Docket File
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Radiation Center

Oregon State University

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September 12, 1979

U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Division of Operating Reactors
Washington, D.C. 20555

Attention: Mr. James R. Miller, Acting Assistant Director for
Site and Safeguards

Gentlemen:

We are writing in response to your letter of July 30, 1979 concerning the impact of complying with new physical protection requirements specified in 10 CFR 73.47 and the Safeguards Upgrade Rule. As you are aware, several potentially affected research reactor licensees, including Oregon State University, did not receive a copy of your July 30th letter following the initial mailing. Consequently, we were unable to respond by your target date of August 15, 1979.

During the NRC's August 27, 1979 meeting on physical security at Region III Headquarters, copies of the July 30th correspondence were again distributed. We were also informed at this meeting that your organization would welcome additional response to the questions even though they were received beyond the original deadline. In view of this understanding and the potential impact which the Commission's new physical protection rules could have on our operation, we would like to submit the following information.

On August 16, 1979, Oregon State University submitted a response to a July 30, 1979 letter from Robert W. Reid, in which we specifically itemized the total amounts of exempt and non-exempt special nuclear material the University desired to possess. All licenses involving SNM were included in this tabulation. (A minor modification of the SNM total was also submitted in a letter to R.W. Reid, dated August 24, 1979.) In the August 16th letter we concluded that based on the regulations in 10 CFR 73.47, particularly 73.47(b) and (c), only the SNM authorized by our TRIGA reactor license would be affected by 73.47 since the non-exempt SNM totals on all other licenses were quite small and were below the lower limits for Category III SNM. We further concluded, based on

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the assumption that we could claim the exemptions listed in 10 CFR 73.47(b) and (c) and obtain necessary modifications to our technical specifications to allow their use, that the total non-exempt SNM authorized for possession on our TRIGA reactor license (R-106), considering all uranium enrichment categories plus plutonium, would not reach the threshold value requiring classification of this material as SNM of moderate strategic significance. As a result, we believe that we should be placed in physical protection Category III for facilities possessing SNM of low strategic significance.

Both of the preceeding conclusions are, of course, very important to us because we feel that our existing physical security program meets essentially all of the requirements for protection of Category III SNM. Therefore, the enactment of 10 CFR 73.47 will have little additional impact upon our operation provided we can qualify as a Category III facility. We recognize, however, that all of the exemptions presently allowed by 10 CFR 73, especially the exemption based on a radiation level of 100 rem/hr at three feet, may not continue in effect. Should we lose this specific exemption or fail to qualify for its use, we would then find ourselves in possession of SNM of strategic significance and would potentially qualify for Category I safeguards requirements, including the Safeguards Upgrade Rule. Since this safeguards classification (Category I) would have the most severe consequences for our TRIGA reactor operation, we will answer your questions assuming that we will have to meet the most restrictive Category I safeguards requirements. The answers to your questions are itemized below:

1. What additional features will be constructed? Walls, vaults, CAS, protected area and costs associated with these.

   Our physical plant layout for protection of the reactor area and SNM is reasonably good, but undoubtedly some modifications would be required. Improvements in our fencing and changes in some interior walls are immediately evident and should require expenditures of $20,000 to $30,000.

2. What is the expected total cost to upgrade hardware? One time cost (alarms, CCTV, guns, uniforms, badges, detectors).

   We are uncertain of the exact costs for these items, but based on the costs to date for similar systems of smaller tasks, we estimate expenditures to be approximately $50,000.

3. What is the expected cost annually--guards, material, screening, two-man rule--for an upgraded physical security plan, manpower and hardware?

Estimated annual cost for an upgraded physical security plan, covering manpower and hardware only, is approximately $86,000 per year at the minimum. This estimate is made on the basis of currently prevailing labor costs pertaining to the following itemized expenditures, and it is recognized that costs could be much higher should more guards or other personnel be required:

a.	Armed guard (one guard, three shifts)	$60,000
b.	Personnel to implement screening procedures during working hours.	$12,000
c.	Two-man rule (reshuffling current staff with the addition of one half-time reactor operator).	$ 9,000
d.	Materials	$ 5,000

4. What is the cost of shutting down the facility?

It is difficult to estimate the exact cost of facility shutdown due to the many uncertainties involved. Using NRC Regulatory Guide 1.86 as a basis for the types of shutdown possible, we estimate that "mothballing" or "in-place entombment" could cost on the order of one million dollars or more, not including the problems of personnel relocation and other annual maintenance and surveillance requirements.

Moreover, inasmuch as the OSU TRIGA reactor operation in the State of Oregon is also under the jurisdiction of State statutes, it will probably be necessary to decommission the facility completely and to restore the space to unrestricted use. This legally required action may cost as much as another one million dollars to cover dismantling, transportation and other engineering costs.

5. What is the annual cost of maintaining possession-only status?

In our judgment, maintaining a possession-only status will, due to the absence of reactor operation and the reduced radiation levels on the fuel elements, enhance the vulnerability of the special nuclear materials possessed on the reactor license to theft or other covert actions. Consequently, the cost of maintaining a physically secure, possession-only status appears to be about the same as the cost required to continue the operation of the research reactor.

6. Effect of loss of program on U.S. industry, i.e., engineers and operators for U.S. nuclear power plants.

The OSU TRIGA Reactor (OSTR) has not been used to accommodate any profit-making organizations. Meanwhile the OSTR is one of the very few research reactors in the nation that is equipped to carry out high speed neutron radiography experiments. This type of project, originating at Oregon State University six years ago, has been providing valuable service to the U.S. Department of Defense under a research contract to study the mechanisms and behavior of explosives. Similarly, during the past ten years the OSTR has been used to accommodate a major research program in lunar sample analysis under a grant from NASA. Termination of the OSTR operation will mean the net loss of a unique research reactor facility to the U.S. scientific and defense-related research community. Furthermore, the OSTR is an integral part of the OSU nuclear engineering program. Closure of the reactor would significantly reduce the quality of the education received by our students. The program graduates about 25 B.S. nuclear engineers each year.

7. Effect of loss on medical research, medical treatment.

Oregon State University does not have a medical school and hence, there are no ongoing research projects in the medical area making use of the Oregon State TRIGA Reactor (OSTR). The OSTR does not supply radionuclides to the radiopharmaceutical industry.

8. Cost of new plans--security, contingency, guard training.

These costs are covered under question 3.

9. Considering the impact of implementing the Safeguards Upgrade Rule will you continue to operate your facility?

No! The University is not in a position to provide the required additional funds, which are indeed sizeable in magnitude, to implement the current Safeguards Upgrade Rule as applied to a Category I facility.

10. Describe the impact of closing the facility on the educational program at your facility (school)--loss of program and courses.

Closing the OSTR facility will make it impossible to offer at least five courses in nuclear engineering and one course in nuclear chemistry, all of which use the OSTR as a major instructional tool. In fact, without the OSTR in active operation, the OSU undergraduate program in nuclear engineering will not be in a position to provide adequate training to the students. It should be emphasized that the OSU B.S. degree nuclear engineering program is one of the 21 Engineer's Council for Professional Development (ECPD) accredited programs in the nation, and the only ECPD accredited program on the Pacific Coast. Furthermore, the OSU program is one of only two such accredited B.S. degree programs in the Western United States. The program graduates approximately 25 B.S. students each year, which is equivalent to 4.3% of the national productivity (576 B.S. degrees in nuclear engineering were granted in the year of 1977-78). Hundreds of OSU graduates in nuclear engineering are presently serving various government organizations such as the NRC, DOE, and the U.S. Navy, and many others are employed by utilities, reactor vendors, and architect-engineering firms. OSU graduates in nuclear engineering are eagerly sought by potential employers due to the fact that each of them has received practical training in reactor operations, reactor behavior, radiation protection, and reactor instrumentation. This is, of course, dependent upon the availability and use of the OSTR. It should be stated here that previously we used our AGN 201 reactor as a training tool and found it to be highly undesirable. The 1 MW power level of the OSTR together with the pulsing capability enables us to conduct a considerably more meaningful selection of reactor experiments and to carry out much more realistic training in all areas.

The OSTR is housed in the OSU Radiation Center which is an institutional facility designed to accommodate a wide variety of instructional and research projects using all types of ionizing radiation. In addition to a large number of OSU programs, the OSTR also accommodates major research programs from three other universities, including the geology research program at the University of Oregon. Presently there are 32 research projects scattered over the entire OSU campus which make use of the OSTR as a research tool. Nineteen additional projects are located at the University of Oregon, and one is located at Battelle Northwest Laboratories under a primary contract with the DOE.

11. What is the size of the facility staff? Will it be cut?

At the present time the OSTR staff includes three faculty members, four classified employees, and about ten student workers. The closing of the OSTR will make it mandatory to cut out at least one faculty member, all classified employees and all student workers.

12. How many students are in the classes? Will they finish their degrees?

At this point there are about 90 undergraduate students enrolled in the OSU Department of Nuclear Engineering with this enrollment being distributed evenly among the senior, junior, and sophomore classes. It is expected that 35 new students will be enrolled in the Department by the end of September, 1979. Closing the OSTR will mean that five required courses will not be taught and it is uncertain whether the university would be able to award degrees to these students without a major curriculum revision. Since a major revision of the curriculum requires approval of the University Curriculum Council, no short-term solution is likely. Furthermore, due to the absence of certain important courses, it is likely that the Engineer's Council for Professional Development would not continue accreditation of our undergraduate B.S. degree program.

13. How many graduate students are in facility-related programs? Will they be able to finish?

There are 21 graduate students enrolled in the Department of Nuclear Engineering. Five of them are doing thesis work utilizing the OSTR as their only research tool. In addition, there are five graduate students in chemistry relying on the OSTR for their respective thesis research. Closing the OSTR will certainly mean that these graduate students will not be able to finish their thesis research, which is one of the basic requirements for them to earn an advanced degree.

14. What is the typical annual operating budget?

The current annual operating budget for the Radiation Center, as appropriated by the State of Oregon, is $384,000 of which approximately $200,000 is directly related to the OSTR operation. In addition, annual operating amounts for research projects relying exclusively on the OSTR as a tool are estimated to be approximately $300,000.

15. With the 100 rem/hr at three feet exemption criteria, can you meet and maintain the SNM at such a level continuously? What would the impact be on current financial and operating resources? How would it maintain the self-protection criteria affect fuel replacement and costs therefore?

Presently, OSU is assuming the OSTR FLIP fuel in the core can be continuously maintained at radiation levels which equal or exceed 100 rem/hr at three feet. We are currently conducting measurements, doing calculations, and preparing a request for an amendment of our technical specifications to allow use of this exemption based on periodic radiation measurements of the fuel and mandatory periods of 1 MW operation.

We do not at this time believe that the operating requirements and radiation measurements will exceed our capabilities and current resources. The FLIP fuel uranium-235 content will allow us to operate for at least 20 to 30 years before refueling is necessary, even with additional operating periods to maintain the self-protecting radiation levels.

16. How many courses utilize the facility--will they be cut?

As mentioned under item 10, six courses will definitely not be offered, and eight courses can be offered only by means of major modifications of laboratory programs.

We hope the above information will be helpful to you in formulating your estimate of the impact of the new safeguards regulations on university research reactors. As you can see, the new rules may have a very serious impact on the OSTR program. We hope

you will seriously consider these potential impacts, and the nature and value of university research reactor programs to our country when determining the degree to which these rules will apply to university reactors.

Thank you for the opportunity to comment.

Very truly yours,

C.H. Wang
Reactor Administrator

CHW/mks
cc: Oregon Department of Energy
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