UNITED STATES
NUCLEAR REGULATORY COMMISSION
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MEMORANDUM FOR: William T. Crow, Section Leader
Uranium Fuel Fabrication Section
Division of Fuel Cycle and Material Safety, NMSS

FROM: David P. Notley, Fire Protection Engineer
Engineering Methodology Standards Branch, OSD

SUBJECT: FIRE SAFETY VISIT OF BABCOCK AND WILCOX LYNCHBURG RESEARCH CENTER

The purpose of this memo is to report on my visit to the B&W Lynchburg Research Center. The visit was necessary to complete your Request for Technical Assistance - Fire Safety Review in Connection with the B&W Application for Renewal of License SNM-778, Docket 70-824. I visited the center on Monday, July 23, 1979, and toured the facility with the following persons:

C. E. Bell, Manager, Facilities
J. W. Cure, Supervisor, Health and Safety
L. J. Hill, Corporate Fire Protection Engineer
A. F. Olsen, Licensing Administrator
W. R. Younger, Plant Engineering Supervisor

In addition to the above, R. R. Spradlin, Industrial Safety Officer, was present for, and participated in, the close-out meeting.

The site visit, and discussion during the close-out were based primarily on the comments contained in my memo to you dated April 17, 1979.

Work done at the Lynchburg Research Center consists of product and process development as well as customer service analysis of goods and materials. The center includes a broad spectrum of laboratories in the physical sciences such as chemistry, ceramics, mechanical, and metallurgical. The nuclear facilities comprise about 50% of the total floor space and about 50% of total work effort.

The buildings are of non-combustible and fire resistive construction. Housekeeping was Good to Excellent in those portions of the facility that I visited.

The nuclear portion of the LRC consists of facilities for:

a. nuclear fuel development

b. non-destructive and destructive metallographic examination of irradiated fuel and/or components

c. physics experiments using one of two low power critical assemblies

d. development and/or calibration and testing of various nuclear instruments

A brief description follows of individual facilities visited in each building.

Building A

Those facilities in Building A that are included in this licensing application include: 1) a counting room; 2) a room where boron concentration meters are assembled and/or calibrated; 3) a critical assembly; and 4) a pool reactor. Housekeeping was excellent throughout the building. Installed automatic fixed fire protection consisted of ionization type smoke detectors located in the control console area of the critical assembly and the pool reactor, and two sprinkler heads over a flammable liquid storage area in a basement section of the pool reactor area. Standpipe and hose installations and portable fire extinguishers are located throughout the building for manual fire fighting effort.

Building B

Destructive and non-destructive metallographic examination of irradiated fuel and other reactor components is done in Building B. Most work is done in one or more of four shielded hot cells equipped with master-slave manipulators for remote operation. The hot cells are presently protected with fixed manually operated total flooding CO_2 fire suppression. A Halon 1301 fire suppression system is on order and will become the primary fire suppression capability in the hot cells with the manual CO_2 system retained as back-up. The new halon system will be automatically actuated by rate compensated fixed temperature thermal detectors.

Chemical analysis of dilute samples that have been prepared in the hot cell is done in the Radio Chemistry laboratory in open face chemical hoods. Work load has decreased to the point that B&W plans to dispose of a number of the chemical hoods. An installed perchloric acid hood is to be retained for possible future use.

Fire protection consists of portable extinguishers and standpipe and hose installation for manual fire fighting. Smoke detectors are on order for the hot cell area.

Ventilation for the portion of Building B covered by this license is once through with discharge through either the hot cells or the chemical hoods. The hot cells are connected to the building exhaust system with steel ducting and discharge air passes through two banks of HEPA filters. The chemical hoods are still connected to the building exhaust system with polyvinyl chloride ducting and discharge air passes through only one level of HEPA filtration.

The perchloric acid hood vents directly to the outside by means of steel ducting through the roof. Since no work involving plutonium or fission

products is done in this hood, no HEPA filters are installed. This hood has not been used for three or four years and will not be used again until new operating and safety procedures have been developed.

Building C

The nuclear fuel development facilities in Building C consist of equipment for fabrication and assembly of fuel tubes - oxide compaction presses, grinders for finished sizing of pellets and tube loading. Tube evacuation, helium back filling and final welding capabilities are not installed at the LRC. Glove box lines are installed for fabricating fuel tubes using either uranium oxide or mixed uranium - plutonium oxide. All mixed oxide fuel development has been discontinued; no uranium oxide fuel development work has been conducted for some time, and none is contemplated in the immediate future.

The level of work activity has declined to the point that B&W has concluded they should dispose of a substantial number of the older glove boxes. About 40 boxes will be filled with a plastic foam to fix remaining surface contamination in place, then packaged in Type A shipping containers and transported to a commercial burial site.

Housekeeping in the general area and inside the glove boxes is Good.

Combination Rate-of Rise/fixed temperature thermal fire detectors are installed throughout the former mixed oxide area of the building.

Building J

Building J is a small detached structure of unprotected metal construction used for drum storage of low level contaminated solid waste prior to shipment to a commercial disposal site.

General

All fire alarms go to the main LRC control panel in Building B, which is attended only during normal working hours, and to the site fire department at the B&W Navy Fuel Fabrication Plant which is adjacent to the LRC. The Navy Fuel Fire Department responds automatically to LRC fire alarms only during other than normal working hours. During normal working hours, the LRC Fire Brigade has primary responsibility; however, the Navy Fuel Fire Department is on standby and will respond if requested by LRC management.

Agreement was reached on the following items during the close out meeting after the site visit.

The present PVC ducting in the exhaust system from the various glove boxes and hoods is acceptable as long as the present stand-by status continues. If and when this condition changes, the PVC ducting will be replaced with steel piping (as was done several years ago for the Hot Cells) before these glove boxes or

hoods are used for work with plutonium or irradiated fuel. No change will be required in the ventilation system ducting for those hoods or boxes used only for unirradiated materials including enriched uranium.

At this point, Mr. Olsen asked if the PVC ducting would be acceptable if B&W committed to some (to be determined) small quantity of material in a glove box or hood, and they could show that a fire involving the ducting would not release contamination to the environment exceeding the limits of 10 CFR Part 100. I told the group that the existing ventilation system installation is acceptable on this basis if NMSS would approve release inside the building (not to exceed 10 CFR Part 20) of plutonium or fission products due to fire involving the PVC ducting. This is an open item between B&W and your office that must be resolved if B&W is to start up their operation again without replacing the PVC ducting with steel.

B&W also proposed a heat sensor in the duct upstream of the final filter, so arranged that a high temperature signal would shut down the fan to protect the final filter from excessive temperature. This seems to be a variation of the above proposal to release contamination inside the building and depend on the structure itself to contain the contamination and prevent unacceptable release to the environment.

Other specific items in my memo of April 17th to you were resolved as follows:

Section 2 - Organization and Support Services will be expanded to identify the specific lines of responsibility for fire protection that exist at the LRC.

Section 3 - Description of Site, Facilities, and License Activities will be expanded to describe fire protection systems and equipment provided throughout the LRC.

Section 3.4.5 - Radiochemistry Laboratory will be expanded to describe the kind of review that is undertaken prior to beginning each new process or procedure in order to identify potential hazards and evaluate safety provided.

Section 4 - Health and Safety will be expanded to describe the various levels of responsibility that exist for fire protection. Also,

Section 4.6.4 - Fire Control will be expanded to describe the training program as it exists, and upgrade any training that may be deficient.

In conclusion, B&W was informed that in the future close liaison between the LRC personnel and the B&W Corporate Fire Protection Engineer, Leroy Hill, who

is located at Lynchburg, was expected. This should be understood as a mandatory requirement to assure the kind of professional contribution in fire protection that is required at the LRC.

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