B. Ralph Sylvia
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NRC-88-0069

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

References: 1) Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43

2) Detroit Edison Letter to NRC, "Fermi 2 Process Control Program," dated June 12, 1985 (NE-85-0722)

Subject: Fermi 2 Solid Radwaste System

Detroit Edison has completed preoperational testing of certain components and sub-systems of the Fermi 2 solid radwaste system (SRWS) in order to verify system operability in accordance with the design. In addition, diagnostic testing has been performed on the system's extruder/evaporator to determine waste-stream throughputs. We were assisted by two authoritative and qualified solid radwaste service organizations, WasteChem Corporation and NUS Corporation. WasteChem personnel were responsible for the design of the system's asphalt extruder/evaporator. NUS incorporated the extruder/evaporator into the SRWS design at Fermi 2. Our test results indicate a significant reduction in the system throughput for bead resin and Ecodex precoat materials. Although disappointing, the results appear consistent with the performance of similar systems in the nuclear industry for these waste streams. A summary of our findings is enclosed.

We are presently unaware of any effective remedies for the throughput inadequacies of this system. As a result, Detroit Edison has suspended further development of the SRWS. At this point, most of the system is free of contamination. We will continue using vendor-supplied solid radwaste services. As you are aware, the extended use of such services is a common industry practice. During the next year or so, other utilities which have installed asphalt systems should have started up, completed testing, and/or commenced operations of their extruder/evaporator systems. We intend to monitor their progress.

FSAR revisions as appropriate to reflect our position will be accomplished during the next annual update.

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The first paragraph of attachment A to our Operating License (Reference 1) requires that:

"The preoperational tests and testing deficiencies identified in Attachments A and B, respectively, to the July 8, 1985, letter from Wayne H. Jens to James G. Keppler shall by completed in accordance with the scheduled commitments contained in those attachments."

Sheet 1 of 4 of Attachment B above indicates that **completion and testing of the solid radwaste system was milestoned for warranty run.** The information and test-results summary herein is provided in satisfaction of this license condition.

In Reference 2 we indicated that **"...test results relating to solidification will be submitted for review by the NRC staff upon completion."** We believe the foregoing information renders this commitment moot.

If you have any questions, please contact Ms. Lynne Goodman at (313) 586-4211.

Sincerely,

Ralph Sylvia

Enclosure

cc: Mr. A. B. Davis
Mr. R. C. Knop
Mr. T. R. Quay
Mr. W. G. Rogers

PRET.G1135.001, REV. 0
TEST STATUS

Checkout and initial operations testing of solid radwaste system mechanical, electrical, and I & C components has been completed as required to support preoperational testing of the system.

Table 1 is a summary of preoperational testing completed. It includes test descriptions, a status of the subsections performed, and the open and dispositioned test exception disposition reports (TEDR's) associated with each section of the test. Logic testing and integrated operation of the subsystems which feed the various waste streams to the extruder/evaporator is complete with the exception of the centrifuge feed/waste slurry feed subsystem. Because the major components of this subsystem are used to feed the vendor supplied solid radwaste processing system and are contaminated, this testing was put on hold. Instead, non-contaminated performance/process control program (PCP) testing of the extruder/evaporator was performed. Testing of support systems such as drum handling, closed circuit television, and drum overpack were scheduled to be performed after PCP verification and so have not been performed.

To prepare for PCP verification (Section 6.12 of the testing protocol) using radioactive waste, diagnostic tests known as sequence-of-events procedures were performed using simulated, non-contaminated waste. The objective of these tests was to establish the waste feed rate, waste to asphalt ratio, and extruder/evaporator temperature profile attainable for each waste stream. In addition, samples were taken to confirm, by inspection and test, compliance with applicable regulations on waste form. The test results addressing system throughput are summarized below.

Evaporator Concentrates

Test runs were performed using an 8% (by weight) simulated concentrates-feed consisting of di- and tri- sodium phosphate in demineralized water. Evaporative capacities as high as 0.8 gpm (as compared to 0.53 gpm design) were achieved.

Resins

Based on the design evaporative rate of 0.53 gpm, the following performance was expected of the extruder/evaporator (these values had originally been used in the Process Flow Diagram calculations):

Bead Resin, Centrifuge Feed	4.77	dry pounds per minute
Ecodex, Centrifuge Feed	2.20	dry pounds per minute
Bead Resin, Slurry Feed	1.55	dry pounds per minute
Ecodex, Slurry Feed	0.40	dry pounds per minute

Fermi 2 has not consistently bettered a 0.4 dry lb/min waste feed to the extruder/evaporator for resin slurries. Resins employed in the testing included slurries of Ecodex P202H, X203H, P205H, bead and a mix of 80% Ecodex P202H and 20% bead resin. Final-product samples taken during the processing exhibited swelling (10%) and then significant shrinkage (35-40%). In order to establish whether this final-product variability was the result of moisture in the bead or tri-methylamine gas driven off during the processing, separate dry cake feeds of cation and anion resin were conducted. If gas was the cause, then the absence of amines in the cation resin should allow it to be processed without displaying swelling. Both anion and cation streams displayed swelling. Accordingly, it was concluded that bead moisture, which was being driven off in the product, was the cause of the swelling.

These samples were also subjected to unconfined compressive tests. Associated results met applicable criteria.

Simulated centrifuge feed to the extruder/evaporator was processed at rates varying from 0.5 to 0.6 dry pounds per minute. Samples taken during the processing yielded results almost identical to those obtained processing resin slurries. The results of centrifuge feed testing were often not repeatable. This was attributed to 1) the temporary method of feeding dry-cake to the extruder/evaporator which did not provide an even, continuous feed and 2) to the resin itself, which exhibited wide variations in surface moisture. The true capacity of the extruder/evaporator to process centrifuged resin cannot be determined until the installed centrifuge system is placed in operation. Until such time, the capacity of the extruder/evaporator to process centrifuged resin is assumed to be 0.4 lb/min, similar to resin slurry feed.

Based on a significant shortfall of system throughput as compared to the design criteria, management suspended testing of the SRWS.

TABLE 1

PRET. G1135.001, REVISION 0 - STATUS

Section	Title	Subsections Performed	Description of Testing Performed	Test Exceptions (By Number) Open*	Dispositioned**
6.1	Condensate Backwash Transfer System	All	Alarms, Logic and Flow Verifications Performance Testing	3	1, 2
6.2	Spent Resin Transfer System	All	Alarms, Logic and Flow Verifications Performance Testing	4, 5, 7, 13, 14	6, 8-12
6.3	Feed to Centrifuge System	All	Alarms, Logic and Flow Verifications Performance Testing	None	None
6.4	Radwaste Auxiliary Steam System	All	Alarms, Logic and Flow Verifications Performance Testing	16	None
6.5	Centrifuge Operation and the Associated Flushing System	All	Alarms, Logic and Flow Verifications Performance Testing	50, 51	None
6.6	Cooling Water Booster Pump System	All	Alarms, Logic and Flow Verifications Performance Testing	None	None
6.7	Asphalt Feed System	All	Alarms, Logic and Flow Verifications Temperature Control Verification	18, 19, 21, 23, 24	17, 20, 22
6.8	Extruder/Evaporator Volume Reduction System	All	Alarms, Logic and Flow Verifications Drum Level Indication Verification Performance Testing	26, 27, 42, 43, 52, 53, 56	25, 28
6.9	Concentrates Feed System	6.9.1 thru 6.9.8	Alarms, Logic and Flow Verifications Performance Testing, Tank Heater Control Verification	29, 32, 34, 41, 54, 55	30, 31
6.10	Spent Resin Slurry Feed System	6.10.1 thru 6.10.6	Alarms, Logic and Flow Verifications Performance Testing	33, 35-40	None
6.11	Centrifuge Feed System and Alternate Waste Slurry Metering	None	N/A	N/A	N/A
6.12	Radwaste Process Control Program (PCP) Verification	6.12.1D, 6.12.5	PCP Verification	57	None

Section	Title	Subsections Performed	Description of Testing Performed	Test Exceptions (By Number) Open*	Dispositioned**
6.13	Radwaste Drum Handling System	6.13.1 thru 6.13.4	Logic Verification, Performance Testing	44-49	None
6.14	Radwaste Closed Circuit Television (CCTV) System	None	N/A	N/A	N/A
6.15	Radwaste Overpack Unit and Integrated Operation with the Extruder/Evaporator and Capper Seamer	None	N/A	N/A	N/A
6.16	Radwaste Electric Operated Shield Doors	All	Logic Verification	None	15
6.17	Annunciators of the Solid Radwaste System	All	Annunciator Verification	19, 21, 27, 34, 38, 40, 41	None
7.0	System Return to Normal	None***	N/A	N/A	N/A
8.0	Acceptance Criteria	None***	N/A	N/A	N/A

* Test exceptions not yet dispositioned and approved by the Lead Plant Systems Engineer (LPSE).

** Test exceptions awaiting approval with the Preoperational Test and Test Analysis Report (TAR).

*** Testing incomplete.

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