U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-54/85-04
70-687/85-07

Docket No. 50-54
70-687

License No. R-81/SNM-639 Priority -1- Category UHBR

Licensee: Cintichem, Inc.
P. O. Box 324
Tuxedo, New York 10987

Facility Name: Research Reactor/Hot Laboratory

Inspection At: Tuxedo, New York

Inspection Conducted: August 19-23, 1985

Inspectors: for M. Shanbaky 10/21/85
A. Weadock, Radiation Specialist date

for M. Shanbaky 10/21/85
J. McFadden, Radiation Specialist date

Approved by: M. Shanbaky 10/21/85
M. Shanbaky, Chief, PWR date
Radiological Protection Section, DRSS

Inspection Summary: Inspection on August 19-23, 1985 (Report No. 50-54/85-04; 70-687/85-07).

Areas Inspected: Routine, unannounced inspection of the licensee's Radiation Protection Program. Areas inspected included posting and labeling, surveys and sampling, dosimetry, Technical Specification surveillances, and exposure controls.

Results: Three violations, one dealing with High Radiation Area control and posting, (Section 3) one involving labeling of radioactive material, (Section 3) and one concerning failure to perform monthly testing of the stack monitor (Section 6) were identified during the course of this inspection. .

DETAILS

1.0 Persons Contacted

During the course of this routine inspection, the following personnel were contacted or interviewed:

J. Baird, Senior Reactor Operator
J. Ditton, Lead Health Physics Technician
R. Johnston, Health Physics Associate, Senior
*C. Konnerth, Manager- Health, Safety, and Environmental Affairs
J. Kratochwil, Utility Supervisor
*J. McGovern, Site Manager
J. Musumeci, Lab Technician II
P. O'Callaghan, Radiochemical QC Supervisor
W. Ruzicka, Manager, Nuclear Operations
R. Saxton, Reactor Operator
B. Strack, Reactor Supervisor

*Present at the exit interview on August 23, 1985

2.0 Purpose

The purpose of this routine inspection was to review the licensee's radiation protection program with respect to the following elements:

- Posting and Labeling,
- Surveys and Sampling,
- Dosimetry (External and Internal),
- Technical Specification-required Surveillances,
- Exposure Controls.

3.0 Posting and Labeling

The inspector toured the licensee's facility on several separate occasions to inspect general housekeeping and evaluate the licensee's posting and labeling of radiation areas, high radiation areas, and radioactive materials. Independent survey measurements were made by the NRC inspectors using an Eberline RO-2, Serial #6298, calibrated May 16, 1985. Two apparent violations, one involving posting and control of high radiation areas and one involving labeling of radioactive material, were identified.

3.1 High Radiation Area Posting and Control

10 CFR 20.202(b)(3) defines "High Radiation Area" as "any area, accessible to personnel, in which there exists radiation originating in whole or in part within licensed material at such levels that a major portion of the body could receive in any one hour a dose in excess of 100 millirem."

10 CFR 20.203(c) requires that each "high radiation area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words: Caution - High Radiation Area."

10 CFR 20.203(3) also requires that "each entrance or access point to a high radiation area shall be maintained locked except during periods when access to the area is required, with positive control over each individual entry."

During a tour of the reactor building the inspector measured the following dose rates at the following areas:

- The glovebox in the I-125 loop process area was reading 300 mR/hr at eighteen inches from the glovebox on August 19, 1985. A general area dose rate of 50 mR/hr was measured at the gate in the fenced area surrounding the glovebox.

- On August 20, 1985, the inspector surveyed the lower level of the pump room in the reactor building and measured 150 mR/hr in the general area around the cation bed ion exchanger and general area dose rates of 250 mR/hr between the cation and anion exchangers.

Neither of the above areas was posted as a high radiation area as required by 10 CFR 20.203(c). The inspector noted that both areas were maintained locked by the reactor operations section.

The licensee maintains a locked, posted high radiation area on the upper level of the reactor building for the storage of radioactive material. While touring this area, the inspectors noted two 55-gallon drums of waste located adjacent to, but outside, this storage area.

The drums were posted with a "High Radiation Area" sign; however, the inspector noted that access to the drums was not locked or restricted. No licensee personnel were in attendance at the storage area and the inspector's progress into the high radiation area generated by the drums was not obstructed. Notations on the "High Radiation Area" sign indicated dose measurements of 150 mR/hr dated February 1985 and 125 mR/hr dated July 1, 1985. The inspector performed a survey of the drums and measured 150 mR/hr at eighteen inches from the drums and 400 mR/hr on contact with the drums.

The inspector informed the licensee that the above instances constitute apparent violation of 10 CFR 20.203, in that:

1) two high radiation areas were not posted as required; and

2) entry to a high radiation area generated by two drums of waste was not locked or restricted (54/85-04-01).

During the exit interview, the licensee indicated their awareness of the exceptions to access control of high radiation areas specified in 10 CFR 20.203(c)(4), which allows high radiation areas established for 30 days or less to be controlled against unauthorized entry by direct surveillance. The licensee stated the 55 gallon drums of waste on the upper reactor floor constituted a temporary high radiation area, and visual control of the entrance to the reactor building was being maintained by the operators. The inspector indicated to the licensee that notations on the "High Radiation Area" sign showing dose rate measurements in February, 1985 indicated that the high radiation area was established at least six months prior to this inspection and could not be considered temporary.

The licensee's HP technicians currently perform daily surface contamination surveys and monthly radiation surveys in the reactor building. The licensee indicated that, due to the nature of the operations, dose rates in the reactor building were transitory and made posting difficult. The inspector noted that, despite transitory dose rates, the low frequency of radiation surveys may have been responsible for the failure to identify the above high radiation areas.

3.2 Labeling of Radioactive Material

10 CFR 20.203(f), "Containers", requires that "... each container of licensed material shall bear a durable, clearly visible label identifying the radioactive contents." During a tour of Building 2 the inspector identified the following unlabeled material:

- Two control rod armatures, reading from 4 to 20 mR/hr on contact, were found laying on a benchtop in the machine shop. No loose contamination was found on the armatures. The two armatures were unlabeled and were found mixed in a pile of tools and scrap. No licensee personnel were present or had apparent responsibility for the material. Licensee supervisory personnel accompanying the inspector indicated that the machine shop does not routinely contain radioactive material. The licensee also indicated that all material leaving the reactor building (Building 1) is usually surveyed by HP prior to removal.

- During a tour of the upper floor of the hot laboratory facility the inspectors identified a 55-gallon, unlabeled drum reading approximately 10 mR/hr on contact. The licensee indicated that the drum was being used to store scrap material from the hot cells.

Licensee failure to label the radioactive material identified above constitutes an apparent violation of 10 CFR 20.203(f) (54/85-04-02, 687/85-07-01).

The licensee took the following corrective actions during the week of the inspection:

1) The two drums of waste creating a high radiation area on the upper level of the reactor building were moved into the locked, shielded storage area.

2) The I-125 loop process area and the ion exchanger area of the pump room, lower level were both posted as "High Radiation Areas."

3) The control rod armatures were removed from the machine shop and placed back in the radioactive material inventory.

4) The 55 gallon drum on the upper floor of the hot lab facility was labeled as containing radioactive material.

4.0 Surveys and Sampling

4.1 Surveys

Daily routine contamination surveys and monthly routine radiation surveys are performed by the Health Physics Staff for the Reactor/ Hot Laboratory facilities. In addition, special surveys are performed as required for evaluating radiological hazards associated with specific work activities.

Adequacy of the licensee's survey program was assessed by the following methods:

- independent radiological measurements performed by the inspector,
- review of selected surveys for 1984 and 1985,
- observation of an HP technician performing routine surveys,
- discussion with supervisory personnel.

Within the scope of the above review, no violations were noted. Surveys were generally thorough and appeared adequate in identifying radiological conditions. However, the frequency of radiological surveys in the reactor building was discussed with the licensee (details, paragraph 3.1).

4.2 Sampling

The inspector reviewed analytical results and licensee sampling methods for reactor pool and holdup tank water. Radioactive liquid from the reactor and hot laboratory operations are collected in a 7200 gallon tank located in the Hot Laboratory Building. Waste from this tank is evaporated and the distillate passes on to the evaporator condensate tank, where it is collected and sampled. Liquid is then passed on to one of several collection tanks, where it is stored prior to discharge to the Indian Kill Creek. Liquid from the radiochemical operations in Building 4 also passes to the collection tanks. These 5000 gallon and 10,000 gallon tanks are sampled for activity prior to discharge.

The inspector reviewed reactor pool and tank sampling records for 1984 and part of 1985 and verified that sampling was being performed at the required frequency. The inspector noted that sampling techniques vary dramatically between the evaporator condensate tank and the collection tanks. Air is continually passed through the evaporator condensate tank to promote mixing of the tank contents. Samples are obtained from the collection tanks by lowering a weighted container through a sampling port into the tank. Tank contents are not mixed prior to sampling. The inspector stated that samples from the tank collected by this method may not be representative of the tank's contents and should not be relied upon as an indicator of the tank's activity levels.

The licensee stated that the present method of sampling the collection tanks provided a suitable indication of tank contents, based on the following:

a) The limit used as a go - no go criteria for the sample was extremely conservative with respect to 10 CFR 20 Appendix B, Table I limits.

b) Until the beginning of 1985, the licensee had used a composite sampler to sample the sump in the discharge pathway between the collection tanks and the Indian Kill Creek. A licensee intercomparison of the results of analyses of the sump and the tanks indicated the tank sampling method provided an adequate representation of tank contents

The results of the licensee's intercomparison and the suitability of tank sampling methods will be reviewed in a subsequent inspection (54/85-04-03, 687/85-07-02).

5.0 Dosimetry (External and Internal)

The licensee's dosimetry program includes the following elements:

- external monitoring by film badge and TLD,
- routine measurements of thyroid burden by thyroid counting, and
- urine bioassay.

5.1 External Monitoring

The licensee contracts with Landauer to provide film badge and badge processing services. The licensee also has the capability of issuing and reading in-house TLDs and uses this capability for immediate dose assessment on high exposure jobs. The licensee also uses TLDs for extremity monitoring. The Landauer badge reading is used as the official dose record by the licensee.

The inspector reviewed exposure records for 1984 and 1985 and reviewed exposure histories for workers exceeding 1250 mrem/quarter during this time period. All required documentation was complete.

Within the scope of this review, no violations were noted.

5.2 Thyroid Assay

The licensee's SNM license requires that thyroid uptake shall be determined at least quarterly for all employees "processing and dispensing" iodine. Current licensee activities include the separation and extraction of I-131 and I-125. The inspector reviewed the licensee's implementation of a thyroid assay program by the following methods:

- discussion with supervisory personnel,
- review of the following procedures:
  - I.I Procedure for Recording Thyroid Counting Data,
  - I.II Determination of Allowable Weekly Increments of I-125 and I-131 in the Thyroid for Radiation Workers,
  - I.V Calculation of Maximum Permissible Thyroid Burden for Iodine-125,
- review of air sampling records for 1985,
- review of the thyroid assay logbook.

The inspector verified by review of the thyroid assay logbook that individuals responsible for "processing and dispensing" iodine had received quarterly thyroid counts. The licensee indicated fulfillment of this requirement was insured by holding back worker's paychecks until all required thyroid counts were completed.

Due to close proximity of working areas in the licensee's facility, personnel not specified as requiring thyroid counts could still be exposed to airborne radioiodine. The licensee stated suitable air sampling was performed to identify airborne areas. The licensee's SNM license also requires that a measurement of thyroid burden will be performed on individuals exposed to 10 MPC-HRS or greater of airborne iodine. Continuous air monitoring is used throughout the facility to identify such an occurrence. The inspector reviewed licensee continuous air monitoring results for 1985 and did not identify any instances where personnel exposure to 10 MPC-Hours or greater occurred.

5.3 Urine Bioassay Program

The licensee's SNM license requires annual urine analysis for all individuals working with open sources of radioactive material. The licensee is currently performing two types of urine analysis: gross beta-gamma counting and uranium analysis. At the time of this inspection the results of the 1984 urine analyses for uranium were not available; the licensee indicated that these assays had been performed but the results were in the possession of a staff member on vacation. Licensee fulfillment of the bioassay requirement in their license will remain unresolved pending inspector review of the uranium analysis data (687/85-07-03).

Licensee raw data for the beta-gamma analysis of urine samples was available during this inspection but was not in a finished form suitable for review until the last day of this inspection. Comprehensive review of the results of this analysis will be performed during a subsequent inspection. (54/85-04-04, 687/85-07-04).

6.0 Technical Specification Surveillances

The licens e Reactor Technical Specifications require the following surveillances and calibrations to be performed at the indicated frequencies:

Surveillance	Frequency
a) Excursion, stack and area radiation monitor calibration	annually
b) Excursion, stack, and area radiation monitor channel test	monthly
c) Excursion, stack, and area radiation monitor channel check and setpoint verification	daily during reactor operation
d) Emergency exhaust system-filter efficiency verification	annually
e) Reactor pool water activity analysis	weekly

The inspector reviewed licensee compliance with the above requirements by the following methods:

- discussion with supervisory personnel,
- review of licensee calibration and surveillance records, and
- review of applicable calibration and surveillance procedures.

The inspector determined that the licensee is completing all surveillances required above with the exception of the monthly channel test on the stack monitor. Failure to perform a monthly channel test to verify the stack monitor operability constitutes an apparent violation of Technical Specification Section 4.4(2) (54/85-04-05)

The licensee indicated that the stack monitor (consisting of three separate detectors for monitoring gas, particulates and iodine) had no built-in source for performing a channel test and consequently this test had not been performed since the inception of the Technical Specifications (dated July, 1984). The licensee indicated, however, that the stack monitor is generally exposed to licensee-generated radiation sources on the average of several times per month. These sources include actual effluent passing through the stack or large local radiation sources generated when a high activity drum of waste is removed from a hot cell. The licensee felt that monitor response in these instances indicates monitor operability. The licensee stated that monitor response in such cases would be recorded on the monitor chart recorders and could be retrieved.

The inspector indicated that the secondary use of radiation sources generated by normal operations to verify monitor operability does not meet the intent of the Technical Specifications, in that:

1) such sources are randomly generated and do not constitute a formal surveillance performed with the intent of determining monitor operability, and

2) stack monitor response has not historically been specifically evaluated at the time of exposure to such sources.

7.0 Exposure Controls

The inspector evaluated the licensee's program for providing radiological protection and exposure control for work being performed in the reactor/hot lab facilities. The licensee has a specific Radiation Work Permit system which is used to control work performed by contractors or workers not normally assigned to radiation work. The work permit specifies HP requirements and is valid only for a specific time limit.

Radiological work performed on a more frequent basis by in-house personnel is controlled primarily by direct HP coverage. Work evolutions involving the potential for significant levels of contamination or dose rates are reviewed by HP supervision who then establish radiological controls.

The inspector noted that the radiological survey forms used for performing job-specific surveys contain check-off lists that indicate radiological controls implemented (respiratory protection, extremity TLD's, etc). Review of surveys, air sampling records, and the HP logbook indicated that HP coverage was provided for all major work evolutions.

On August 23, 1985 the inspector toured the reactor and hot laboratory areas and observed two jobs in progress: operation of the I-125 loop in the reactor and the pulling of a remote manipulator from hot cell #4 in the Hot Laboratory.

Work on the I-125 loop in the Reactor building involved pumping noble gas from the core to a shielded container in a glovebox outside the reactor pool to allow for plateout of I-125. This operation can produce high transient dose rates. The inspector discussed this operation with the operators performing it and determined that:

a) personnel were aware of the radiological implications of their work,

b) the operating procedure had appropriate hold points requiring radiological surveys, and

c) appropriate surveys were being performed and documented by the operators.

The inspector also discussed radiological survey techniques and the use of survey meters with the operators and verified the operators had received appropriate training in this area.

At approximately 10:00 a.m. on August 23, 1985 the inspector observed licensee personnel pulling a contaminated remote manipulator unit out of hot cell #4. One worker, wearing a respirator and a full set of protective clothing, was wiping down the manipulator as it was slowly pulled out through the hot cell penetration. The inspector later reviewed survey results and discussed the procedure with the involved HP technician and determined that:

a) the worker wore extremity monitoring as required,

b) the HP technician providing coverage was familiar with the operation and associated radiological hazards,

c) appropriate ventilation was used, and

d) air sampling and follow-up surveys were performed.

The following concern was identified in association with the manipulator pull operation:

The individual performing the manipulator wipedown was standing on a ladder and his head was consequently approximately 10 feet off the floor. Air sampling for this operation was provided by a continuous air monitor, located approximately 10 feet away with a filter intake height of approximately 4-1/2 feet off the floor. The inspector stated that the air being sampled may not be representative of the air in the worker's breathing zone.

The licensee indicated that the manipulator pull operation was a routine one and consequently air flow patterns in the room and air sampling methods had been previously evaluated. Portable air samples had been taken in the worker's breathing zone in previous instances and compared with samples taken using the continuous air monitor, and the licensee determined that the air monitor provided representative sampling. The inspector did not have the opportunity to review the licensee's evaluation during the course of this inspection. This area will be reviewed during a subsequent inspection (54/85-04-06, 687/85-07-05).

8.0 Exit Interview

The inspector met with licensee personnel denoted in Section 1.0 at the conclusion of the inspection on August 23, 1985. The scope and findings of the inspection were discussed at that time. At no time during this inspection was written material provided to the licensee by the inspector.