



UNITED STATES
 NUCLEAR REGULATORY COMMISSION
 REGION II
 101 MARIETTA STREET, N.W.
 ATLANTA, GEORGIA 30323

NOV 8 1989

Report No.: 50-297/89-04

Licensee: North Carolina State University
 Raleigh, NC 27607

Docket No.: 50-297

License No.: R-120

Facility Name: Pulstar Reactor

Inspection Conducted: October 3-4, 1989

Inspector: C Bassett 11/2/89
Date Signed
 C. H. Bassett, Radiation Specialist

Approved by: E J McAlpine 11/8/89
Date Signed
 Edward J. McAlpine, Chief
 Radiation Safety Projects Section
 Nuclear Materials Safety and Safeguards Branch
 Division of Radiation Safety and Safeguards

SUMMARY

Scope:

This routine, unannounced inspection involved onsite review of followup of previous enforcement issues and allegation followup.

Results:

The licensee responded in a timely and thorough manner to previously identified violations of procedures. These issues were closed as a result of this inspection.

Within the areas inspected regarding the allegation, the following non-cited violation was identified:

- Failure to follow procedures for calibration of air monitors used in the environmental monitoring program.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

W. Bowman, Associate Radiation Protection Officer
*T. Bray, Reactor Operations Manager
*T. Elleman, Acting Head, Department of Nuclear Engineering
*K. Mani, Reactor Health Physicist
R. Mangum, Supervisor, Radiation Safety
*G. Miller, Associate Director, Nuclear Reactor Program
*W. Morgan, Radiation Protection Officer

Other licensee employees contacted included technicians and office personnel.

*Attended exit interview.

2. Licensee Actions on Previous Enforcement Issues (92702)

- a. (Closed) VIO 50-297/89-01-01: Failure to Provide Adequate Training for Radiation Protection Office Personnel Performing Surveys in the Reactor Facility.

The inspector reviewed and verified implementation of corrective actions stated in the North Carolina State University response dated August 30, 1989. It was verified that the Reactor Health Physicist (Rh?) had conducted training for all Radiation Protection Office (RPO) technicians and supervisors. The topics covered included alarm systems, potential hazards, monitoring, response to emergencies, and a review of 10 CFR 19 and 10 CFR 20. This training had been conducted as indicated by training records dated October 13, 1988. Emergency response training has been provided annually for those individuals as dictated by the Emergency Plan. Further training has been given to RPO technicians by the RPO. Although this training was primarily Hazard Communication training, it did include radiation protection topics. This training, as indicated by the records, was given June 28, 1989.

- b. (Closed) VIO 50-297/89-01-02: Failure to Follow Environmental Procedures for Collecting and/or Analyzing Millipore Filters and Milk Samples.

The inspector reviewed and verified implementation of corrective actions stated in the North Carolina State University response dated August 30, 1989. The inspector verified that the millipore air filters in question had not been collected due to the fact that the air sampler had not been operational during a portion of the period reviewed. It was found that, when the air sampler had been

installed, the electricians had not run the correct wiring to the sampler. Instead of running electrical wire through a conduit to the air sampler (hard-wired), an extension cord had been used to supply the required power to the air sampler. When the area was inspected by safety personnel, the power supply situation was found to be inadequate and RPO personnel were instructed not to use the air sampler until correct wiring was installed to supply the power needed. The modifications were requested but final installation was delayed due to higher priority work on campus. The inspector verified that the modifications to the wiring had been completed May 31, 1989, and that the air sampler on the roof of the Riddick Building is now functioning properly. Air sample analyses/results from this sampler were also reviewed and no problems were noted.

In reviewing the analysis of cows milk with RPO personnel, the inspector verified that the samples had not been analyzed due to the inoperability of a fume hood in the Clark Labs where the RPO radiological laboratories are located and these analyses are performed. No negative pressure could be maintained inside the hood and a part had to be ordered to correct the problem. During the time period that the part was on order, no analyses were performed. Another fume hood in the RPO radiological lab area was operable but material had been stored inside preventing the use of the hood. In April 1989 the second hood was cleared of material and the hood was used to perform the milk sample analyses. Since then, the first hood was repaired on June 19, 1989, and the analyses are again being performed there. The inspector verified that the first hood was functioning properly and that the analyses of milk samples were being performed on a monthly basis as required.

3. Allegation Followup (99014)

a. Allegation No. RII-88-A-0085 - Statement of Concern

It was alleged that the portable instruments used to detect radiation and to sample the air at the reactor facility were not calibrated correctly. Also, it was alleged that the air monitors located on the rooftops of various buildings around campus and used in the environmental monitoring program were not calibrated properly.

b. Discussion

The inspector discussed these concerns with licensee representatives and reviewed the procedure used to calibrate the portable radiation survey instruments. The procedure, Calibration of Portable Radiation Survey Instruments, Revision 0, dated July 17, 1989, was written to give general guidance on instrument calibration and appeared to be adequate. It referred to the manufacturer's instruction manual for each instrument for specific details on calibration of that instrument. The inspector verified that the licensee had a copy of each manufacturer's instruction manual on file and that these were

used during instrument calibration. The inspector also observed the calibration of an instrument chosen at random for those on hand and verified that it was done correctly and in accordance with the manufacturer's manual. The inspector also reviewed the licensee's calibration records. Some differences were noted in which instruments were recorded as being calibrated and which instruments were in use at the reactor facility. However, the inspector verified that all instruments in use at the facility had been calibrated and had the required documentation. The licensee indicated that the apparent record keeping problem would be investigated and resolved.

With respect to air sampler calibration, the inspector determined that the licensee did not have an approved procedure for calibrating air sampling equipment. The method used to calibrate portable air samplers (high volume or Hi-Vol samplers) was discussed with licensee representatives. The licensee varied the electrical input to the air sampler being calibrated which, in turn, varied the flow rate. By placing a machined calibration assembly over the air intake and measuring the pressure change while varying the flow rate, the licensee could determine whether the air sampler was still in calibration and drawing the proper amount of air through the sampler. For the portable, Hi-Vol air samplers this method appeared to be adequate.

Through discussions with licensee representatives, the inspector determined that the air monitors or millipore pumps located on the rooftops of various buildings around campus and used to draw air through the millipore filters were not calibrated. The licensee indicated that the original environmental air monitoring system had been set up using a pump, a pressure gage and a rotameter to indicate the flow rate of the air being drawn through the filters. This did not prove to be a good system because the rotameters became plugged and needed to be cleaned frequently. The system was subsequently modified and a rotameter was installed only periodically to insure that the proper air flow was being maintained. After a period of testing and comparison of rotameter readings with the pressure gage readings, the licensee determined that the rotameters would be left out of the system entirely and that the pressure gages would be used to give an indication of the flow rate. A pressure gage reading of 20 to 25 centimeters of mercury (cm hg) was determined to be indicative of a flow rate of 30 liters per minute (lpm) plus or minus 1 liter. (The licensee indicated that the pressure gages were not calibrated either.)

The inspector indicated that, to be technically correct and defensible, the millipore pumps should be equipped with some sort of in-line rate measuring device either continuously, or at least periodically. Also, a procedure describing the calibration of air sampling equipment would be useful to ensure that the program was implemented as intended. The licensee indicated that rotameters would be ordered immediately (October 4, 1989) and that a procedure

would be developed within one month to outline the calibration program. On October 6, 1989, the inspector was informed that the licensee had located the "old" rotameters that had been used originally in the environmental monitoring system. The inspector accompanied the RPO environmental health physicist during an initial evaluation of the flow rate of the millipore pump located on the roof of the David Clark Labs building. The "old" rotameter indicated a flow rate of 28-29 lpm while the pressure gage indicated a reading of 24 cm Hg.

During a telephone call on October 20, 1989, an RPO representative informed the inspector that the recently purchased rotameters were being used to collect more data and comparison readings between the rotameters and the pressure gages. The data recorded to that date indicated that the previous assumption about pressure gage readings was generally correct. The licensee also indicated that a National Bureau of Standards (NBS) certified device was on order and would be used to periodically verify the flow rate of the millipore pumps (environmental air monitors) on campus as well as other devices.

c. Finding

10 CFR 20.106(a) stipulates that a licensee shall not possess, use or transfer licensed material so as to release to an unrestricted area radioactive material in concentrations which exceed the limits specified in Appendix B, Table II.

10 CFR 20.201(b) requires each licensee to make or cause to be made such surveys as (1) may be necessary for the licensee to comply with the regulations, and (2) are reasonable under the circumstances to evaluate the extent of radiation hazards that may be present.

10 CFR 20.201(a) states that as used in the regulations in this part, "survey" means an evaluation of the radiation hazards incident to the production, use, release, disposal, or presence of radioactive materials or other sources of radiation under a specific set of conditions. When appropriate, such evaluation includes a physical survey of the location of materials and equipment, and measurements of levels of radiation or concentrations of radioactive material present.

Technical Specifications 6.3.a.8. requires that operating procedures shall be written, updated periodically and followed for radiation control.

Licensee Procedure, Millipore Filters, ERS-MP, Revision 0, dated March 17, 1989, requires in Part G, Acceptance Criteria, that proper calibration of the Millipore pumps must be maintained in order to obtain useful air flow data.

The licensee was informed that failure to calibrate the air monitors used in the environmental monitoring programs was a violation of Technical Specification 6.3.a.8. However, the inspector also indicated that the violation was not being cited because criteria specified in Section V.A of the NRC Enforcement Policy were satisfied.

d. Conclusion

The allegation was partially substantiated in that air monitors used in the environmental monitoring program were not calibrated as required by the licensee's Technical Specifications. However, no Notice of Violation is being issued since the following criteria were met:

- (1) appropriate corrective actions were initiated before the end of the inspection,
- (2) the violation did not appear to be willful, and
- (3) the violation was not similar to prior violations for which corrective actions have not been sufficient to prevent recurrence.

Other aspects of the allegation were not substantiated because the portable radiation detection instruments were apparently being calibrated correctly and the portable air samplers were also being calibrated.

8. Exit Interview

The inspection scope and results were summarized on October 4, 1989, with those persons indicated in Paragraph 1. The licensee was informed that the previous inspection findings (listed below) were considered closed. The allegation and the findings were discussed. The licensee was informed that, although failure to calibrate air monitoring equipment was a violation of Technical Specifications, no Notice of Violation will be issued because the criteria outlined in Section V.A of the NRC Enforcement Policy were satisfied. The licensee did not identify as proprietary any of the material provided to or reviewed by the inspector during this inspection.

<u>Item Number</u>	<u>Description and Reference</u>
50-297/89-01-01	(Closed) VIO - Failure to provide adequate training for Radiation Protection Office personnel performing surveys in the reactor facility (Paragraph 2).

50-297-89-01-02

(Closed) VIO - Failure to follow environmental protection procedures for collecting and/or analyzing millipore air filters and milk samples (Paragraph 2).