OPTIONAL FORM NO. 10
MAY 1962 EDITION
GSA GEN. REG. NO. 27
5010-107

UNITED STATES GOVERNMENT

Memorandum

TO : File, 19-1398-29

DATE: February 2, 1965

FROM : W. H. Ray, Irradiated Fuels Branch
Division of Materials Licensing
W. H. Ray

SUBJECT: VENTILATION PERFORMANCE REVISIONS

A letter from the Martin-Marietta Corporation dated January 12, 1963 submitted revised minimum pressure differential data for Table 6.3 of MND-3137 relevant to the performance of ventilation in the hot cells used for Strontium-90 processing at Quehanna, Pennsylvania. Also, a revision was submitted of paragraph 6.6.1 of MND-3137, which describes the routing of ventilation into the outer enclosure of the Stationary Overhead Transfer System (SOTS). These revisions describe conditions found feasible for operation of the remodeled plant, and were submitted with a request for DML concurrence prior to the initiation of tracer operations with Strontium-89.

Although nearly all the minimum pressure differentials in the revised Table 6.3 are reduced from the preceding ones, they are sufficient to induce air flow velocities in excess of 1200 ft. per minute through leakage or other openings between the referenced spaces. An improvement derives from the apparent intent to operate with the doors between the cells and their respective isolation rooms normally closed, rather than open, as was the previously indicated plan.

Perhaps of most significance is the reduction of the minimum suction in Cell 4 from 0.5" to 0.3" water gauge. This effects two factors considered previously in the safety analysis. Paragraph 12.8.2 of MND-3137 shows that it would be impossible to pump contaminated air from within a manipulator boot out through the cell wall with a 0.5" pressure differential between the operating gallery and Cell 4. We have performed a recalculation, taking into account the reduced velocity through the manipulator passage in the cell wall that will result from a minimum pressure differential of 0.3" water gauge, and are convinced that the pumping of contaminated air from within a manipulator boot to the operating gallery is still impossible.

The other factor considered, although not spelled out, is the pressure differential between Cell 4, where the strontium processing will be conducted within a separately exhausted process box enclosure, and the adjacent Cells 3 and 5, used for waste and product removal, respectively. The revised minimum pressure differential schedule implies that the static pressure in Cell 4 will likely exceed that maintained in Cells 3 and 5, the reverse of the previously considered differential.

B-52

On January 22, Mr. Ray, DML-IFB discussed this matter with Mr. M. J. Gaitanis of the Quehanna plant via telephone, and Mr. Gaitanis indicated that passages through Cell 4 walls (for pipes and transfer locks) were well caulked. Presumably, there is no direct passage between Cells 3 and 4. But there is a product transfer air lock from the Cell 4 process box which penetrates the wall between Cells 4 and 5. During a visit to the plant March 24, 1964, Mr. Ray observed streaks on the wall in Cell 5 around a cover plate then mounted in Cell 5 to close this opening. These streaks appeared to be deposited from dirt generated by sand blasting then being performed in Cell 4.

The work in Cell 5 will deal with encapsulated strontium and should be relatively free from contamination. In Cell 3, solid wastes from the process are to be transferred into barrels for shipment. The Process Box enclosure should keep contamination in Cell 4 to a minimum, so it is not clearly established that pressure differentials should favor flow of leakage air (if there are any leaks) from Cells 3 and 5 to Cell 4, or the reverse. Since the reverse condition will likely prevail under the revised pressure differential schedule, it may be reasoned that even if contamination were to make its way from Cell 4 into Cells 3 and 5, that this would merely constitute an operating inconvenience, and would not be a safety hazard. Health physics surveys will be performed prior to cell entries to determine the protection that will be required by persons entering the cells to change waste drums, to introduce or remove transfer casks, or to perform other work. And the suction maintained in Cells 3 and 5, if greater than that in Cell 4, is, to that extent, even more capable of preventing the escape of contaminants from these cells.

The possibility of lower pressure prevailing in Cell 3 than in Cell 4 raised a question regarding the differential pressure between the SOTS downcomer in Cell 3 and Cell 3. Mr. Gaitanis was called regarding this matter January 25, and revised Tables 6.3 and 6.4 were submitted on January 27, 1965 establishing zero as the minimum differential pressure and 0.05" water gauge as the operating differential pressure between Cell 3 and the SOTS downcomer. This signifies that when the SOTS downcomer door at the Cell 3 ceiling level is closed, and the bag out operation is not active, the pressure differential may be reduced to zero, but that it will not be reversed so as to force contaminants from the bag out system into Cell 3.

The revision of paragraph 6.6.1 of MND-3137 provides for admitting ventilation air into the outer SOTS containment from the service area through an absolute type filter, rather than venting the outer SOTS compartment to the Cell 3 atmosphere via an absolute type filter. This independently controlled supply is adjusted to maintain the pressure in the outer SOTS enclosure above that in either Cell 3 or Cell 4, thus assuring that the outer SOTS will function as a secondary containment above both cells.

In view of the above considerations, it is recommended that the revisions specified in the submission of January 27, 1965 be approved by the issuance of an appropriate amendment to License 19-1398-29.