely to close
- mechanisms to assure that such closures do not go so far as to damage the national interest related to research and educational capabilities in the nuclear sciences and engineering
- development and support of a reactor network to provide enhanced utilization and productivity of U.S. research reactors involving researchers from universities with and without on-campus reactors, and from the national laboratories.

To implement the above strategy:

- a single federal agency should be designated to administer programs in support of the national research reactor programs
- the federal government should create a standing advisory structure to advise on a continuing basis on all aspects of this program.

In pursuit of this strategy the Federal government should:

- adopt the goals of meeting U.S. research reactor needs, and regaining a position competitive with Europe and Japan in the neutron-based sciences
- study in detail the approaches of other advanced countries to operating research reactor networks such as that of linking the major facility at Grenoble with smaller reactor research centers in Europe (see Chapter 5)
- establish and support such a network, adapted to U.S. needs
- make up to $20 million available annually (as a preliminary estimate to be modified as improved data become available) to universities through the designated federal agency, specifically for operational support and facility upgrades of university research and educational reactors (see Chapter 7)
- create a peer review mechanism to assist the designated agency in making grants to universities.

The Nuclear Regulatory Commission should examine its current approach to the licensing and regulation of university research reactors in terms of the following issues:

- the small nuclear materials inventories and low power densities of university research reactors, which result in risk factors related to safety and safeguards considerably lower than commercial power reactors (see Chapter 6)
- avoiding unnecessary exposure of small university reactor operators to costly hearing and litigation procedures as a condition for licensing upgrades and improvements.

Finally, the Nuclear Regulatory Commission should consider grants of technical and financial assistance to help university reactor operators to comply with upgraded safet and safeguard requirements, including and continuing beyond the current program of assisting with the conversion to low-enriched fuels.