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SPENT FUEL HANDLING AND PACKAGING PROGRAM QUARTERLY REPORT **MASTER**

for the period

APRIL THROUGH JUNE 1980

JULY 1980

Prepared for

UNITED STATES DEPARTMENT OF ENERGY
NEVADA OPERATIONS OFFICE
Under Contract DE-AC-08-80NV10061

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APRIL THROUGH JUNE 1980

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INTRODUCTION

This document is a report of activities performed by Westinghouse Advanced Energy Systems Division-Nevada Operations at the E-MAD Facility, Area 25, Nevada Test Site, in meeting subtask objectives during the third quarter of FY 1980. Activities during this period included completion of encapsulation and preparation for shipment of 11 spent fuel assemblies to be tested at the Climax test site by Lawrence Livermore Laboratories; calorimetry of two fuel assemblies; repeat of three 1 KW Fuel Temperature Test runs; acquisition of gas samples from fueled canisters; removal of ten R-MAD shielding windows; and assembly and checkout of the canister cutter, which was received from AESD-Large.

GLOSSARY

AESD-Large	Westinghouse Advanced Energy Systems Division at Large, Pennsylvania
AESD-Nevada	Westinghouse Advanced Energy Systems Division, Nevada Test Site
AGNS	Allied General Nuclear Services
BWR	Boiling Water Reactor
DOE/NTSSO	Department of Energy, Nevada Test Site Support Office
DOE/NV	United States Department of Energy, Nevada Operations Office
DWK	Deutsche Gesellschaft für Wiederaufbereitung von Kernbrennstoffen (West Germany)
EDP	Experimental Demonstration Program
EG&G	EG&G, Inc.
E-MAD	Engine Maintenance, Assembly and Disassembly Building, Area 25, NTS
HEDL	Westinghouse Hanford Engineering Development Laboratory, Hanford, Washington
NDE	Non Destructive Examination
PWR	Pressurized Water Reactor
REECo	Reynolds Electrical and Engineering Company, Inc. (Support Services Contractor at the Nevada Test Site)
R-MAD	Reactor Maintenance, Assembly and Disassembly Building, Area 25, NTS
BWIP/NSTF	Basalt Waste Isolation Program/Near Surface Test Facility

OBJECTIVES

- Prepare 11 spent fuel assemblies for shipment to Climax test site
- Perform first calorimetry on canistered Climax fuel assemblies
- Start 3 KW Soil Temperature Test
- Remove 10 shielding windows from R-MAD Hot Bay
- Repeat 1 KW Fuel Temperature Test runs 7, 8, 9
- Complete data collection from 1 KW Drywell and Sealed Storage Cask #2 tests
- Complete acquisition of gas samples for DWK, West Germany
- Submit Purchase Request for Stack Monitoring System to REEC

HIGHLIGHTS

- Released 11 canistered Climax fuel assemblies to LLL for shipment to Climax test site
- Calorimetered 2 Climax fuel assemblies
- Acquired gas samples from 5 fuel assemblies for DWK West Germany
- Removed and stored 10 R-MAD Hot Bay shielding windows for possible future use in E-MAD
- EDP Canister Cutter components received, assembled and checked out
- Initiated 3 KW Soil Temperature Test
- Published AESD-Nevada Operations Data Management Plan
- Instituted E-MAD personnel control program; prepared and published procedure

NARRATIVE SUMMARY

WORK TASK NUMBER

ACTIVITY

1.1.2

3 KW Soil Temperature Test

On April 1, 1980, power to the Soil Temperature Test was increased from 2 KW to 3 KW. At 2,044 hours of operation at 3 KW, the maximum canister temperature was 734.5° F. Temperature of the nearest liner thermocouple was 693.5° F.

1.2.1

1 KW PWR Drywell Test

a. Thermocouple temperatures:

(1) Drywell 3, at 12,463 hours of operation: maximum canister: 225.5° F; nearest liner: 177.1° F.

(2) Drywell 5, at 12,750 hours of operation: maximum canister: 225.1° F; nearest liner: 179.9° F.

b. The 1 KW Drywell Tests were terminated June 30, 1980.

1.2.3

Drywell 1, 2, 3 Array

Preparation for this interaction test continues. The procedure for transferring a fueled canister from one Drywell to another, WN-TOP-018, is in the internal review cycle. Technical Operations Procedure WN-TOP-021, for moving a fueled canister from a Drywell to the E-MAD Transfer Pit, is in external review.

1.2.4

2 KW Drywell Test

The Technical Instruction for checkout and emplacement of drywell instrumentation for a 2 KW test, WN-TI-002 Addendum II, was completed.

WORK TASK NUMBER

ACTIVITY

1.3.1

1 KW PWR Sealed Storage Cask #2 Test

At 13,507 hours of operation, maximum canister temperature was 169.7⁰ F; nearest liner thermocouple reading was 117.9⁰ F. Continuous data acquisition and transmittal ended April 30; however, a 72-hour hourly data scan was performed June 25 - 27 at AESD-Large request.

2.1.0

Baseline Activities

- a. AESD-Nevada staff members conducted tours of the E-MAD facility for 32 groups.
- b. At DOE request, a proposed schedule and informal ROM (rough order of magnitude) cost estimate were prepared to provide packaging of spent fuel and solidified waste in support of the BWIP/NSTF program.
- c. Safety:
  - (1) Eighteen employees completed Radiation Worker's qualification training.
  - (2) The annual E-MAD facility fire inspection was performed by the REEC Co Fire Protection Engineer, accompanied by the AESD-Nevada Safety Officer.
- d. Operator Qualification and Training
  - (1) Eleven trainees were qualified to operate The Railroad Transport System, Manned Control Car, Closed Circuit Television system and other E-MAD equipment.

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ACTIVITY

- (2) Dry run operations required 142 man-hours; hands-on training, 1,155 hours; classroom training, 88 hours; and safety indoctrination, 66 hours.

e. Documentation

- (1) The "AESD-Nevada Operations Data Management Plan," WN-P-003, and "E-MAD Personnel Control," WN-A-007, were completed and published.
- (2) The "E-MAD Facility Security Procedure," WN-A-005, was revised. After DOE/NTSSO Security review and concurrence, very limited distribution of the revision was made in accordance with DOE Security instructions.
- (3) The "AESD-Nevada Operations Training Program Plan" (WN-P-002) was revised.
- (4) WN-TOP-100, "Technical Operations Procedures Generic Guidelines and References," was prepared for reference in individual TOPs to apply current guidelines and references to performance of specific operations.
- (5) Three Departmental Guides were drafted for preparation and processing of AESD-Nevada Operations documents.

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- (6) Four procedures for Railroad Transport System component maintenance and one pre-operation checklist for that equipment were prepared.

f. Facility and Equipment Maintenance/Repair

- (1) Locomotive L-5 (surplus property from Bremerton, Washington) was made operational.
- (2) Manned Control Car (MCC) annual maintenance was performed. The air compressor was beyond repair due to broken piston and head, scored cylinder, and bent connecting rod on the high pressure side. The damage occurred when a broken discharge valve bolt dropped down on the piston during compressor operation. A request for procurement of a replacement air compressor was transmitted to DOE/NV.
- (3) During annual V-1 crane maintenance, the main hook load-tested satisfactorily, but the auxiliary hook would not lift the required load for certification. The cause has been determined and is scheduled to be corrected the first week in July.
- (4) The high pressure air compressor unit was serviced and new relief valves and gauges were installed. Condenser water samples were taken for analysis of the water treatment effectiveness.

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- (5) A detailed survey of the E-MAD HVAC (heating, ventilation, air conditioning) systems and current energy conservation practices was conducted by engineers from Holmes and Narver, Inc., and Sullivan and Mason, Inc., assisted by the E-MAD Facility Engineer.
- (6) A radiological survey of the north and south Lag Storage Pits (LSP) was performed and acquired data were transmitted to DOE and AESD-Large.
- (7) A Lag Storage Pit temperature study was performed at AESD-Large request. Temperatures were recorded with different numbers of fueled canisters in the pits and with two fans or no fans operating. Results were transmitted to AESD-Large.
- (8) The Varian leak detector was repaired and the vacuum chamber was evacuated. A spare system was received and calibrated. A manifold block and piping are being fabricated to bring the spare unit into the required configuration for E-MAD use. A leak detector which had been borrowed from EG&G was returned.

2.2.1

Calorimeter Installation

Installation, calibration and checkout are completed. See Work Task 3.1.6 for operations report.

2.2.2

Canister Cutter

EDP canister cutter components, received from AESD-Large, were assembled and the canister cutter was checked out. Two cuts were successfully completed on a dummy canister section.

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The canister cutter lifting fixture was load tested to 3,850 pounds.

2.2.3

RAM (Remote Area Monitoring) System

Installation of electrical conduit and wire trays, for extension of the RAM/CAM (Constant Air Monitor) alarm to the E-MAD gate alarm panel, is approximately 80% complete. Work has halted, temporarily, for lack of funds.

2.2.7

R-MAD Windows

Ten shielding windows were removed from the R-MAD Hot Bay walls and temporarily stored in the R-MAD warehouse. One of these windows is scheduled to be installed, as-is, in the E-MAD second floor West Gallery (over the Hot Bay Lag Storage Pits) some time in FY 1981. A plan and cost estimate for refurbishment of the remaining nine windows are being prepared.

3.1.1

1 KW Fuel Temperature Test (FTT)

WN-TOP-019, the procedure for disassembly of the 1 KW Fuel Temperature Test and transfer of the fuel assembly to the Weld Pit, was drafted, internal review comments resolved, and submitted to DOE/NV for review. An addendum to this procedure was prepared, at AESD-Large request, for performing dry calorimetry of a fuel assembly in the Weld Pit prior to boiling water calorimetry. The draft is being internally reviewed.

See 3.1.7 for additional FTT data test.

3.1.2

2 KW Fill Media (Fuel Temperature Test)

The final draft of WN-TOP-023, "Technical Operations Procedure for Operation of the 2 KW Fuel Temperature Test," was submitted for DOE/NV review. Comments resulting from that review are being resolved.

WORK TASK NUMBER

ACTIVITY

3.1.4

West German Gas Sampling

Gas samples were acquired from Climax fuel assemblies D-04, D-15, D-22 and D-34, and from the 1 KW fuel assembly in the Fuel Temperature Test (B-43). The samples were shipped to Westinghouse Advanced Reactors Division (ARD) and Westinghouse Hanford Engineering Development Laboratory (HEDL) for analysis.

The procedure for obtaining gas samples from the fuel assembly in the Fuel Temperature Test (WN-TOP-022) was completed, approved and published. WN-TOP-020, for obtaining gas samples from a welded storage canister, was drafted and is in internal review.

3.1.5

Neutron/Gamma Spectra Measurements

A canister stand was fabricated for use during neutron spectra measurements. The procedure for obtaining neutron or gamma spectra on canistered fuel assemblies, WN-TOP-026, was drafted and submitted for internal review.

3.1.6

Calorimeter Operations

- a. The first calorimeter operation was performed April 1, 1980, on Climax fuel assembly D-34. Acquired data were transmitted to HEDL.
- b. During the first calorimetry, the Hot Bay became contaminated to the extent that decontamination was required prior to the next Hot Bay operation. An anti-contamination device, using a Roots vacuum system, was fabricated and successfully demonstrated without a fuel assembly in the Calorimeter. This system is being used for all subsequent calorimetry.

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- c. REECo laboratory analyses of several Calorimeter water samples were as follows:
- (1) Original Calorimeter water (used for fuel measurement) $1.74 \times 10^{-2} \mu\text{Ci}/\text{cm}^3$ Cobalt 60.
  - (2) Sample from fresh Calorimeter water after nominal stirring $1.53 \times 10^{-5} \mu\text{Ci}/\text{cm}^3$ Cobalt 60.
  - (3) Sample from fresh water after boiling to perform anti-contamination device tests $1.69 \times 10^{-3} \mu\text{Ci}/\text{cm}^3$ Cobalt 60.
  - (4) Lead content, 3 parts per million.
- d. The Calorimeter was heated and left unattended during working hours to establish reliability of the heater system for possible future backshift unattended operations.
- e. Fuel assembly D04/LM0141 was removed from the Lag Storage Pit and calorimetered. Preliminary data assessment indicates that this fuel assembly produced 1.58 kilowatts of thermal energy.
- f. A calibration check of the Calorimeter condensate weighing system was performed, at HEDL request. An error which was found in the system was resolved and the system was satisfactorily recalibrated.
- g. The primary load cell, which failed due to metal fatigue, was returned to HEDL. Using the spare load cell, the Calorimeter was recalibrated to the required accuracy.

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- h. A low power reference run was completed June 24. On June 26, calorimetry of fuel assembly D-22 was started but the Calorimeter malfunctioned and the operation was postponed until the week of July 7. The malfunction was defined (leaks in the collection sensing lines) and repairs were accomplished.
- i. Revision I of WN-TOP-014, "Technical Operations Procedure for the Spent Fuel Calorimeter System," was completed and published.

3.1.7

1 KW Fuel Temperature Test Additional Data

DOE concurrence was received for repeating runs 7, 8 and 9 of the 1 KW Fuel Temperature Test to obtain additional test data. Runs 7 and 8 were completed and test 9 is in process. Data plots are being transmitted to AESD-Large.

During rerun #8, at 6,178 total hours of operation, temperature of the centermost fuel assembly thermocouple was 399.7° F; the highest canister thermocouple temperature was 278.3° F.

4.0

Climax Operations

- a. Eleven fueled canisters were retrieved from lag storage, prepared for shipment to the Climax test site, and released to LLL:

(1)	D-40/LM014P	-	4/15/80
(2)	D-18/LM0148	-	4/22/80
(3)	D-34/LM014T	-	4/25/80
(4)	D-46/LM0151	-	4/29/80
(5)	D-09/LM0143	-	5/ 1/80
(6)	D-35/LM014Q	-	5/ 5/80

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(7)	D-47/LM014Y	-	5/ 7/80
(8)	D-06/LM0144	-	5/12/80
(9)	D-01/LM0140	-	5/15/80
(10)	D-16/LM0149	-	5/20/80
(11)	D-04/LM0141	-	5/28/80

- b. During preparation of fuel assembly D-16/LM0149, scheduled for the third shipment to Climax, a canister support pin galled, making removal by the procedural method impossible. The assembly was returned to lag storage and, with LLL concurrence, fuel assembly D-34/LM014T was substituted. An alternate pin removal procedure was developed and a special tool was fabricated: the pin was successfully removed prior to preparation for shipment on May 20, 1980.
- c. One of the canister support pins also galled in fuel assembly D-22/LM014C, scheduled to be installed in Drywell 5 for test prior to exchange with a fuel assembly from Climax, during an unsuccessful attempt to obtain a gas sample. The operation was aborted and the fueled canister was returned to lag storage until June 25, when the galled pin was removed by the alternate method, described above, and gas sampling was completed.
- d. While welding the fuel assembly D04/LM0141 enclosure, the welder arced out due to small bugs flying into the arc. The Climax shield plug was installed on the canister and the assembly was stored in the Transfer Pit until the welder problem could be corrected. Difficulties in restarting the welder led to a complete system checkout, during which the problem was found to

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be pitting in the RF arc-start section of the control console. This problem was corrected and the welder was successfully restarted several times. A dummy canister/lid assembly was prepared, including a partially completed weld, and a complete re-weld was successfully demonstrated. "Bug bombs" were set off in the Hot Bay to control the insects, the canistered fuel assembly was retrieved from the Transfer Pit, and the welding was completed. The helium backfill and leak test were accomplished and the shield plug was replaced. The assembly was held in the Transfer Pit over the weekend, then loaded into the STV and released to LLL.

- e. The Climax Lag Storage Pit adapters were removed, modified for permanent installation, and reinstalled.

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