

U. S. NUCLEAR REGULATORY COMMISSION  
REGION I

Report Nos. 50-54/91-03 and 70-687/91-03

Docket No. 50-54 and 70-687

License No. R-81 and SNM-639

Priority 1

Category UHBR

Licensee: Cintichem, Incorporated  
P.O. Box 816  
Tuxedo, New York 10987

Facility Name: Reactor and Hot Laboratory

Inspection At: Tuxedo, New York

Inspection Conducted: May 22-24, 1991

Inspector:

for

Michael A. Austin, Radiation Specialist  
Effluents Radiation Protection Section (ERPS)  
Facilities Radiological Safety and Safeguards  
Branch (FRSSB)

6/18/91  
date

Approved by:

Robert J. Bores, Chief, ERPS, FRSSB,  
Division of Radiation Safety and Safeguards

6/18/91  
date

Inspection Summary: Inspection on May 22-24, 1991 (Inspection Report  
Numbers 50-54/91-03 and 70-687/91-03

Areas Inspected: Inspection of licensee's activities to observe ongoing decontamination operations and to review licensee's actions related to a contamination incident on May 6, 1991.

Results: A concern regarding a breakdown in the radiation protection program for workers, as a result of three apparent violations, was identified. The three violations are: (1) failure to adequately evaluate radiation hazards related to a radwaste handling operation (Paragraph 3.3); (2) failure to adequately specify health physics requirements in a Radiation Work Permit (RWP) procedure (Paragraph 3.3); and (3) failure to have written procedures and follow the RWP procedure for a radwaste handling operation (Paragraph 3.4).

## DETAILS

### 1.0 Contacts

- \*J. Adler, Co-Project Manager, Decommissioning
- L. Glander, Health Physics Supervisor
- J. McGovern, President and Plant Manager
- F. Morse, Manager, Decommissioning
- \*L. Thelin, Staff Health Physicist
- \*E. Truskowski, Manager, Health, Safety and Environmental Affairs

\*Denotes those present at the exit interview. The inspector also interviewed other licensee employees during the inspection.

### 2.0 Facility Tour

The inspector was accompanied by the Manager, Health, Safety and Environmental Affairs (HS&EA) during a tour of the reactor and hot laboratory facilities. The inspector observed workers preparing the hot cells and some equipment located therein for upcoming decontamination with high-pressure water spray wash equipment. The inspector also examined the area behind the hot cells where a contamination incident had occurred on May 6, 1991. The relative locations of personnel and monitoring equipment during that incident were reviewed. No unsafe conditions, violations or deficiencies were identified during the tour of the facilities.

### 3.0 Contamination Incident

#### 3.1 Background

Region I was informed by the licensee via telephone on May 7, 1991, that, while three members of the licensee's staff were repackaging radwaste, a puff of airborne contamination was released to the room. The three workers, all of whom were wearing respirators, and 12 other workers in the vicinity of the incident, were whole body counted at another licensee's facility. The licensee stated that the whole body counts indicated none of 15 workers received an uptake of regulatory significance.

#### 3.2 Sequence of Events

A few months before the current inspection, the licensee had cut open the lid of a sealed high integrity container (HIC) to remove the contained radwaste. After removing the radwaste, the cut-out lid was placed inside of the empty, used HIC. Subsequently, this HIC was placed in a B25 shipping package for eventual transport to a commercial burial site. A radiation survey indicated that the HIC was causing radiation levels on the outside surface of the B25 package in excess of the 200 millirem/hour dose limit permitted by Department of Transportation (DOT) regulations. The measured dose rate on the

surface of the HIC was about 40 Roentgens (R)/hour, which created a dose rate of about 3 R/hour on the surface of the B25 package. The licensee determined that the measured dose rates were caused by residual particulate contamination on the inside surface of the HIC.

On May 6, 1991, the Radwaste Supervisor decided that the HIC should be cleaned to reduce the external radiation levels of the B25 to a level below the permissible limit for transportation. A Radiation Work Permit was issued by the Health Physics (HP) Supervisor for the task.

The operation began at approximately 1330. A forklift was used to remove the lid from the B25 package, then the accessible inner surfaces (sides) of the HIC were cleaned, and the B25 lid was replaced. Radiation measurements indicated that the B25 still exceeded the permissible DOT limit, so the B25 was reopened to clean the bottom inside surface of the HIC. During this second opening of the B25, a worker attempted to lift the cut-out lid from the bottom of the HIC so that this inside surface could be cleaned. During this attempt, the cut-out lid fell back into the HIC, creating an observable plume of dust, and the work was temporarily stopped. After the observable airborne dust had settled, the work was resumed. Radiation measurements taken after the second cleaning of the inside surface of the HIC indicated that the radiation levels were within the DOT limits, and the licensee considered the cleaning operation completed. The entire cleaning operation took about 40 minutes.

After the cleaning operation was completed, personnel monitoring and initial smear surveys of the work area indicated that a significant release of radioactive material had occurred. Additional surveys revealed that contamination levels ranging from about 5,000 to 20,000 disintegrations per minute (dpm)/100 cm<sup>2</sup> had spread throughout the work area and above and behind the hot cells, including into the adjacent pit building. As a result, routine operations in Building 2 were stopped for approximately the next two days while an extensive cleanup effort was undertaken. Routine operations resumed following completion of the cleanup.

### 3.3 Preparation and Implementation of Radiological Controls

The inspector reviewed the RWP issued for the work that resulted in the contamination incident. The inspector noted that the RWP did not require that a CAM be used to monitor the work area during the operation. The RWP did not specify the type of respiratory equipment to be used by workers. The RWP did not specify which workers were required to wear PASs to monitor airborne exposures. The RWP did not specify hold points in the operation during which the workers and the work area should be monitored for possible contamination caused by the handling of the radwaste materials. The RWP did not specify where or how the work zone was to be identified with physical barriers. These inadequacies led to some personnel being present without

respirators in the same zone as those workers with respirators. Section 3.1.1 of the NRC-approved application for License No. SNM-639 requires that the RWP be written to specify the HP requirements for personnel performing the job. The failure of this RWP to adequately specify the HP monitoring and control requirements for the job that caused this contamination incident is an apparent violation of an NRC license condition (687/91-03-01).

The poor planning for this operation which contributed to the above-described preparation of an inadequate RWP also demonstrated that the licensee had failed to adequately assess the potential airborne contamination that could result from the resuspension of radioactive particulates from the HIC. Consequently, the licensee also did not adequately assess the possible inhalation exposures that could be received by personnel performing the operation.

During the HIC cleaning operation, two HP technicians were present to observe and monitor worker activity. When the visible plume of dust occurred during the second attempt to clean the HIC (see paragraph 3.2), the HP technicians temporarily stopped the work but did not perform any surveys prior to resuming work to determine if any release of radioactive material had occurred. During the cleaning operation, the alarm sounded on a continuous air monitor (CAM) located on the second floor of the facility. The second floor is open to the air space above the work area. The HIC cleaning operation was not stopped at that time to identify the cause of the apparently elevated airborne radioactivity levels. Following the observable airborne release of dust during the second mopping of the HIC, surveys were not immediately performed to determine if any significant personnel exposures or spread of contamination had occurred. The first indication of the severity and extent of the contamination did not come until after the work was completed and followup smear surveys and personnel monitoring were performed. Preliminary analysis of a personal air sampler (PAS) filter indicated a possible worker exposure of approximately 540 MPC-Hours, a value in excess of the exposure limits given in 10 CFR 20.103(a)(1) (see paragraph 3.6). 10 CFR 20.103 requires, in part, that no licensee shall permit any individual to inhale radioactive material in excess of the limits specified in paragraph (a) (1) of that section. 10 CFR 20.201(b) requires, in part, that each licensee shall make such surveys as may be necessary to comply with the regulations in that part. The failure of the licensee to adequately assess the possibility of airborne contamination and inhalation exposure during planning for this HIC cleaning operation, the failure to perform a radiation survey after observing a visible release of airborne material, and failure to evaluate the radiation hazard indicated by the CAM alarm constitute an apparent violation of 10 CFR 20.201(b) (687/91-03-02).

### 3.4 Procedures

The cleaning operation was performed without any written operating procedure. This contamination incident indicated that the licensee had not prepared operating procedures for all the radwaste handling activities. The lack of written procedures contributed to the incident which was exacerbated by the licensee's failure to follow a number of the RWP procedural requirements for the cleaning operation. For example, contrary to RWP requirements, a zone was not established to contain the contaminated work area, a floor covering was not placed beneath the operation in the work area, and workers, who were not wearing respirators, entered the work area.

Section 2.7(c) of the NRC-approved license application for License No. SNM-639 requires that written procedures be established for all processes pertinent to radiation safety, such as waste processing and packaging. Section 2.7(h) of the NRC-approved license application states that non-routine operations which involve process safety issues will be normally done according to written procedures. Failure to conduct this operation according to written procedures and failure to have a written operating procedure for the radwaste handling activity which led to this contamination incident were identified as apparent violations of an NRC license condition (687/91-03-03).

### 3.5 Personnel Exposure Evaluations

Preliminary analysis of the PAS filter of one worker initially indicated an exposure of 544 MPC-Hours. An isotopic analysis of the filter contaminants was performed to provide data to calculate the effective MPC for this specific mixture of radionuclides. Using the effective MPC and the gross alpha plus gross beta-gamma activity measured on the PAS filter, the possible exposure was calculated to be as high as 963 MPC-Hours. Fifteen employees who were potentially exposed to contamination from this incident were whole body counted and all but one individual showed less than detectable activity. For the one individual with a positive result, the value was very near the minimum detectable activity and, therefore, did not represent a significant intake. The inspector discussed the evaluation of the potential personnel exposures with the licensee's staff health physicist. The inspector stated that the intake exposure to each individual involved in this incident should be quantitatively estimated and formally recorded. The inspector further stated that if air sample measurements were deemed not representative of actual worker exposure, then other measurements, such as whole body count data, should be used to derive and assign an MPC-Hour exposure value for each individual. Based on a review of the raw bioassay data, the inspector determined that no significant personnel exposures resulted from this incident. However, the licensee's evaluation and assignment of worker exposures from this incident will be reviewed in a future inspection (Inspector Followup Item 687/91-03-04).

#### 4.0 Management Review

As a result of this incident, the Nuclear Safeguards Committee (NSC) held meetings on May 8 and 10, 1991. During these meetings, the NSC members reviewed the entire incident in detail, identified the specific problems and mistakes that were made, and proposed recommendations to address the identified deficiencies. In addition, during its weekly Decontamination and Decommissioning (D&D) meetings, the licensee established a plan to assign specific responsibility for various corrective actions and to monitor progress made to comply with the NSC recommendations. Based upon review of NSC meeting minutes and discussions with licensee representatives, the inspector determined that licensee management had attempted to conduct a forthright self-assessment and develop an action plan to identify and correct programmatic deficiencies which contributed to this contamination incident.

#### 5.0 Exit Interview

The inspector met with the licensee representatives denoted in paragraph 1.0 at the conclusion of the inspection on May 24, 1991. The inspector summarized the scope of the inspection and the findings. On May 31, 1991, the inspector conducted a telephone discussion with the Plant Manager and members of his staff to further review the findings of this inspection.