Docket No. 50-320

Mr. F. R. Standerfer
Vice President/Director THI-2
GPU Nuclear Corporation
P. O. Box 480
Middletown, PA 17057

Dear Mr. Standerfer:

Subject: Temporary Reactor Vessel Water Filtration System (TRVWFS)

Reference: Letter 4410-86-L-0029, F. Standerfer to W. Travers,
Safety Evaluation Report for the TRVWFS

The staff completed a safety review and approves operation of the subject system. Concurrently, the staff has reviewed and approved the related procedures per Technical Specification 6.8.2. This letter transmits our Safety Evaluation. Our Safety Evaluation concludes that the operation of the system does not constitute an unreviewed safety question and is within the scope of activities discussed in the PEIS.

Sincerely,

/s/ C. Cowgill for

William D. Travers
Director
Cleanup Project Directorate

Attachment: TRVWFS Safety Evaluation

cc: T. F. Demmitt
    R. E. Rogan
    S. Levin
    W. H. Linton
    J. J. Byrne
    A. W. Hiller
    Service Distribution List
    (see attached)
Introduction:

Operation of the Defueling Water Cleanup System (DWCS) revealed that the differential pressure across its filter canisters tends to increase rapidly. As the differential pressure increases, the reactor coolant processing flow rate decreases. Consequently, only a relatively small amount of reactor coolant can be processed before the maximum design pressure is reached and the filter canisters have to be replaced. The probable cause of this problem is the growth of microorganisms in the reactor coolant. This phenomenon has increased such that the amount of reactor coolant that can be processed between filter canister change-outs decreased from 250,000 gallons initially to about 45,000 gallons during the third change-out. While the licensee is investigating the problem and developing a program to permanently correct the situation, a Temporary Reactor Vessel Water Filtration System (TRVWFS) has been proposed to improve the visibility in the reactor vessel such that defueling activities can continue.

System Description:

The TRVWFS consists of a 75 gpm pump, a diatomaceous earth precoated filter assembly, a spent filter precoat waste collection drum, a gamma radiation monitor, radiation shields around the filter assembly and the waste drum, and the shadow shield wall enclosing the entire system. Reactor coolant suction and return hoses are secured in the Internals Indexing Fixture (IF) and submerged to no more than two feet below the normal reactor coolant level (327.6'). The filter is housed in a shielded container and filtration is provided by about 100 15 inch long by 2 inch diameter filter bags on which about 7 lbs of diatomaceous earth precoat is attached. The filter media can be regenerated by recirculation flow or the spent filter media can be drained to the waste drum and clean diatomaceous earth recharged. When the contact dose rate of the filter assembly reaches a predetermined limit (currently 3 R/hr), the filter media will be removed and recharged.

Criticality:

To approach criticality, either at the filter assembly or at the waste drum, a minimum of 70 kg of UO₂ has to accumulate. Several considerations will ensure that even a small fraction of that amount will not be accumulated.

(1) The filter assembly surface will be continuously monitored for gamma radiation. Filter change-out will take place prior to the radiation level reaching a conservative set-point (currently 3 R/hr). In order for the amount of UO₂ to reach 70 kg, the corresponding radiation level would have reached 15,000 R/hr. Therefore, there is a safety factor of about 5,000. The safety margin at the waste drum would also be a factor of about 500, assuming that it contains 10 filter media change-outs with each batch at the maximum radiation level prior to change-out.
(2) The suction of reactor coolant will be taken through a hose in the IIF at no more than two feet below the normal reactor coolant level which is more than 10 feet above the top of the core debris bed. At the maximum flow rate of 75 gpm through the 1½" I.D. suction hose, there will be no velocity effects to pickup any significant amount of fuel debris from the debris bed. Only materials suspended in the reactor coolant will be removed. It is estimated that no more than about 0.2 kg of UO₂ will accumulate in the filter media after 12 hours of continuous operation assuming that the reactor coolant contains 1 ppm of UO₂. This assumed UO₂ concentration is conservative since analysis of the DWCS fluid has shown no detectable fissile material. In addition, it is estimated that the radiation level at the surface of the filter assembly containing 0.2 kg of UO₂ would be above 30 R/hr; a factor of about ten above the radiation level when filter media change-out would have taken place.

(3) Sample analysis for gross alpha radioactivity will be performed on the waste drums. Although the amount of UO₂ in each spent filter media batch is expected to be no more than a few grams, analysis of the grab sample from the waste drums will provide further assurance that no significant quantities of UO₂ accumulate in each waste drum.

Radiation Dose Considerations:

Lead shielding will be provided for the filter assembly and the waste drum. In addition, shadow shields will be installed around the entire system. A gamma radiation detector with remote read-out will continuously monitor the contact radiation level of the filter housing. This radiation level is currently limited to 3 R/hr. At 3 R/hr, the dose rate to workers outside of the shields on the defueling platform is expected to be no more than 5 mR/hr. The only times an operator must enter the shadow shields are during initial startup of a recharged filter to monitor filter differential pressure rise, filter regeneration or replacement, and during waste drum transfer. During initial filter monitoring, the radiation levels are expected to be less than 10 mRem/hr. During filter regeneration or replacement, the shielding on the filter will reduce the radiation levels to less than 100 mRem/hr and the expected dose to the operator is about 50 mRem. The expected dose to the operator during waste drum transfer is about 50 mRem. Based on these estimates, the staff concludes that the projected occupational exposure is within the scope of considerations made in Supplement 1 to the Programmatic Environmental Impact Statement on TMI-2 Cleanup (PEIS).

Conclusion:

Based on the above evaluation, the staff concludes that the operation of the TRWFS does not pose a significant risk to the public or the occupational work force. The staff further concludes that its operation does not present an unreviewed safety question per 10 CFR 50.59 and the potential environmental consequences fall within the scope of activities already discussed in the PEIS.
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