DETAILS

1.0 Persons Contacted

M. Adams, BMRC Operations Manager
L. Henry, SUNY-Buffalo
M. Pierro, SUNY Radiation Safety Officer
J. Slawson, BMRC Senior Health Physicist
D. Vasbinder, BMRC Director/Analytical Services Manager

All above personnel attended the Exit Interview on December 10, 1993.

2.0 Organization and Staffing

On the first day of this inspection the licensee announced changes in the upper management organization of the facility. The Buffalo Materials Research Center (BMRC) General Manager (Mr. L. Henry) resigned from the contractor, Buffalo Materials Inc.(BMR), that operates the BMRC for SUNY-Buffalo and transferred to SUNY-Buffalo as a special assistant to the Vice President for Research. The president (Mr. L. Henken) of Materials Engineering Associates (MEA), the parent company for BMR, became the BMRC General Manager and assumed all administrative responsibility. The General Manager will remain located at the MEA corporate headquarters. The BMRC Manager of Analytical Services (Mr. D. Vasbinder) became the BMRC Director, a position that has been vacant for several years. The licensee stated that these changes may be temporary pending the outcome of negotiations to renew the contract between SUNY and MEA/BMR which expires in March 1994. The inspector noted that the positions affected by these changes did not have specific training or qualification requirements delineated by the Technical Specifications nor specific qualifications recommended by ANSI Standard 15.4, "Selection and Training of Personnel for Research Reactors". The inspector also noted that the line management and personnel in the facility reactor operations and health physics departments had not changed. Within the scope of this review, no safety concerns were noted. The status of the organization will be reviewed during the next inspection.

3.0 Primary Heat Exchanger Tube Leaks

Primary water from the reactor pool flows through the shell side of an aluminum heat exchanger and is cooled by secondary water from the cooling tower flowing through the tube side. The cooling tower is filled from the city water system and overflows to the sanitary sewage system. Technical Specification (TS) 4.5.3 requires the licensee to monitor water additions to the reactor pool. TS 4.6 requires monitoring of liquid wastes discharged to the sanitary sewer system. The licensee conducted weekly gross beta-gamma activity analysis on the secondary water. On September 7, 1993, the licensee noticed that about 5 extra gallons of make-up water were needed to replace evaporation

from the pool that week. Make-up was expected to be about 30 gallons for that week. A sample of secondary water taken from the heat exchanger revealed detectable sodium-24 (Na-24), which is the most prevalent radioactive isotope in reactor water during operation. Licensee management concluded that a primary-to-secondary leak occurred in the heat exchanger and ordered the reactor shut down. A radiological survey in and around the cooling tower was conducted which included: water and sludge in the cooling tower basin, and airborne particulate activity, surface soil, and vegetation in areas adjacent to the tower. Water, soil, and vegetation samples were also taken by two New York State (NYS) agencies - Department of Health (DOH) and Department of Environmental Conservation (DEC). No activity was detected in samples taken outside the cooling tower. The licensee detected Na-24 in cooling tower water taken soon after the leak was detected. However, this material decayed quickly due to its 15 hour half-life and was not detected in later samples. The state agencies reported trace quantities of antimony-124 and iodine-131 in tower water, but the concentrations were well below discharge limits. The Nuclear Safety Committee (NSC) met on September 10, 1993, and approved the proposed corrective actions identified below. On September 13, 1993, the cooling tower water was drained to the sanitary sewer and the sludge in the basin was removed and placed in disposal drums until it can be classified. The heat exchanger was disassembled and inspected. Only one tube in the heat exchanger was found to be leaking. This tube was plugged, the heat exchanger was reassembled, the primary and secondary water systems were refilled, and the reactor returned to routine operation with increased surveillance on pool level and secondary water activity.

Corrective actions taken included increasing the frequency of gross beta-gamma analysis of secondary water from weekly to daily in order to assure more prompt detection of any additional leaks. Further, the counting apparatus was changed from a thin window Geiger-Müller (G-M) detector to a phoswich detector in order to increase the detection sensitivity. This improved the minimum level of detection for Na-24 from about 5E-7 μCi/ml to about 1E-7 μCi/ml. These values are about 0.1% of the discharge limit for Na-24 in water to the sanitary sewer. On December 6, 1993, the daily sampling again detected Na-24 at the minimum detectable activity (MDA) concentration in the secondary water. The reactor was shut down and the radiological surveys in and around the cooling tower were repeated. The NYS Department of Health also responded but these survey results were not available during the inspection. Due to the early detection of the leak, the licensee only identified MDA levels of Na-24 in the cooling tower water. Inspection of the heat exchanger revealed that two additional tubes had failed. These tubes were plugged and the heat exchanger was undergoing hydrostatic testing during this inspection. There are a total of 454 tubes in the heat exchanger.

The Director stated that, pending review by the NSC and SUNY management, the actions to be taken in response to the tube failures will include the following:

1) Sampling of secondary water will be increased to twice daily, with one of the samples to be analyzed on a sensitive gamma detection system to detect gamma only emitters.