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August 8, 1989 4410-89-L-0084/0051P

US Nuclear Regulatory Commission ATTN: Document Control Desk Washington, DC 20555

Dear Sirs:

Three Mile Island Nuclear Station, Unit 2 (TMI-2) Operating License No. DPR-73 Docket No. 50-320 Solid Waste Staging Facility System Description

Pursuant to your letter dated February 4, 1982, attached for your information is the annual update of the Solid Waste Staging Facility (SWSF) System Description. This update includes minor changes to Pages 3 and 8 to reflect the current operation of the SWSF. For example, Section 2.4.9 was revised based on a review of the facility drawings to state that the SWSF, only, is epoxy coated. Due to repagination, the entire system description is being submitted.

Sincerely,

MB Rode

M. B. Roche Director, TMI-2

RDW/emf

cc: W. T. Russell - Regional Administrator, Region 1

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DIVISION

SYSTEM DESCRIPTION

FOR

Solid Waste Staging Facility

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Rev.	SUMMARY OF CHANGE	Approva 1	Date
0 1 2 3 4	Initial issue per GPU Nuclear letter 4400-82-L-0059. Reissued per GPU Nuclear letter 4410-83-L-0078. Annual update. Annual update. Annual update. Revised Sections 2.1.2, 2.1.3.2, 2.4.9, and 2.4.3.1.	mi mi mi mi mi mi mi mi mi mi mi mi mi m	4/1 3/1 7/1 7/1

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1.0 INTRODUCTION

The Solid Waste Staging Facility (SWSF) performs no active function. The facility is a passive system for temporary staging of nuclear radioactive waste prior to preparation for shipment and disposal to approved off-site burial grounds. The SWSF has been designed and is operated in such a manner as to provide assurance that:

- A. The health and safety of the public will be protected;
- B. Occupational exposures will be as low as reasonably achievable (ALARA); and
- C. There will be no significant adverse impact on the environment.

2.0 DESIGN DESCRIPTION

- 2.1 Facility Function
 - 2.1.1 The SWSF is used for the collection and temporary staging of the radioactive waste (e.g., solidified/dewatered resins, filters, sludges) generated during the cleanup operations at TMI-2, and operations at TMI-1.
 - 2.1.2 The SWSF is located as shown on Figure 1, south and east of Unit 2 Natural Draft Cooling Towers within the area protected by the Flood Control Dikes.

Space was allocated to accomodate six (6) modular structures. Two modules ("A" and "B") are completed and space is available for three (3) of the four (4) additional modules. At this time, there is no intention to construct any of the additional modules.

- 2.1.3 Figure 2 shows the typical layout of the SWSF system.
- 2.1.3.1 Each module is designed with 60 cells forming the compartments for storing the radioactive waste generated during processing.
- 2.1.3.2 Each cell is designed to stage the radioactive waste contained in either one (1) 6 ft. diameter by 6 ft. high liner, or two (2) 4 ft. diameter by 4 ft. high liners, or 18 55-gallon DOT specification drums.
- 2.1.3.3 Each module is designed to accomodate any combination of the radioactive waste containers as follows:

Container	Total <u>Quantity</u>	Wt. of One FilledContainer lb
6'x6' Liners	60 (1 per cell)	7,000 - 22,000 max.
55 gallon drums or	1080 (18 per cell)	840
4'x4' Liners	120 (2 per cell)	4,500 - 5,000 max.

2.1.3.4 A floor drainage system is incorporated into the module design which discharges into a common sump located between Modules "A" and "B". The total capacity of the sump is approximately 2750 gallons.

2.2 References

- 2.2.1 U.S. Nuclear Regulatory Guide 1.143, July 1978, Design Guidance for Radioactive Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants.
- 2.2.2 Design Criteria/Input Record. GAI W.O. #04-4283-070.
- 2.2.3 Gilbert Associates, Inc. (GAI) Drawings:
- 2.2.3.1 Excavation and Grading Plan. E-774-151.

2.2.3.2	Plant Layout.	E-012-006 E-014-004.
2.2.3.3	Structural.	E-430-006 E-430-007 E-430-008 E-430-011 E-430-012 E-430-013 E-430-014 E-430-015.
2.2.3.4	Building Services-Piping.	E-311-873 E-311-874.
2.2.3.5	Electrical.	SS-308-417 B-256-031 E-266-011.

2.3 Design Basis

- 2.3.1 The SWSF is designed to comply with the requirements of Regulatory Guide 1.43, July 1978. The facility is designed to provide a controlled but ready access for material handling operations and to ensure that the operator exposures are as low as is reasonably achievable (ALARA).
- 2.3.2 The facility is designed to maintain the dose rates in accordance with 10 CFR Part 20 and to meet the requirements of 40 CFR Part 190 at the site boundary and beyond.
- 2.3.3 The shielding thickness was calculated to limit the contact dose rates at the outer surfaces of the module walls and the top of the cell covers to within 0.5 mr/hr and 2.5 mr/hr, respectively. The analysis was based on the types of waste defined in Attachment 1. No credit was taken for the structure being partially underground.

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- 2.3.4 Quality Assurance requirements for the design, construction, and operation of the SWSF are consistent with those specified in Regulatory Guide 1.43.
- 2.4 Summary System Description
 - 2.4.1 The concrete structure and individual cell covers provide the necessary shielding from the radioactive waste housed in the SWSF Module Storage Cells.

The cell covers with gaskets protect the waste containers from the elements and the ingress of precipitation. Slots and weep holes in the upper module structure are provided to direct rainwater to external drainage ditches. A drainage plping system prevents any spillage/leakage of fluids from accumulating in the cells (i.e., floor drain hub in each cell); the system manifold discharges into a common sump.

- 2.4.2 The sump compartment, a radwaste seismic concrete structure, houses the pump, valves, piping, instrumentation, etc., necessary to perform the intended functions and control the disposal of any effluent which may collect in the sump. The compartment is divided into two (2) levels, with the upper operator level shielded by a thick concrete floor from the sump. Access to the upper compartment is via a manhole in the concrete slab roof. Access to the sump is via a removable ladder at the sump plug opening and a permanently installed ladder into the sump.
- 2.4.3 The flow diagram (Figure 3) shows the pumping system for the sump effluent. All operations are local/manual. The local alarms and sump level indication are housed in a weatherproof instrumentation panel mounted outside the Module "A" structure adjacent to the sump compartment.

The sump pump, Solenoid Valve #WS-5 and three-way valve #WS-1 (extension spindle) are located in the lower sump while the electrical distribution and control panels, valves, etc. are mounted in the operators compartment.

Sump level is measured by a variable capacitance sensor (SWS-LE-O1) which transmits the signal to local and remote (Unit 2 Control Room) alarms. Sump influent flow alarms are provided. The sensing elements (conductivity) Nos. SWS-CE-O7 and SWS-CE-O8 are mounted in the Module "A" and "B" drain system manifold.

2.4.3.1 Sump Pumping Operations (See Figure 3)

The SWSF sump is controlled and disposal of the effluent is in accordance with the Unit 2 Procedures 4210-OPS-3011.01 and 4215-OPS-3232.14. The sump compartment is posted as a radiological controlled area and surveillance is required prior to entry to ensure operator exposure will be as low as is reasonably achievable (ALARA).

On receipt of the alarm signal (approximately 50% sump level) in Unit 2 Control Room, the above procedures are put into effect and the sequence of operations is as follows:

- 2.4.3.1.1 Recirculation Mode (sump effluent mixing to obtain representative sample for analysis)
 - A. All valves to be checked closed;
 - B. Operate three-way valves WS-1 to route pump discharge returned to sump; and
 - C. Start pump.

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2.4.3.1.2 Sampling Mode (during Recirculation Mode)

NOTE: Radiologically monitor the collection of the sample with the appropriate instrument.

- A. Solenoid valve WS-5 open;
- B. Valve WS-7 open;
- C. Collect sample;
- D. WS-5 and WS-7 closed; and
- E. Stop pump.

2.4.3.1.3 Discharge Mode (only after sample analysis is completed)

- A. All valves to be checked closed;
- B. Connect hose to the tank truck (or portable vehicle) connection for effluent disposal;
- C. Operate three-way valve WS-1 to route pump discharge to truck discharge manifold;
- D. Valve WS-4 (WS-3) open;
- E. Start pump;
- F. Stop pump, disconnect tank truck (or portable vehicle);
- G. Valve WS-4 (or WS-3) closed; and
- H. Operate three-way valve WS-1 for recirculation mode and secure.

2.4.4 Major Equipment

A. Sump Pump (1): Gould Model 3171 1 x 1-1/2-6

Capacity:	50 gpm
TDH:	100 ft
Fluid:	Radioactive waste water/resin slurry pH approx. 7
Materials:	Cast iron/bronze fittings
Impeller:	Open type
Discharge Conn.:	Flanged above mtg. plate
Service:	Intermittent 5 yr. life

B. Solenoid Valve (1):

1/2" nom. bore. 120 volt AC

- C. Instrumentation: See Table 1.
- 2.4.5 Facility General Arrangement: See typical layout Figure 2. The general arrangement, layout, and details of the SWSF systems are shown in the drawings in Section 2.2.3.
- 2.4.6 Instrumentation and Controls
- 2.4.6.1 The SWSF has three (3) instrument loops as follows:
 - A. A level instrument string provides the alarm and level indication both local and remote. In addition, this loop provides a sump pump permissive at greater than 10% level.
 - B. The other two (2) instrument strings are conductivity flow loops providing local alarms. One (1) loop senses input from the drain discharge manifold from Module "A" and the other from Module "B".
- 2.4.6.2 Instrument Setpoint Index (see Table 2).
- 2.4.7 System Interfaces

There are five (5) interfaces associated with this facility:

- Processing Systems: Access road to and from waste and fluid processing facilities for transportation of materials and equipment.
- Material Handling System: Facility will accept radioactive waste containers from the processing systems and are compatible with the transportation and lifting equipment (i.e., transfer shield and site cranage) (Manitowoc 4000 W mobile crane or equivalent).

- 3. Cooling Water Pump (CHP) House: 480 V, 3 0 200 A feeder cable from Bus 2-61 shall provide power for the following:
 - A. 460 volts to the sump pump;
 - E. 480 volt welding receptable; and
 - C. 25 KVA, 240-120V power center to energize lighting, convenience receptacles, instrumentation, and control devices.
 - NOTE: No permanent heat tracing required for sump compartments.
- 4. Control Room: Sump level alarm.
- 5. Chemistry Laboratories: Sump effluent samples for chemistry and radiological analysis prior to distribution.
 - NOTE: The sump pump discharge is not directly connected to any plant systems; a local hose station is provided.
- 2.4.8 Operations-Radwaste Handling

The major operation performed at the SWSF is handling the radioactive waste containers while loading/unloading the individual cells in accordance with the types of containers specified in Section 2.1.3. Handling of these containers is performed in accordance with Unit 2 procedures. The Manitowoc Mobile Crane, or equivalent, is utilized for handling activities along with appropriately shielded equipment.

Each cell has an individual concrete cover 8'3" square x 3'0" deep (Dwg. #B-430-015) weighing approximately 14 tons. Normally only one (1) cell containing radioactive waste containers within a module system will be uncovered at any given time. If more than one (1) cover is to be removed at any one time, additional safety procedures will be exercised.

2.4.9 Maintenance

Most operations including maintenance requires a RWP. Inner surfaces of the sump are epoxy coated to ease decontamination of the facility.

- 2.4.10 Acceptance Testing
- 2.4.10.1 Mechanical. Dwgs. #E-311-873 and E-311-874
 - A. Module "A" and "A" Drain Piping Systems.

i. Leak Test in accordance with ANSI 831.1.1977.

Criteria: Static Head. (Fill system, water level top of drain hubs)

Holding Period: No minutes minimum.

Acceptance: No visual leakage.

 Flow verification, allow leak test water to drain to sump.

Criteria: No visible fluid in system.

B. Sump Pump "A" and associated piping.

Initial Service Leak Test in accordance with ANSI 831.1, 1977.

Criteria: Pump discharge pressure.

Acceptance: No visual leakage, all welded joints leaktight.

- 2.4.10.2 Electrical/Instrumentation: Dwgs. #8-256-031, B-248-011, and SS-261-011
 - Continuity and megger tests were performed for all circuits.
 - B. Instrument and control were tested and calibrated in accordance with MTX 507.
 - C. Sump Pump "A" tested in accordance with Electrical Preoperational Test Procedure WG-EO1.
 - 0. Solenoid Valve #WS-V05, tested in accordance with Electrical Preoperational Test Procedure WG-E02.

TABLE 1

SOLID WASTE STAGING FACILITY INSTRUMENTATION

Instrument Designator	Model or Type	Locations	Functions
SWS-LE-01	Drexelbrook 700-2-57	Mod A Sump	Sump Level Sensor
SWS-LT-11	Drexelbrook 408-6230	Mod A Opr. Floor	Sump Level Transmitter
SWS-LI-01	370-1104-401	Mod A Opr. Floor	Sump Level Indication
SHS-LI-01A	International Instr. 1151	Mod A Top Panel	Sump Level Indication
SWS-LSL-01	SETCON 401-100x	Mod A Top Panel	Sump Level Switch Low (Pump Permissive)
SWS-LSH-01	SETCON 401-100x	Mod A Top Panel	Sump Level Switch High
SWS-LAH-01	PANALARM	Mod A Top Panel	Sump Level Alarm High
SWS-LAH-01A	PANALARM	CR Panel 17E-24	Sump Level Alarm High
SWS-CE-07	Level Lance 14-115V	Sump	Influent Flow Conductivity Element
SHS-CAH-07	PANALARM	Mod A Top Panel	Influent Flow Alarm
SWS-CE-08	Level Lance 14-115V	Sump	Influent Flow Conductivity Element
SWS-CAH-08	PANALARM	Mod A Top Panel	Influent Flow Alarm

TABLE 2

INSTRUMENT SETPOINT INDEX

Instrument Tag No.	Instrument Description	Component Type	Setpoint Description	Action
SWS-LSL-01	Solid Waste Staging Facility Sump Level	Current	10% level (5.6 ma)	Contact Closure
(GAI: LB-S-4)	Switch Low (Sump Pump Permissive)	Switch	Increasing	
SWS-LSH-01	Solid Waste Staging Facility Sump Level	Current	42% level (11.2 ma)	Contact Closure
(GAI: LB-S-3)	Switch High	Switch	Increasing	
SWS-CE-07	Solid Waste Staging Facility Sump Influent	Conductivity	Maximum	Contact Closure
(GAI: CE-S-7)	Flow Module "A" Conductivity Element	Element	Sensitivity	
SWS-CE-08	Solid Waste Staging Facility Sump Influent	Conductivity	Maximum	Contact Closure
(GAI: CE-S-8)	Flow Module "B&C" Conductivity Element	Element	Sensitivity	

TABLE 3

OPERATING PROCEDURES

Procedure Number	Description
4215-0PS-3232.14	SWSF Sump Pump Operation
4231-0PS-4440.01	Transfer of EPICOR 4'x4' Liners
4231-0PS-4430.08	On-site Transfer of Radioactive Liners to SWSF/Ship Cask
4231-0PS-4430.09	On-site Transfer of Radioactive Liner from SWSF
4231-0PS-4450.20	Transfer of 4'x4' Liner HIC from SWSF

ATTACHMENT 1

SHIELDING ANALYSIS - TYPES OF WASTES

NOTE: SDS vessels used in the SDS processing system may not be stored in this facility unless resin has been removed.

Types of wastes considered are given below. A 3-month decay period was used in the analysis.

 Natural Circulation Evaporator with Solidification Waste Form: 55 gallon drums (solidified) Design Basis for Cell: C-D waste at VR* = 4.5, n** = .6 18 drums per storage cell C-D waste analysis is given below

or

- 2. Forced Circulation Evaporator/Crystallizer with Solidification Waste Form: 55 gallon drum (solidified) Design Basis for Cell: C-O waste at VR = 22, n = .6 18 drum per storage cell
- or 3. EPICOR II Charcoal Filter Waste Form: Activated Charcoal in 4 ft. diameter x 4 ft. high liner Design Basis for Cell: 2500 R/hr on contact Two liners per cell

or

- 4. EPICOR II Demineralizer Resins Waste Form: Dewatered Resins in 4 ft. diameter x 4 ft. high liner Design Basis for Cell: B-C waste at VR = 543 B-C waste analysis is given below
- * VR = volume reduction
- **n . Packaging efficiency: ratio of volume of waste to total container volume
- A. Quantities; C-D Waste

83,000 Gallons - Reactor Coolant Bleed Tank - A 83,000 Gallons - Reactor Coolant Bleed Tank - B 250,000 Gallons - Reactor Building Sump

B. Isotopic Analysis (uCi/ml) - Design Basis; C-D Waste

Isotope uCi/ml

10 99	-	180	Cs	1 38	-	120	Ce 144	1 -	100
I 131	-	8200	Ba	140	-	290	Н 3	-	1.2
I 132	-	20	La	140	-	160			
Cs 134	-	82	Sr	89	-	1400			
Cs 137	-	330	Sr	90	-	120			

с.	<u>Isotopic Analysis (uCi/ml) - Design Basis; B-C Waste</u>								
	B-C Waste								
	Isotope	uC1/ml	Isotope	uC1/ml					
	Ba 133 Co 60 Cs 134 Mo 99 I 131 B1 207	2 E - 1 1.4 E - 4 1.6 E - 1 2.7 E - 1 2.3 E + 1 2.2 E - 2	Ba 140 La 140	7.5 E - 1 2.4 E + 0					
	Co 58 Cs 137	1.2 E - 3 7 E - 1							





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