April 10, 2000

MEMORANDUM TO: Edward J. McAlpine, Chief
Fuel Facilities Branch
Division of Nuclear Materials Safety
Region II

FROM: James Lyons, Deputy Director **/RA/**
Technical Review Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

SUBJECT: HOLTEC CALCULATIONS TO SUPPORT INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI) DEMONSTRATION (TAC NO. V24458)

Your memorandum, dated March 9, 2000, requested that the Spent Fuel Project Office (SFPO) review the Holtec International (Holtec) calculations[1] that assess the helium temperature in the multi-purpose canister (MPC) after the water in the annulus between the overpack and the MPC stops boiling. You also requested that SFPO review the calculation performed to demonstrate that the temperature of the helium exiting the pre-cooler in the helium cooldown skid will be less than or equal to 140 degrees Fahrenheit (ºF).

SFPO reviewed the Holtec calculation package that arrived at the following conclusions:

a. Steady-state temperature rise of the water in the annulus between the MPC and the overpack inner wall is 14 ^{o}F
b. Steady-state MPC gas temperature with annulus water cooling is 246 ^{o}F. This conclusion was arrived using the FLUENT computer code.
c. Time to cool the MPC gas to 300 ^{o}F with annulus water cooling is 33 hours.
d. Time to cool the MPC gas to 200 ^{o}F with helium circulation is 25 hours.
e. The helium precooler outlet temperature was calculated using the performance characteristic provided by the vendor of the heat exchanger.
f. The helium aftercooler heat duty is within the design specifications of the heat exchanger.

The analysis using the FLUENT computer code (b, above) took credit for natural circulation cooling by the helium gas inside the MPC. While the staff has not approved this modeling

[1]Holtec Report No: HI-992340, "Calculation Package on the Performance Characterization of the MPC Cooldown System (Holtec Ancillary Nos 307 & 332)," Author date February 10, 2000.

technique that credits natural circulation cooling of the helium gas, crediting that mode of cooling is appropriate. Given Holtec's benchmarking of its model with Idaho National Engineering and Environmentla Laboratory full scale spent nuclear fuel cask experiments, the staff has reasonable assurance that the results from the calculations are acceptable.

In summation, the staff finds the HOLTEC analyses acceptable.

Docket Nos.: 72-1008, 72-1014, 72-36

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In summation, the staff finds the HOLTEC analyses acceptable.

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