

December 15, 1988

MEMORANDUM FOR: Vandy L. Miller, Assistant Director
for State Agreements Program
State, Local and Indian Tribe Programs

FROM: Richard E. Cunningham, Director
Division of Industrial and
Medical Nuclear Safety, RMSS

SUBJECT: REQUEST FROM WASHINGTON REGARDING EVALUATION
OF IRRADIATOR SOURCES.

This is in response to your December 12, 1988, memorandum requesting our assistance in evaluating old sources in the reactor pool at the Washington State University. The 27 sources consist of 5 sources; AECL models 132 and XC-309, J.L. Shepherd models 1099 and JEC-JCS-9147, and US Nuclear Corporation model 368. Due to the lack of historic information on the source construction (except from the AECL sources), use, handling and lack of knowledge about the current condition of the capsules, we cannot recommend that the sources be deemed acceptable for licensing at this time.

If the State wishes to proceed with licensing of the sources they should request information on the above concerns and specifically address the following:

- 1) Configuration or arrangement of the sources in the pool showing the location of the reactor and fuel storage areas.
- 2) The pH and conductance of the water in the pool along with a corrosion assessment of the capsules and welds in that environment.
- 3) There have been cases involving older sources that due to changes in their normal use conditions have developed stress cracks at the welds. ORNL performed an analysis in the 1970's on old cobalt-60 teletherapy sources which supported the theory that embrittlement of the weld lead to stress cracks forming because of transportation and handling conditions. For this reason the licensee should physically examine each source with particular attention being given to identifying any flaws in the weld, any irregularity in the materials and any dimensional changes or irregularities and prepare a report on their findings.
- 4) The licensee needs to provide information on the construction material of the J.L. Shepherd and US Nuclear sources specifically addressing the type of capsule material used, the type of filler rod used to weld the capsules and the sources' associated ANSI classification.

Vandy L. Miller

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- 5) Due to the age of the sources it appears they may be at or near the end of their useful life. The licensee should provide a justification for continued use of these sources based on residual stresses introduced by past and present use conditions.

There is one issue the State of Washington may want to be aware of based on the information submitted. The licensee is only authorized to possess and use ORNL and Idaho Nuclear Corporation sources. Their possession of the sources, identified in the first paragraph, may be a violation of the license. If the State considers licensing the sources they should treat the action as if it were a Category III irradiator and ensure that the associated requirements, tests and sampling provisions are implemented.

We understand that you have requested NRR's view on the jurisdiction issue of whether the State of Washington or NRC should license the capsules that are placed in a nuclear reactor pool. Therefore, we have not addressed that matter.

If you have any questions please contact John Austin at Extension 23418.

Sincerely,



Richard E. Cunningham, Director
Division of Industrial and
Medical Nuclear Safety, NMSS

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20548

August 18, 1988

MEMORANDUM FOR: Stewart D. Ebner, Director
Division of Radiation Safety and
Safeguards, RI

J. Phillip Stohr, Director
Division of Radiation Safety and
Safeguards, RII

John A. Hind, Director
Division of Radiation Safety and
Safeguards, RIII

Richard L. Bangart, Director
Division of Radiation Safety and
Safeguards, RIV

Ross A. Scarano, Director
Division of Radiation Safety and
Safeguards, RV

SUBJECT: LICENSE CONDITION FOR BYPRODUCT MATERIAL TO BE IRRADIATED
IN A NON-POWER REACTOR

At the Reactor Health Physics Counterpart Meeting of May 18-19, 1988, a question arose as to what the appropriate license condition should be for possession of byproduct material at non-power reactor facilities (see Enclosure 1, item 8). The question was prompted by a statement in guidance provided to the Regions in a memorandum dated March 8, 1988 (Enclosure 2). The statement in enclosure 2 appears in item 7 and reads as follows:

...If a reactor license is silent with regard to possession of byproduct material it shall be amended...

All non-power reactor licenses have a license condition which permits the licensee to - "possess, but not to separate such byproduct material as may have been produced by operation of the facility." This license condition, however, does not adequately cover byproduct material received at the facility which is going to be irradiated in the reactor. Enclosure 2 (Memorandum, D.M. Crutchfield to Regions, March 8, 1988), item 3 states that -

All byproduct material which is to be inserted into a reactor, or which is removed from the reactor, must be covered by the reactor license while the material is within the facility.

In order to satisfy this condition, the license condition dealing with possession of byproduct material should be amended if a licensee receives

CONTACT:
T. Michaels, HRB/PDSNP
492-1102

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byproduct material which is to be irradiated in the reactor. The license condition should read as follows:

Pursuant to the Act and 10 CFR Part 30, "Rules of General Applicability to Licensing of Byproduct Material," (and Part 70)*, to receive byproduct material which is to be irradiated in the reactor within 31 days of receipt, and to possess, but not separate, such byproduct (and special nuclear)* materials as may be produced by operation of the facility.

* Delete if Part 70 not applicable

Licensees must request an amendment to their license to include this condition if they receive byproduct material to be irradiated by their reactor, unless the material is covered by another license before it is inserted into the reactor.

Violations involving byproduct material that is to be irradiated in a non-power reactor should generally be charged against the reactor license unless some other specific documentation has been developed by the licensee. In this regard the statement in enclosure 2, item 3 is modified to read as follows:

All byproduct material which is to be inserted into a reactor, should be covered by the reactor license; byproduct material which is removed from the reactor must be covered by the reactor license.

Dennis M. Crutchfield
Dennis M. Crutchfield, Director
Division of Reactor Projects - III,
IV, V and Special Projects
Office of Nuclear Reactor Regulation

Enclosures:
As stated

ENCLOSURE



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

March 8, 1988

MEMORANDUM FOR:

Frank J. Congel, Director
Division of Radiation Safety and
Safeguards, RI

Douglas M. Collins, Director
Division of Radiation Safety and
Safeguards, RII

John A. Hind, Director
Division of Radiation Safety and
Safeguards, RIII

Richard L. Bangart, Director
Division of Radiation Safety and
Safeguards, RIV

Ross A. Scarano, Director
Division of Radiation Safety and
Safeguards, RV

FROM:

Dennis M. Crutchfield, Director
Division of Reactor Projects - III,
IV, V and Special Projects
Office of Nuclear Reactor Regulation

SUBJECT:

REGULATORY RESPONSIBILITIES FOR BYPRODUCT MATERIALS
IN NON-POWER REACTORS

In a memorandum dated June 8, 1987, Region IV requested guidance for determining cases where licensed material in a non-power reactor facility may be covered by a NRC material license or an Agreement State license, rather than the reactor license. This issue becomes important in determining compliance and issuing notices of violation involving licensed material in a reactor facility. All regions were asked to comment on this issue. After consideration of your comments, we are providing the following guidance. The guidance has been coordinated with NMSS, GPA, and OGC.

1. Generic guidance related to this issue is contained in Inspection Manual Chapter 2832, Appendices 1 and 2. Normally, material within a non-power reactor facility will generally be assumed to be possessed by the reactor licensee, unless there is prior documentation approved by NRC, or some other clear demonstration that the licensed material is covered under another license.


CONTACT:

T. Michaels
NRR/PDSNP
Ext. 21102

88 03300 442 26

2. Consistent with #1 above, NMSS does not normally issue separate licenses which authorize possession of licensed material within an operating reactor facility. If a reactor facility license is silent with regard to possession of byproduct material, it should be amended. NRC normally exercises exclusive federal jurisdiction within operating reactor facilities.
3. All byproduct material which is to be inserted into a reactor, or which is removed from the reactor, must be covered by the reactor license while the material is within the facility.
4. The facility boundaries for a non-power reactor are normally defined by the Safety Evaluation Report or Technical Specifications. In the absence of identifiable facility boundaries, the Regions should establish a facility boundary with the licensee for compliance purposes, and the boundary should be specified in TS or FSAR.
5. As indicated in Manual Chapter 2882, Appendix 2, there are exceptions to the above guidelines, and specific cases can be complex. Questionable cases should be referred to Headquarters for resolution along with a proposed course of action.

Questions concerning this guidance or specific cases should be referred to this Division for resolution. We will coordinate with NMSS, GPA, and OGC as appropriate.


Dennis M. Crutchfield, Director
Division of Reactor Projects - III, IV,
V and Special Projects
Office of Nuclear Reactor Regulation

H. North



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION V

1450 MARIA LANE, SUITE 210
WALNUT CREEK, CALIFORNIA 94596-5308

JUN 15 1989

Docket No. 50-27

Research Reactor
Nuclear Radiation Center
Washington State University
Pullman, Washington 99163

Attention: Mr. W. E. Wilson
Associate Director

Gentlemen:

Subject: NRC Inspection

This refers to the routine inspection conducted by Messrs. A. D. Johnson and H. S. North of this office on May 24-26, 1989, of activities authorized by NRC License No. R-76 and to the discussion of our findings held by Messrs. Johnson and North with Mr. Wilson and other members of your staff at the conclusion of the inspection.

Areas examined during this inspection are described in the enclosed inspection report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations by the inspector.

No violations of NRC requirements were identified within the scope of this inspection.

In accordance with 10 CFR 2.790(a), a copy of this letter and the enclosure will be placed in the NRC Public Document Room.

Should you have any questions concerning this inspection, we will be glad to discuss them with you.

Sincerely

Ross A. Scarano, Director
Division of Radiation Safety
and Safeguards

Enclosure:
Inspection Report No. 50-27/89-01

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U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No. 50-27/89-01

Docket No. 50-27

License No. R-76

Licensee: Washington State University
Research Reactor: Nuclear Radiation Center
Pullman, Washington 99163

Facility Name: Research Reactor: Nuclear Radiation Center

Inspection at: Pullman, Washington

Inspection Conducted: May 24-26, 1989

Inspector:

H. S. North
H. S. North, Senior Radiation Specialist

6/14/89
Date Signed

A. D. Johnson
A. D. Johnson, Enforcement Officer

6/15/89
Date Signed

Approved by:

E. M. Garcia
E. M. Garcia, Acting Chief
Facilities Radiological Protection Section

6/15/89
Date Signed

Summary:

Inspection on May 24-26, 1989 (Report No. 50-27/89-01)

Areas Inspected: Routine unannounced inspection by regionally based inspectors of the reactor operations program; including reactor operations, health physics, emergency planning and preparedness, transportation activities, follow-up items and exit interview. Inspection procedures 30703, 40750, 83743, 86740 and 92717 were addressed.

Results: In the five areas inspected, no violations or deviations were identified. The licensee's programs were capable of meeting their safety objectives.

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DETAILS

1. Persons Contacted

- * W. E. Wilson, Associate Director, Nuclear Radiation Center
- * J. A. Neidiger, Reactor Supervisor, Senior Reactor Operator (SRO)
- D. D. Barbee, DVM, former Interim Director, Nuclear Radiation Center
- R. H. Filby, Ph.D., Chairman, Department of Chemistry
- B. Bunce, Reactor Technician, SRO
- J. Jewel, Reactor Technician, Reactor Operator (RO)
- M. Scott, Head of Technical Services, Nuclear Radiation Center

* Denotes those individuals attending the exit interview.

2. Reactor Operations (40750)

a. General

The inspection established that reactor operations were consistent with the information provided in the licensee's annual reports of 1987 and 1988. The inspectors observed reactor operation including startup and shutdown. No deficiencies were identified.

The reactor facility continues to provide support for irradiations and research programs.

b. Organization

The organizational structure for the reactor facility was as described in Section 6.2 and 6.3 of the Technical Specifications (TS). Dr. R. Filby, former Director of the Nuclear Radiation Center (Center) resigned that position to accept the Chairmanship of the Chemistry Department, effective April 1, 1988. Dr. D. Barbee, from the veterinary medicine faculty was appointed interim Director, effective May 1, 1988. Dr. Barbee resigned his interim assignment effective May 18, 1989. Dr. W. C. Rayburn, Associate Vice Provost for Research, was designated as the new interim Director. The University has announced an opening for an individual, experienced in research reactor supervision and management, at the SRO level, to be the Director of the Center. The present Associate Director has announced his intention to retire as of June 30, 1989. No other changes in the reactor operations staff were contemplated at the time of the inspection.

Shortly before the commencement of the subject inspection the Region V office of the USNRC became aware of an allegation concerning a security matter. During the inspection the inspectors interviewed present and former facility staff members as a part of a follow-up of the allegation. The inspectors found the allegation to be without merit and established that no threat to the facility existed.

The division of radiation protection responsibilities between the reactor operations staff and the University Radiation Safety Office, which is active with respect to the Washington State licensed program, remains as described in Inspection Report No. 50-27/87-01.

The licensee's organization appears to be capable of the safe use and direction of the reactor facility.

c. Review and Audit

The Reactor Safeguards Committee (RSC) was assigned review and audit responsibilities in TS Section 6.5. Review of the records of RSC meeting minutes and audit records established that the committee had met or exceeded the requirements for meetings and reviews and audits specified in the TS. The audits were adequate for safe operation of the facility.

d. Corrective Actions for Unusual Events and Occurrences

The licensee had reported no unusual events or occurrences since the last inspection. Discussion with the licensee's staff and examination of records identified no matters which should have been reported.

e. Experiments

Discussion with licensee personnel and an examination of the records of experiments conducted since the last inspection established that no new experiments had been approved or conducted. The scope of experiments performed were consistent with previous approvals and the TS.

The records of completed experiments were maintained in three volumes identified as Shared (involving work for another university or college), University (Washington State University), and Commercial. An examination of the Irradiation Request Forms showed that the irradiations had involved various animal products, mineral samples (geological samples), and organic and inorganic chemicals or metals. In connection with the operation of the reactor, foils and wires had also been irradiated. The record review established that the Shared experiments had been reviewed last on July 14, 1988. A total of 19 experiments were addressed in the University record and 8 in the Commercial record. Discussions with the licensee's staff established that no changes to the facility, experiments or SOP's necessitating a safety evaluation pursuant to 10 CFR 50.59 had occurred.

The licensee had established an administrative limit for pulses more conservative than that imposed by the TS. The TS limit was \$2.50, however, the licensee's limit was \$2.00, based on evaluation of the fuel damage observed at the Texas A & M reactor. The licensee plans to request amendment of the TS when their evaluation is complete.

The licensee documented the results of calculations of the maximum power density in core 32A, the current mixed standard-FLIP core. The calculations showed the value to be 18.9 kw/rod which was less than the limiting value of 22 kw/rod identified in the 1979 SAR.

f. Site Tour

The facility was found to be orderly and well maintained. Records of all operators' reactor operating time were maintained. The records established that all operators had satisfied the requirements for the minimum operating time and the required number of checkouts, startups and shutdowns since the last inspection. The review of operating procedures identified no inconsistencies from the as-built system. It appeared that fuel handling could be done safely in accordance with procedures. Tagouts and jumper controls were not addressed. During the tour, confirmatory surveys were performed using an ion chamber survey meter, NRC-009163, due for calibration September 10, 1989. No concerns were identified. It was noted that postings were found to be consistent with the requirements of 10 CFR 20.203.

g. Emergency Systems

The operators verify that the emergency alarm system is operable by weekly verification with the campus police to assure that alarms are properly received. Sensors are checked on a monthly basis. The campus police participate in an annual walk through of the facility. Fire detection systems were tested by the campus fire department twice a year in addition to a check of fire extinguishers. Campus fire department personnel participate in a semiannual facility walk through.

h. Records Review

The weekly, monthly, quarterly and annual maintenance summaries as maintained in the "Preventive Maintenance Checklist for 1989" and "... 1988" were examined. No failures to perform required maintenance and tests at required intervals were identified. The following data represent a partial summary of the data examined:

<u>Parameter</u>	<u>Units</u>	<u>Range 1988</u>	<u>Range 1989</u>
Conductivity	µmhos/cm	0.47-0.76	0.61-0.75
pH		5.23-6.19	5.12-6.22
Shutdown margin	\$	-3.14 to -3.97	-3.75 to -3.77
Rod Drop Times	ms		
longest of 1,2 & 3		562	557 (April)
Pulse		687	843 (April)
Pulse test	Number	822 and 827	832

The maintenance records contained in "Maintenance Log Vol. 1 0.8" were examined. The individual records were very brief, however, the log referred to the individual Equipment Maintenance Record books which contained detailed information. Log entries were signed off by the Reactor Supervisor indicating that a review had been performed.

i. Procedures

The inspection established that the licensee's Standard Operating Procedures (SOP), required by TS Section 6.8, were maintained and changes were reviewed by the RSC as required by TS Section 6.5.4. The procedures were located in the control room.

Startup and shutdown of the reactor using SOP-4, "Standard Procedure for Startup, Operation and Shutdown of the Reactor", was observed. No deficiencies in the procedures or operations were identified.

The licensee's Administrative Procedures required approval of new and amended procedures by the Reactor Supervisor and the Assistant Director prior to implementation. RSC reviews were performed at the time of the quarterly audits. Annual review of the procedures by the operating staff was required and documented. SOP-33, "Standard Procedure for Offsite Shipment of Radioactive Materials", and SOP-34, "Standard Procedure for the Transfer of Nonfuel Devices and Experimental Apparatus into and out of the Reactor Pool", were reviewed.

j. Requalification Training

The licensee had not conducted the biennial written requalification examination at the time of the inspection. The exam was scheduled for later in the summer. The licensee was maintaining records of SRD and SRD reactor operation and facility and safety reviews by the facility operating staff and of training received.

k. Surveillance

Surveillance records, documented in the "Reactor Log", were examined for the periods March 17-26, 1988, and January 27-May 18, 1989. It was noted that higher than normal fuel temperatures were observed February 6-13, 1989, 361°-363°C, approximately 14°C higher than normal at 1 Mw steady state. The licensee had determined that the anomaly was apparently due to thermal stratification in the pool due to cold weather. Other operating parameters noted in the Log were identified in Report Section 3.h. Records. The Log was well maintained, complete and had been signed by either an RD or SRD. It was noted that all the required surveillances had been completed and documented.

In these areas the licensee's program was adequate for safe operation of the facility. No violations or deviations were identified.

3. Health Physics (40750 and 83743)

a. Posting

It was noted that Forms NRC-3 were appropriately posted. Current copies of the Form, were provided to the licensee at the time of the inspection, which were posted in place of the existing forms during the inspection. Postings of restricted areas, radiation areas and radioactive materials storage areas were consistent with the requirements of 10 CFR 20.203.

b. Personnel Monitoring

Personnel were provided with film badges and finger rings by the campus radiation safety organization. Records for all members of the reactor staff were examined for 1987 and 1988. All exposures were less than the limits specified in 10 CFR 20.101. The highest exposures were 100 and 90 mRem whole body and 930 and 380 mRem extremity in 1987 and 1988, respectively. The licensee maintained prior occupational exposure information on forms consistent with the requirements of 10 CFR 20.102.

c. Surveys

During the facility tour a survey was performed with an NRC instrument as noted in Report Section 2.f. The log identified as "Daily Survey/Daily Swipe Log, Liquid Effluent Release Records, Personnel Exposure Records 0.13", was examined. The portions of the log addressing Daily Surveys/ Swipe records, monthly neutron surveys and Holdup Tank Release Data Log were examined. No significant differences from the results of the inspectors facility survey were identified.

The licensee's health physics program applicable to the reactor facility appeared adequate to protect the health and safety of the staff and public. No violations or deviations were identified.

4. Emergency Planning and Preparedness (40750)

The report of an Emergency Drill, conducted June 8, 1988, was examined. The drill involved the transportation of an injured and possibly contaminated person to the hospital. A post drill critique was conducted. The licensee documented the review of the current operating and emergency procedures by the reactor operations staff, during the period March-April 1989. The tests of the facility alarm systems and interface familiarization of emergency response personnel with the reactor facility were previously identified in Report Section 2.g. The emergency preparedness program was adequate for the safe operation of the facility.

5. Transportation Activities (86740)

The licensee disposes of radioactive material by transfer to the Washington State licensed program. The licensee's records of shipment of

irradiated materials to other universities and commercial customers were examined. Shipping records for 1988 and 1989 were examined. The documents supporting the shipments were found to be complete and no concerns were identified. The transportation program was adequate for the safe operation of the facility.

6. Information Notices (92717)

Receipt and review of Information Notices 87-22: Operator Licensing Requalification Examinations at Nonpower Reactors, and 89-09: Credit for Control Rods Without Scram Capability in the Calculation of the Shutdown Margin, was verified. No concerns were identified.

7. Exit Interview (30703)

The scope and findings of the inspection were discussed with the individuals denoted in Report Section 1. The licensee was informed that no violations or deviations had been identified. It was the inspectors conclusion that the facility was being operated in a safe and conservative manner.