University Reactor Instrumentation Grant Program

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FINAL REPORT

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1. Introduction

The Ohio State University Nuclear Reactor Laboratory (OSU NRL) participated in the Department of Energy (DOE) grant program commonly denoted as the University Reactor Instrumentation (URI) program from the period September 1990 through August 1995, after which funding was terminated on a programmatic basis by DOE. This program provided funding support for acquisition of capital equipment targeted for facility upgrades and improvements, including modernizing reactor systems and instrumentation, improvements in research and instructional capabilities, and infrastructure enhancements. The staff of the OSU NRL submitted five grant applications during this period, all of which were funded either partially or in their entirety. This report will provide an overview of the activities carried out under these grants and assess their impact on the OSU NRL facilities.

2. Program History

Initially, the URI grant program was targeted towards maintaining and improving the research reactor facilities located at various educational institutions around the country. The DOE recognized the importance of these facilities as a component to the scientific and technical educational infrastructure, while noting that many of them were aging facilities, having been built mainly in the period from the late 1950s through the mid 1960s. At first, the grant program emphasized purchases of equipment and systems which would enhance the reactor systems themselves, including safety-related and other operational subsystems. Later, the program focus was broadened to include research and instructional instrumentation, with the hope of leveraging this investment through the mechanisms of institutional cost-sharing and increasing utilization of the reactor facilities by funded research programs.

The following sections will provide detail on the OSU NRL participation in this program.

2.1 Program Year 1990-1991

This was the initial grant program year, which coincided with activities at the OSU NRL facility related to fuel conversion and power uprating begun under a separate grant. The OSU NRL staff used the opportunity presented by the URI grant program to request funding for systems related to the power uprating. These included a cooling system plenum and decay tank, temperature monitoring instrumentation, a data acquisition system, and cooling system flow monitoring and control devices. The grant award notification was made on 6/13/90, in the amount of about $35K. In this particular program year, the University made a matching funds commitment on a 1:1 basis, which provided significant leverage of the DOE award amount.

The proposed program was completed mostly in the grant period, but because of the complexity of the effort and the need for subcontracting some of the proposed work, there was some carryover into the following program year.
2.2 Program Year 1991-1992

The following program year included a continuation of the effort to uprated the reactor facility operating power, as well as enhancements to the research capabilities of the laboratory. The program award notice was on 5/23/91, in the amount of about $14.5K. Once again, the various departments within the University associated with the OSU NRL (Office of Research. The College of Engineering, and the Laboratory itself) committed to cost sharing on about a 1:2 basis.

As a result of the reduced program award, the overall scope of the proposed work was subsequently limited. However, the instrumentation purchases were made and installed during the program year. These included, among other items, replacement of the older, vacuum tube-based NI channel recorders with newer, solid-state devices, and the acquisition of a SUN workstation for artificial intelligence-related research associated with reactor system control.

2.3 Program Year 1992-1993

The grant for this program year contained a blend of reactor system-related requests and research instrumentation upgrades, which reflected the moderately-expanded grant program focus. The award notice was dated 7/30/92, in the amount of $35K. This represented a significant increase over the previous year’s funding level, and, when combined with institutional cost sharing, allowed for a significantly expanded effort. Acquisitions included replacement of the reactor pool water processing system (original system), upgrading of the secondary cooling system flowmeters, modifying the secondary cooling system pump, replacing the older pumps in the pool water processing system with newer, more reliable units, replacing NI channel cabling, and replacing the startup source positioning drive system. Also, because of successful negotiations with suppliers for some of these items, reduced costs and discounts were made available. This released additional funds for acquisition of research instrumentation, including a hyperpure germanium detector and low background cave to enhance gamma spectroscopy capabilities, and an upgraded computer system for acquisition and analysis of spectroscopic data.

All program objectives were completed within the program period with the exception of the startup source drive system, which required a formal review by the reactor operations committee, which by administrative rule must approve such changes to the reactor system. This required completion of this task in the following program year.

2.4 Program Year 1993-1994

The final year of funding for the URI grant program included a request for a major NI channel upgrade in the form of a wide-range power monitoring channel and associated stripchart recorder, and several research instrument requests. The award notification was received verbally on 7/1/93, in the amount of $36.4K. The University
provided matching funds on a 1:3 basis. Competitive bidding resulted in about a 10% savings of cost on the budgeted amount for the instrumentation. Further, the OSU NRL staff was able to modify the existing stripchart recorders to accommodate the output from the new instrument, thus avoiding the need to purchase the stripchart recorder. This allowed funds to be available for purchase of a backup wide range fission chamber, which will serve as a backup instrument as well as a research instrument for studies of wide range power sensor response time and diagnostic capabilities. Because of the time required for the competitive bidding process, the program was extended on a no-costs basis through 8/95. All of the items were purchased within this program period.

The final project budget statement showed a small surplus of unexpended funds of approximately $1.9K. This represents a reasonably successful program management effort over the course of the five year project.

3. Summary and Conclusions

By almost any measure, the participation in the URI grant program by the OSU NRL has been successful and fruitful. We can truthfully say that the power upgrade of the reactor system would likely have been impossible to complete without the support provided by the URI funding. This effort alone represents a considerable enhancement of the OSU NRL capabilities. Other improvements in the laboratory facilities, such as the gamma spectrometer upgrades and the purchase of the wide range power monitoring channel, also have resulted in real, tangible benefits to the reactor facility. The utilization of the facility has increased, not only by University personnel, but also by private industry, and other academic institutions, through the DOE-funded Reactor Sharing Program. Many of the research and instructional activities now underway at the OSU NRL would likely have been difficult or impossible to undertake without the facility enhancements made possible from URI funding support.

We are aware of the efforts and intentions of the DOE to resume funding the URI program. As a recipient of past grants, we commend the department for this effort and look forward to participating in the forthcoming program.