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The Northeast Utilities System

JUN 30 2000

Docket No. 50-423
B18122

Re: 10CFR50.90

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Millstone Nuclear Power Station, Unit No. 3
License Amendment Request - Unreviewed Safety Question
Proposed Revision to Final Safety Analysis Report
Installation of a New Sump Pump System in
the Engineered Safety Features Building (PLAR 3-00-2)

Northeast Nuclear Energy Company (NNECO) has determined that the installation of a new sump pump system in the Engineered Safety Features Building (ESFB), involves an unreviewed safety question (USQ). Therefore, per 10CFR50.59(c), NNECO requests that the NRC review and approve the changes to the Final Safety Analysis Report (FSAR) through an amendment to Operating License NPF-49, pursuant to 10CFR50.90. This license amendment request deals with changes in the Millstone Unit No. 3 FSAR due to the installation of a new sump system in the ESFB.

The proposed FSAR changes will affect Sections 2.4.13.5, "Design Bases for Subsurface Hydrostatic Loading," 2.5.4.6.1, "Design Basis for Groundwater," 3.4.1.2, "Permanent Dewatering System," 3.8.1.6.4, "Waterproofing Membrane," 3.8.1.6.5, "Steel Liner and Penetrations," 9.3.3.1, "Reactor Plant Vent and Drain Systems, Design Bases," 9.3.3.2.4, "Reactor Plant Aerated Drains System," 9.3.3.2.4.1, "Safety-Related Containment Recirculation Cubicle Sump," 9.3.3.3, "Safety Evaluation," 9.3.3.4, "Tests and Inspections," and 12.3.1.3.2, "Post-Accident Access to Vital Areas," Tables 1.8-1, 3.2-1, 8.3-3, 12.3-3 and 12.3-4, and Figures 3.8-67 and 9.3-6 to reflect the addition of the new subsystem and its impact on other safety-related systems. The new sump pump system creates the possibility of a malfunction of a different type than previously evaluated in the FSAR because of the system's dependence on electrical power; only one non-environmentally qualified, non-safety-related pump is provided; and portions of the ESFB structure are now credited with preventing Recirculation Spray System (RSS) cubicle flooding. Additionally, the proposed changes involve deviations from safety classification and "code & standards," Standard Review Plan 3.4.1 and Regulatory

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Guide (RG) 1.26[1] which go beyond that which was previously approved by the NRC.[2] Based on the above considerations, these changes are deemed to involve an USQ according to 10CFR50.59 (a)(2)(i).

Attachment 1 provides a discussion of the proposed changes and the safety summary and has concluded the proposed changes are safe. Attachment 2 provides the Significant Hazards Consideration. Attachment 3 provides the FSAR pages with the changes indicated.

Environmental Considerations

NNECO has reviewed the proposed license amendment request against the criteria of 10CFR51.22 for environmental considerations. The proposed changes will not significantly increase the type and amounts of effluents that may be released offsite. In addition, this amendment request will not significantly increase individual or cumulative occupational radiation exposures. Therefore, NNECO has determined the proposed changes will not have a significant effect on the quality of the human environment.

Conclusions

The proposed changes do not involve a significant impact on public health and safety (see the Safety Summary provided in Attachment 1) and do not involve a Significant Hazards Consideration pursuant to the provisions of 10CFR50.92 (see the Significant Hazards Consideration provided in Attachment 2).

Plant Operations Review Committee and Nuclear Safety Assessment Board

The Plant Operations Review Committee and Nuclear Safety Assessment Board have reviewed and concurred with the determinations.

Schedule

We request issuance of this amendment for Millstone Unit No. 3 prior to December 30, 2000, with the amendment to be implemented within 30 days of issuance. This will allow Millstone Unit No. 3 to implement the proposed changes during the next refueling outage, currently scheduled for the first quarter of 2001.

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(1) Regulatory Guide 1.26, "Quality Group Classifications and Standards for Water, Steam and Radioactive Waste Containing Components of Nuclear Power Plants."

(2) J. W. Anderson to M. L. Bowling, "Issuance of Amendment - Millstone Nuclear Power Station, Unit No. 3 (TAC No. MA1379)," dated March 17, 1999.

State Notification

In accordance with 10CFR50.91(b), a copy of this license amendment request is being provided to the State of Connecticut.

There are no regulatory commitments contained within this letter.

If you should have any questions on the above, please contact Mr. Ravi Joshi at (860) 440-2080.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

Raymond P. Necci
Vice President - Nuclear Technical Services

Subscribed and sworn to before me

this 30 day of June, 2000

Diane M. Phillipo
Notary Public

DIANE M. PHILLIPO
Notary Public
My Commission Expires Dec. 31, 2000

Date Commission Expires:_____

Attachments (3)

cc: H. J. Miller, Region I Administrator
V. Nerses, NRC Senior Project Manager, Millstone Unit No. 3
A. C. Cerne, Senior Resident Inspector, Millstone Unit No. 3

Director
Bureau of Air Management
Monitoring and Radiation Division
Department of Environmental Protection
79 Elm Street
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Docket No. 50-423
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Attachment 1

Millstone Nuclear Power Station, Unit No. 3

License Amendment Request - Unreviewed Safety Question
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Installation of a New Sump Pump System in
the Engineered Safety Features Building (PLAR 3-00-2)
Discussion of Changes

License Amendment Request - Unreviewed Safety Question
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the Engineered Safety Features Building (PLAR 3-00-2)
Discussion of Changes

Introduction and Background

Northeast Nuclear Energy Company (NNECO) has determined that the installation of a new sump pump system in the Engineered Safety Features Building (ESFB), involves an unreviewed safety question (USQ). The current safety-related sump pumps have been proven unreliable. In a letter dated June 15, 1999,[1] NNECO made a commitment to replace the air motor-driven sump pumps, 3DAS*P15A/B, with electric sump pumps prior to the startup from Refueling Outage 7. Therefore, per 10CFR50.59(c), NNECO requests that the NRC review and approve the changes to the Final Safety Analysis Report (FSAR) through an amendment to Operating License NPF-49, pursuant to 10CFR50.90.

The installation of a new sump pump system is part of a design change which will move the location for removal of groundwater that has circumvented the butyl rubber membrane to a new sump location in the "A" Recirculation Spray System (RSS) cubicle. The new sump will be provided with a non-safety related deep well electric submersible pump inserted from the ESFB roof via a casing pipe. The sump and casing pipe is classified as safety-related and provides a new Supplemental Leak Collection and Release System (SLCRS) boundary within the ESFB. The groundwater removed by the new pump will be routed to a new tank, 3SRW-TK1, adjacent to the ESFB where it will be stored, sampled, treated and eventually released to the drain system. New tank 3SRW-TK1 will be installed in the location of the existing abandoned-in-place Chemical Addition Tank, 3QSS*TK2. The existing pumps 3DAS*P15A/B will be removed and the associated piping and support equipment will be cut back or abandoned-in-place. The porous concrete drains to sumps 3DAS*SUMP7A/B will be capped and sealed. The existing 3DAS*SUMP7A/B covers and extensions will be removed. RSS cubicle floor drain and Hydrogen Recombiner Building flow paths to the sump will be restored.

The proposed FSAR changes will affect Sections 2.4.13.5, "Design Bases for Subsurface Hydrostatic Loading," 2.5.4.6.1, "Design Basis for Groundwater," 3.4.1.2, "Permanent Dewatering System," 3.8.1.6.4, "Waterproofing Membrane," 3.8.1.6.5, "Steel Liner and Penetrations," 9.3.3.1, "Reactor Plant Vent and Drain Systems, Design Bases," 9.3.3.2.4, "Reactor Plant Aerated Drains System," 9.3.3.2.4.1, "Safety-Related Containment Recirculation Cubicle Sump," 9.3.3.3, "Safety Evaluation," 9.3.3.4, "Tests

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[1] C. J. Schwarz to the Nuclear Regulatory Commission, "Millstone Nuclear Power Station, Unit No. 3, Licensee Event Report 99-006-00, Failure of Both Reactor Plant Aerated Drains Safety-Related Air Driven Sump Pumps During a Technical Requirements Manual Surveillance," dated June 15, 1999.

and Inspections," and 12.3.1.3.2, "Post-Accident Access to Vital Areas," Tables 1.8-1, 3.2-1, 8.3-3, 12.3-3, and 12.3-4 and Figures 3.8-67 and 9.3-6 to reflect the addition of the new subsystem and its impact on other safety-related systems. The new sump pump system creates the possibility of a malfunction of a different type than previously evaluated in the FSAR because of the system's dependence on electrical power; only one non-environmentally qualified, non-safety-related pump is provided; and portions of the ESFB structure are now credited with preventing RSS cubicle flooding. The current plant licensing bases for containment structure and ESFB design features for protection against below-grade water have been established in license amendment No. 168.[2] The current plant licensing basis includes deviations from the acceptance criteria defined in Standard Review Plan (SRP) 3.4.1, "Flood Protection," and Regulatory Guide (RG) 1.26.[3] Past NRC review and approval, as described in license amendment No. 168, included consideration of non-safety related quality classifications for components in accessible areas; use of design standards other than the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Class 1, 2 or 3; qualification issues associated with inaccessible safety related pumps; and periodic testing for these inaccessible pumps. The proposed changes involve safety classification and "code & standards," SRP 3.4.1 and RG 1.26 deviations which go beyond that which was previously approved by the NRC. Based on the above considerations, these changes are deemed to involve an USQ according to 10CFR50.59 (a)(2)(i) but are safe. The differences are outlined in a tabulation which is provided in the section entitled "Description of Proposed changes."

Current Design

The containment structure at Millstone Unit No. 3 includes a thick reinforced concrete basemat founded on rock. Between the foundation rock surface and the underside of the basemat are two porous concrete subfoundation layers which are separated by a waterproof butyl rubber membrane designed to preclude the inleakage of groundwater. Porous concrete pipes are installed in the upper porous concrete layer to collect and drain the groundwater into the RSS cubicle sumps inside the ESFB in the event of degradation of the membrane. Figure 1 provides details of the current design.

The butyl rubber membrane surrounds the substructure of the Millstone Unit No. 3 containment building, the ESFB and other structures to protect these substructures from internal flooding of groundwater and prevent hydrostatic loads on the containment liner. This membrane has degraded and is currently breached. Groundwater is being collected in the ESFB sumps.

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(2) J. W. Anderson to M. L. Bowling, "Issuance of Amendment - Millstone Nuclear Power Station, Unit No. 3 (TAC No. MA1379)," dated March 17, 1999.

(3) Regulatory Guide 1.26, "Quality Group Classifications and Standards for Water, Steam and Radioactive Waste Containing Components of Nuclear Power Plants."

Per license amendment no. 168, Millstone Unit No. 3 has added a new sump pump subsystem to prevent inleakage through the containment basemat. The safety function of this sump pump design is the long-term removal of groundwater, post accident, to preclude flooding of the RSS cubicles, and to maintain the integrity of the containment liner and the operability of both trains of the RSS. Originally, with the waterproof membrane intact, no significant amount of inleakage had been expected and no safety-related dewatering system had been required.

The current safety-related pumping subsystem consists of one air-driven pump for each of the two RSS cubicle sumps. The two sumps communicate hydraulically, therefore, either air-driven pump is capable of removing groundwater inleakage from both cubicles. Motive air for the pumps is supplied by portable diesel compressors which are connected during sump pump operation to permanently installed air supply connections outside the ESFB. The SLCRS boundary has been changed to extend to the isolation valves located outside of the ESFB. Equipment accessible for repair and which does not have a failure mode that can adversely affect inaccessible safety related pumps (such as the portable diesel compressors) is classified non-safety-related, with the exceptions of the SLCRS boundary components.

The air-driven pumps discharge the sump water to temporary storage tanks located outside the ESFB, where it is sampled and processed as required.

While not classified as ASME Code Class, the pumping subsystem components in the inaccessible portion of the system are classified as nuclear safety related and Seismic Category I. It is estimated that these sump pumps would be needed approximately ten hours after a design basis accident and would be operated periodically, once every twelve hours thereafter. Thus, there is sufficient time for the operators to make these pumps available for operation.

The sump pump subsystem has been installed such that the underdrain system directs the groundwater from the containment and the ESFB to sumps 3DAS*SUMP7A/B located in the RSS cubicles in the ESFB at (-)34'-9" elevation. To preclude the potential for flooding the RSS cubicles, the groundwater collected in sumps 3DAS*SUMP7A/B is removed during normal operation by non-safety related pumps 3DAS-P8A/B to sump 3DAS-SUMP10, where it is processed through the Radioactive Waste System. During loss of normal power (LNP) and post accident conditions, the groundwater collected in sumps 3DAS*SUMP7A/B is removed by the safety related air operated motor pumps 3DAS*P15A/B to temporary containers at ground level. The liners of 3DAS*SUMP7A/B have been upgraded to assure the sumps remain isolated from potentially contaminated RSS system fluids. In addition, all sources of liquid radiological contamination to the sumps have been eliminated and the RSS cubicle floor drains leading to the sumps have been plugged.

The current system meets the single failure requirements of SRP 3.4.1 which states:

> "If safety-related structures are protected from below-grade groundwater seepage by means of a permanent dewatering system, then the system should be designed as a safety-related system and meet the single failure criterion."

The groundwater protection removal system is described in FSAR Sections 2.4.13.5, 2.5.4.6.1, 3.4.1.2, 3.8.1.6.4, 3.8.1.6.5, 9.3.3.1, 9.3.3.2.4, 9.3.3.2.4.1, 9.3.3.3, 9.3.3.4, and 12.3.1.3.2. Additionally, there is a licensing commitment associated with the current design to replace pumps 3DAS*P15A/B with electric sump pumps prior to startup from Refueling Outage 7 as described in the letter dated June 15, 1999.

Proposed Design

A new safety related collection sump 3SRW*SUMP6 shall be installed in the south corner of the "A" RSS cubicle. The sump will be a stainless steel structure on the floor at elevation (-)34'-9". The 6 inch inlets to the new collection sump shall utilize two existing sample bore holes and one new bore hole for communication with the porous concrete layer underdrain through the "A" RSS cubicle floor. These shall serve as groundwater inlets from the porous concrete underdrain to the new collection sump. The porous concrete layer is common to both RSS cubicles. Figure 2 provides details of the proposed design.

The new collection sump 3SRW*SUMP6 shall have level instrumentation, 3SRW-LT18, to provide for control room process computer points for both level indication and a high level alarm. The high level alarm shall be set such that approximately 4 days capacity remains in the collection sump prior to reaching the elevation of the containment steel liner, elevation (-)27'-3". As such, adequate time is provided in the capacity of the new sump 3SRW*SUMP6 to allow for pump maintenance. The pump is accessible with respect to radiation from the ESFB roof at 24 hours post Loss of Coolant Accident (LOCA). A proposed Technical Requirements Manual (TRM) change will be implemented to ensure that maintenance on the pump will be performed within 4 days.

A safety related casing pipe shall be routed from the new collection sump through the ESFB roof. The new collection sump shall be open to the atmosphere via a vent valve in the casing pipe at the ESFB roof. The vent valve shall be locked in the open position to ensure a sump vent path. The new collection sump and the casing pipe shall become a new SLCRS boundary within the ESFB. Figure 3 provides details of the pump system design.

The new safety-related collection sump shall be provided with one non-safety related deep well electric submersible pump, 3SRW-P5, inserted from the ESFB roof via the casing pipe. At least one spare pump shall be maintained on site for replacement of a failed pump. The new pump shall be used for both normal operation and post-accident

operation for removal of groundwater. Pump maintenance is accomplished from the ESFB roof level allowing pump access for maintenance during normal and post-accident conditions (24 hours after a LOCA). The actual replacement time is anticipated to be approximately 8 hours, of which 4 hours would be actually spent on the ESFB roof. Retrieval of the failed pump and piping, and the installation of the replacement pump and piping can be achieved by using the piping, the electrical cable or a stainless steel retrieval cable provided on the pump. This stainless steel retrieval cable is significantly over designed and is classified as non-safety related.

The groundwater removed by the new pump shall be sent from the ESFB roof to a new non-safety related tank (3SRW-TK1) adjacent to the ESFB. The volume of the tank will be 10,000 gallons, corresponding to a two week storage capacity. Provisions will be provided to redirect the groundwater from this tank to a temporary container for further treatment if the groundwater sample show radioactive contamination or is otherwise not releasable.

The new tank will be installed in the location of existing abandoned-in-place Chemical Addition Tank (CAT), 3QSS*TK2. The tank shall be seismically supported utilizing similar struts and attachments to the Refueling Water Storage Tank (RWST) as the removed CAT, such that there is no impact on the seismic qualification of the RWST as a result of the new tank.

Based on nominal in-leakage rates, the new sump pump is expected to run approximately once per day. It will start and stop automatically based on non-QA level switch 3SRW-LS17, in the new collection sump 3SRW*SUMP6. Pump 3SRW-P5 can also be operated in manual mode from a control station located in the yard area adjacent to tank 3SRW-TK1. In addition, at the pump control station by tank 3SRW-TK1, a run time meter is provided. Initiation of manual mode would be based on using the trending information from multiple instrument readings available on the process computer. In the event that instrumentation readings conflict, local 3SRW-TK1 level measurements via a portable instrument can be used to trend 3SRW-TK1 level and thus, verify accomplishment of the dewatering function.

The new sump pump will be powered by a non QA power circuit which derives power from a reliable Class 1E Motor Control Center (MCC). Two Class 1E circuit breakers will serve as the necessary electrical isolation device. The new sump pump 3SRW-P5 can be powered from the Train A Emergency Diesel Generator (EDG) 3EGS*EGA.

Both QA air-driven pumps (3DAS*P15A/B) shall be removed from sumps 3DAS*SUMP7A/B. The piping shall be cut back, capped and abandoned in-place and support equipment associated with 3DAS*P15A/B shall be removed. The porous concrete drains to sumps 3DAS*SUMP7A/B shall be capped. The sump covers and extensions for 3DAS*SUMP7A/B shall be removed. RSS cubicle floor drain and Hydrogen Recombiner Building flow paths to the sump will be restored. These sump inflow pathways had previously been eliminated to prevent 3DAS*SUMP7A/B

radiological contamination. Portions of the abandoned piping would continue to function as a SLCRS boundary.

The current non safety related sump pump 3DAS-P8A/B will continue to transport water collected from sumps 3DAS*SUMP7A/B to 3DAS-SUMP10 for radwaste system processing. Operator actions per emergency operating procedure EOP 35 ES-1.3 will continue to ensure that power to these pumps will be isolated following a LOCA.

Given a single failure, the proposed design can still accomplish the dewatering function, thus, meeting the single failure design criteria defined in SRP No. 3.4.1. The associated Failure Mode and Effects Analysis (FMEA) takes credit for the ability to detect a failure, the post-LOCA component accessibly of most system components, and the approximate 4 day duration provided to complete corrective actions. For example, 3SRW-P5 pump failure is mitigated by pump replacement.

The following comparison is provided to demonstrate how the quality standards chosen for the new system compare with the current system design:

Table 1
Code & Standards and Safety Classification Comparison

Attribute	Previously Approved by NRC in Amendment No. 168 (current system design).	Proposed Design
Design	Piping (air supply and water) : QA, non-ASME, ANSI B31.1, except for compressor air supply lines and water lines located outside the ESFB which are defined as non-QA and designed in accordance with manufacturer's standards Support design per NETM-45 Small Bore Piping Supports installed per NETM 24 to ensure piping compliance with ASME BPVC, Section III, NC/ND 3600 Pumps (QA): non-ASME, commercial grade pump qualified by special test report Pump Power Supply (non-QA): Compressed air, commercial grade portable compressors, three available onsite.	Pipe Casing and Sump Inlet Piping (QA): Same as current design except for structural components which are under the guidance of AISC code. Pump Outlet Piping (non-QA): The outlet piping with the exception of the polyethylene pipe is designed per ANSI B31.1, NETM 24 and NETM-44. Polyethylene piping is non-code piping. Casing Pipe Supports (QA): Same as current design. Sump 3SRW*SUMP6 (QA): Guidance of AISC code Pipe Supports (non-QA): Same as current design Tank 3SRW-TK1 (non QA): ASME Section VIII Pump (non-QA): Non-ASME, commercial grade pump, no special qualifications, pump retrieval cable over designed and classified as non-QA. Pump Power Supply (non-QA): Electric powered, derived from Class 1E electrical bus.

Attribute	Previously Approved by NRC in Amendment No. 168 (current system design).	Proposed Design
Materials	Piping (QA): SA material with traceability Pump (QA): Manufacturer's Standards, Non-ASME Supports: SP-ME-570[4]	Pipe Casing and Sump Inlet Piping (QA): SA and ASTM with traceability. Pump outlet Piping (non-QA): polyethylene pipe section is ASTM material, stainless steel piping is SA material. Sump 3SRW*SUMP6 (QA): SA and ASTM material with traceability Pump (non-QA): Manufacturer's Standards Supports: Same as current design
Fabrication	Piping (QA): All welding per NU Welding Manual and ASME BPVC, Section III, Section IX. Supports: All welding per NU Welding Manual and AWS D1.1	Pipe Casing and Sump Inlet Piping (QA): All Welding per NU Welding Manual and ASME BPVC Section IX, exceptions addressed by weldability evaluation. Supports: All Welding per NU Welding Manual and AWS D1.1 Sump 3SRW*SUMP6 (QA): ASME Section IX and NU Welding Manual, exceptions addressed by weldability evaluation.
Examination	Piping: All socket welds, VT, acceptance criteria per B31.1 Supports: All fillet welds, VT acceptance per AWS D1.1	Pipe Casing and Sump Inlet Piping: VT, acceptance per B31.1 or AWS D1.1 performed by Quality Inspectors. Supports: All fillet welds, VT acceptance per AWS D1.1 Sump 3SRW*SUMP6: Visual inspections required for all welds by Quality Inspectors with acceptance criteria derived from AWS D1.1.

(4) SP-ME-570, Design Specification for Field Fabrication and Erection of Piping and Supports, Northeast Utilities Service Company.

Attribute	Previously Approved by NRC in Amendment No. 168 (current system design).	Proposed Design
Testing	Piping - Hydrostatic (1.5 times design pressure) and in-service leak test for pump and piping not hydro tested.	Sump 3SRW*SUMP6 and Inlet Piping: In-service Leak test to top level of sump. Pump Discharge Piping: In-service Leak test. Casing Pipe: SLCRS surveillance test Tank 3SRW-TK1: Hydrostatic Leak Test per ASME Section VIII

Description of Proposed FSAR Changes

NNECO requests that the NRC review and approve, through an amendment to Operating License NPF-49 pursuant to 10CFR50.90, the proposed FSAR changes which affect Sections 2.4.13.5, 2.5.4.6.1, 3.4.1.2, 3.8.1.6.4, 3.8.1.6.5, 9.3.3.1, 9.3.3.2.4, 9.3.3.2.4.1, 9.3.3.3, 9.3.3.4, and 12.3.1.3.2, Tables 1.8-1, 3.2-1, 8.3-3, 12.3-3 and 12.3-4 and Figures 3.8-67 and 9.3-6.

The FSAR changes reflect the following design changes:

1. Moving the location for removal of groundwater that has circumvented the butyl rubber membrane to a new sump location in the "A" RSS cubicle.

2. The new sump will be provided with a non-safety related deep well electric submersible pump inserted from the ESFB roof via a casing pipe.

3. The sump and casing pipe will be classified as safety-related and provides a new SLCRS boundary within the ESFB.

4. The groundwater removed by the new pump will be routed to new tank 3SRW-TK1 adjacent to the ESFB where it will be stored, sampled, treated and eventually released to the drain system.

5. New tank 3SRW-TK1 will be installed in the location of existing abandoned-in-place Chemical Addition Tank, 3QSS*TK2.

6. The existing pumps 3DAS*P15A/B will be removed and the associated piping and support equipment will cut back or abandoned-in-place.

7. The porous concrete drains to sumps 3DAS*SUMP7A/B will be capped and sealed.

8. The sump covers and extensions will be removed. RSS cubicle floor drain and Hydrogen Recombiner Building flow paths to the sump will be restored.

Safety Summary

This license amendment request deals with changes in the Millstone Unit No. 3 FSAR due to the installation of a new sump pump system in the ESFB. The new sump design will be provided with a new safety grade sump 3SRW*SUMP6, which will be isolated from the RSS cubicle and will operate during normal, abnormal and post accident conditions. The sump will be provided with instrumentation and provides for a 4 day capacity beyond the normal operating sump levels to provide adequate time to implement corrective actions, such as replacement of a failed 3SRW-P5 pump.

Only one non safety related electric sump pump will be provided. A spare pump will be maintained onsite. Monitoring of the sump pump can be initiated 8 hours after the accident and once per day thereafter. If the sump pump fails, it can be accessed from the ESFB roof 24 hours after a LOCA. Replacement activities are expected to last 8 hours. Since operation of the pump is not required for 4 days, there is sufficient time available to perform maintenance evolutions. EOP 35 ES-1.3 will be modified to reflect use of the new system.

Although the sump pump is classified as non-safety related and is provided with a non Class 1E circuit, it is connected to a safety related Class 1E MCC and can be operated with power supplied by the Train A EDG. It has been determined that addition of the sump pump to the Train A EDG would not affect operation of the EDG. Two Class 1E breakers have been added as isolation devices. As such, this changes would not affect any vital bus. Upon failure of the Train A electrical system, there is sufficient time (4 days) to repower the sump pump from another source.

The design change will result in a change in the SLCRS boundary in the ESFB. Modifications and surveillance of the SLCRS boundary will be performed in accordance with SLCRS design requirements and Technical Specification 3/4.6.6. As such, these changes will not affect the SLCRS.

The groundwater from the sump will be transferred by the sump pump to a new non safety tank adjacent to the ESFB. Since the new sump is separated from the RSS cubicle, the groundwater is expected to be non radioactive. However, measures will be taken to sample the groundwater and if found radioactive, disposition it accordingly. The new tank will be installed in the location of existing abandoned-in-place CAT, which is currently attached to the RWST. It has been confirmed through calculation that the new tank will pose no impact on the seismic qualification of the RWST. As such, operability of the RWST is not impacted.

Sump pump 3SRW-P5 will not be added to our plant Inservice Test (IST) Program due in part to the fact that the pump operates during normal operation (about once per day) and this normal pump use confirms the pump operability.

Therefore, the proposed changes will not affect the RSS, the RWST [which provides water to the Emergency Core Cooling System (ECCS) and the containment Quench Spray System (QSS)], the SLCRS, the containment, the Train A EDG or any vital bus. As such, probability and consequences of malfunction to these systems are not affected.

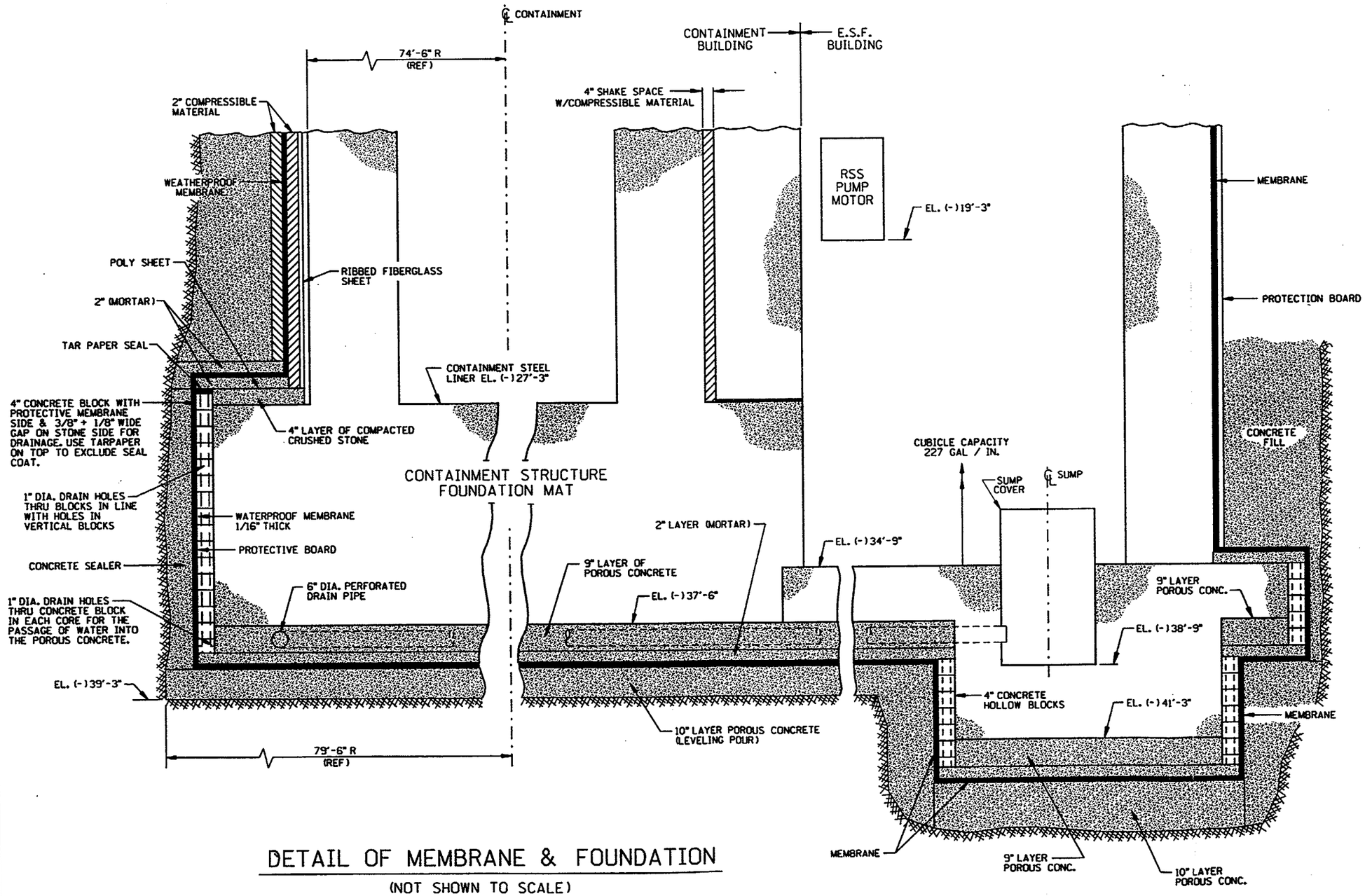
The new sump system will be separated from the primary and secondary plant systems. As such, the proposed changes will not affect the probability of occurrence of a LOCA or any other accident. The RSS, the RWST (which provides water to the ECCS and the QSS), the SLCRS, the containment, the Train A EDG and any vital bus are credited for the mitigation of a LOCA. Since these systems are not impacted, the consequences of a LOCA are not impacted. In addition, the proposed changes would not result in an accident of a different kind and would not reduce the margin of safety as defined in the basis of any Technical Specification.

The design change, per NUREG 0737 Section II.B.2 requirement, has been evaluated by a calculation to ensure that the required operator actions post LOCA can be performed within a 5 rem whole body dose requirement, and has been found to be acceptable.

Because of the above reasons, the proposed changes are safe.

The current plant licensing bases for Containment Structure and ESFB design features for protection against below-grade water have been established in license amendment no. 168. The current plant licensing basis includes deviations from the acceptance criteria defined in SRP 3.4.1, "Flood Protection," and RG 1.26. Past NRC review and approval included consideration of non-safety related quality classifications for components in accessible areas; use of design standards other than the ASME Boiler and Pressure Vessel Code Class 1, 2 or 3; qualification issues associated with inaccessible safety related pumps; and periodic testing for these inaccessible pumps. The proposed changes involve safety classification and "code & standards," SRP 3.4.1 and RG 1.26 deviations which go beyond that which was previously approved by the NRC. In addition, the proposed design further deviates from the current sump design which relies on air operated pumps, independent from the electrical system, while the proposed design would rely on non safety electrical circuits. Therefore, because of these deviations, the proposed changes could create the possibility of a malfunction of a different type than already evaluated in the Safety Analysis Report.

Based upon the above, the proposed design change has been determined to be an USQ but is safe and acceptable.

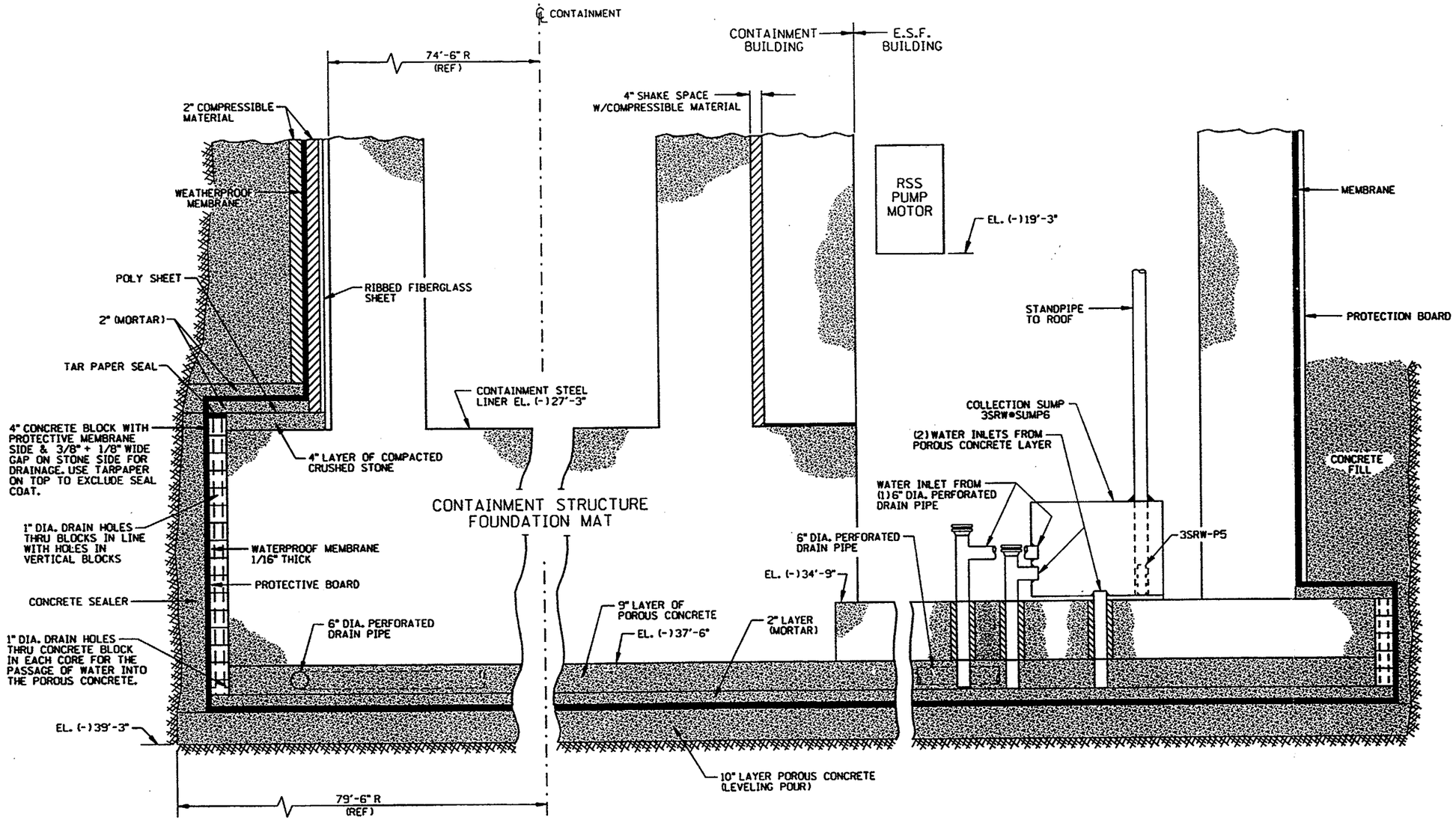


DETAIL OF MEMBRANE & FOUNDATION

(NOT SHOWN TO SCALE)

FIGURE 1

DETAIL OF MEMBRANE & FOUNDATION
SCALE : NONE
DRAWN BY : CRAIG JANUS
DATE : 12/6/99
FILE NAME: SKM-CSJ-CTMTMAT
REVISION 0



DETAIL OF MEMBRANE & FOUNDATION

(NOT SHOWN TO SCALE)

FIGURE 2

DETAIL OF MEMBRANE & FOUNDATION
SCALE : NONE
DRAWN BY : CRAIG JANUS
DATE : 12/6/99
FILE NAME: SKM-CSJ-CTMTMAT
REVISION 1

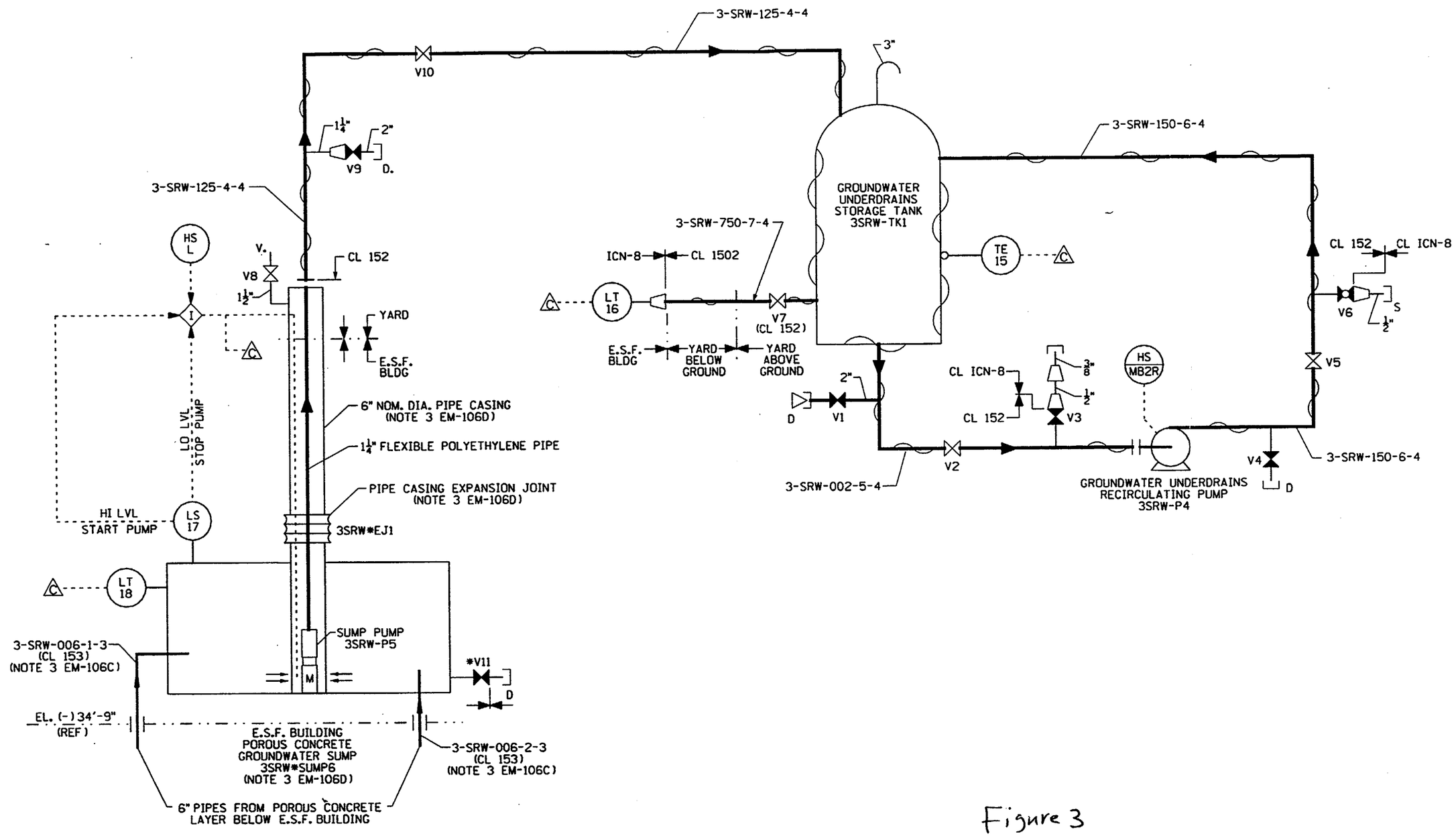

3-SRW-125-4-4
V10
3"
1¼"
2"
V9
D.
3-SRW-125-4-4
GROUNDWATER UNDERDRAINS STORAGE TANK 3SRW-TK1
3-SRW-150-6-4
HS L
V.
V8
1½"
CL 152
3-SRW-750-7-4
ICN-8
CL 1502
LT 16
V7 (CL 152)
TE 15
CL 152
CL ICN-8
V6
S
½"
YARD
E.S.F. BLDG
E.S.F. BLDG
YARD BELOW GROUND
YARD ABOVE GROUND
2"
D
V1
CL ICN-8
⅜"
½"
CL 152
V3
HS MB2R
V5
6" NOM. DIA. PIPE CASING (NOTE 3 EM-106D)
1¼" FLEXIBLE POLYETHYLENE PIPE
LO LVL STOP PUMP
PIPE CASING EXPANSION JOINT (NOTE 3 EM-106D)
HI LVL START PUMP
LS 17
3SRW*EJ1
V2
V4
3-SRW-150-6-4
3-SRW-002-5-4
GROUNDWATER UNDERDRAINS RECIRCULATING PUMP 3SRW-P4
D
LT 18
SUMP PUMP 3SRW-P5
3-SRW-006-1-3 (CL 153) (NOTE 3 EM-106C)
*V11
D
M
EL. (-)34'-9" (REF)
E.S.F. BUILDING POROUS CONCRETE GROUNDWATER SUMP 3SRW*SUMP6 (NOTE 3 EM-106D)
3-SRW-006-2-3 (CL 153) (NOTE 3 EM-106C)
6" PIPES FROM POROUS CONCRETE LAYER BELOW E.S.F. BUILDING

Figure 3

Attachment 2

Millstone Nuclear Power Station, Unit No. 3

License Amendment Request - Unreviewed Safety Question
Proposed Revision to Final Safety Analysis Report
Installation of a New Sump Pump System in
the Engineered Safety Features Building (PLAR 3-00-2)
Significant Hazards Consideration

License Amendment Request - Unreviewed Safety Question
Proposed Revision to Final Safety Analysis Report
Installation of a New Sump Pump System in
the Engineered Safety Features Building (PLAR 3-00-2)
Significant Hazards Consideration

Significant Hazards Consideration

In accordance with 10CFR50.92, Northeast Nuclear Energy Company (NNECO) has reviewed the proposed changes and has concluded that they do not involve a Significant Hazards Consideration (SHC). The basis for this conclusion is that the three criteria of 10CFR50.92(c) are not compromised. The proposed changes do not involve an SHC because the changes would not:

1. Involve a significant increase in the probability or consequences of an accident previously evaluated.

   This license amendment request deals with changes in Millstone Unit No. 3 Final Safety Analysis Report (FSAR) due to the installation of a new sump pump system in the Engineered Safety Features Building (ESFB). The sump pump system which prevents inleakage through the containment basemat is not connected to and is fully independent of the reactor coolant system. Therefore, the proposed changes to this system will not increase the probability of occurrence of a Loss of Coolant Accident (LOCA). The new system is a support system for the Recirculation Spray System (RSS) and containment protective boundary which are mitigation design features. Therefore, the new system does not increase the probability of occurrence of accidents previously evaluated.

   The proposed changes to the groundwater sump system separate the sump from the RSS pump cubicle. As such, the proposed changes would preclude flooding of the RSS cubicles and a potential malfunction of the RSS pumps. The RSS pumps function to provide containment and core cooling, as early as 11 minutes and 30 minutes, respectively, post LOCA. Operability of the RSS pumps is required long term. Since the changes do not affect the operation of the RSS pumps, they will not increase the consequences of a LOCA.

   The new collection tank 3SRW-TK1 will be installed in the location of the existing abandoned in place Chemical Addition Tank (CAT) 3QSS*TK2, by the Refueling Water Storage Tank (RWST). The tank will be seismically supported utilizing similar struts and attachments to the RWST as the removed CAT. A calculation has confirmed that there is no impact on the seismic qualification of the RWST as a result of the new tank. The RWST provides water to the Emergency Core Cooling System (ECCS) and Containment Quench Spray (QSS) which are credited to mitigate the consequences of a LOCA. Therefore, the proposed changes do not increase the consequences of a LOCA.

In the proposed design, the installation of the new safety related collection sump and casing pipe will result in a change in the Supplemental Leak Collection and Release System (SLCRS) boundary within the ESFB. This modification will be performed to meet the SLCRS design requirements. Testing will be performed post modification and routinely to satisfy SLCRS Technical Specification 3/4.6.6 requirements. Per Technical Specification 3/4.6.6 basis, the SLCRS is credited post LOCA to limit the release of fission products from the containment. Since the proposed changes do not affect operability of SLCRS, it does not increase the consequences of a LOCA.

In the proposed changes, sumps 3DAS*SUMP7A/B inflow pathways will be restored such that it may become potentially contaminated. Emergency operating procedures shall contain operator actions to ensure that power to 3DAS*SUMP7A/B sump pumps 3DAS-P8A/B is isolated post LOCA. As such, the proposed changes will continue to ensure that potentially contaminated water is not discharged from 3DAS*SUMP7A/B. Therefore, the changes will not increase the consequences of a LOCA.

The design change, per NUREG 0737 Section II.B.2 requirement, has been evaluated by a calculation to ensure that the required operator actions post LOCA can be performed within a 5 rem whole body dose requirement, and has been found to be acceptable.

Therefore, these changes will not significantly increase the consequences of an accident previously evaluated.

2. Create the possibility of a new or different kind of accident from any accident previously evaluated.

The proposed changes do not impact the operation of the RSS, QSS, ECCS, SLCRS and any other Class 1E equipment following a LOCA or any other accident.

Although the new proposed design is equipped with only one non safety sump pump, versus two safety pumps currently installed, a spare pump is maintained on site. This pump is accessible 24 hours following a LOCA when exposure level becomes acceptable. Replacement activities are expected not to exceed 8 hours. The proposed sump will be provided with 4 days excess capacity. As such, sufficient time would be available to replace a failed pump, if necessary.

As such, groundwater introduced into the underdrains system can not affect the integrity of the containment liner following a LOCA.

The current and proposed changes result in the transfer of groundwater from the sump to above ground. The proposed design adds new features to separate the RSS cubicles from the sump. As such, the release of radioactive water from the groundwater sump to the environment is highly unlikely. However, if found radioactive, the proposed changes will include measures for the safe disposal of this groundwater. The proposed changes will continue to ensure that operator actions are performed to preclude potentially contaminated water from being discharged from sump 3DAS*SUMP7A/B post-LOCA.

The design change, per NUREG 0737 Section II.B.2 requirement, has been evaluated by a calculation to ensure that the required operator actions post LOCA can be performed within a 5 rem whole body dose requirement, and has been found to be acceptable. As such, the operators will not be prevented from performing the required actions outside the control room.

Therefore, the proposed changes do not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Involve a significant reduction in a margin of safety.

The Millstone Unit No. 3 FSAR changes reflect the installation of a new sump pump system in the ESFB. The proposed changes do not affect operation of the RWST, ECCS, QSS, RSS, SLCRS, Containment, EDG or any Class 1E component required for safety. The additional load on the Train A EDG and fuel oil consumption are within the calculated allowance. Therefore, these changes do not significantly reduce the margin of safety.

As described above, this license amendment request does not involve a significant increase in the probability of an accident previously evaluated, does not involve a significant increase in the consequences of an accident previously evaluated, does not create the possibility of a new or different kind of accident from any accident previously evaluated, and does not result in a significant reduction in a margin of safety. Therefore, NNECO has concluded that the proposed changes do not involve a SHC.

Docket No. 50-423
B18122

Attachment 3

Millstone Nuclear Power Station, Unit No. 3

License Amendment Request - Unreviewed Safety Question
Proposed Revision to Final Safety Analysis Report
Installation of a New Sump Pump System in
the Engineered Safety Features Building (PLAR 3-00-2)
Marked Up Pages

2.4.13.5 Design Bases for Subsurface Hydrostatic Loading

There is no safety related permanent dewatering system for lowering groundwater levels for Millstone 3. Safety related structures are designed for water pressure and buoyancy forces applied from their respective foundation levels to the design piezometric surface levels, as shown in Figure 2.5.4-37 assuming saturated soil conditions to the water surface. Section 2.5.4.6 includes a discussion of groundwater conditions with respect to plant structure design and construction and Section 3.4 includes a discussion of flood design for Seismic Category I structures and components. Section 9.3.3 includes a description of the sump systems installed in the ESF building for removal of groundwater inleakage collected in the ~~recirculation spray system cubicle sumps~~ porous concrete groundwater sump. 99-47 99-47

2.4.14 Technical Specification and Emergency Operation Requirements

In order to minimize the water associated impact of adverse hydrologically related events on safety related equipment and facilities, Millstone 3 has one technical specification. Technical Specification 3/4.7.6, Flood Protection, describes the measures required to provide flood protection for the service water pump cubicles.

The service water pumps are designed to operate at a low water level of el -8.0 feet msl, which is 3.2 feet lower than the historical low water level (Section 2.4.11.3) and are enclosed in a flood protected portion of the circulating and service water pumphouse (Sections 2.4.1.1 and 3.4.1). Other safety related structures and components are protected from flooding by the site grade of el 24.0 feet msl. AOP 3569 addresses safety measures to be taken in the case of severe weather conditions. These measures ensure that all watertight doors are in place and the pump cubicle sump drain valves are closed and thus all safety-related structures and components are protected from flooding.

Section 2.4.2.3 states that there is no water associated impact in the safety related facilities, resulting from local rainfall as severe as the probable maximum. Therefore, no technical specifications or emergency operating procedures are required, except as discussed above for the pumphouse.

2.4.15 References for Section 2.4

Bechtel Corporation 1972. Final Safety Analysis Report, Millstone Nuclear Power Station, Unit 2, Docket No. 50-336, Sections 2.5 and 2.7.

Bodine, B.R. 1971. Storm Surge on Gulf Coast: Fundamentals and Simplified Predictions. Technical Memorandum 35. U.S. Army Corps of Engineers, Coastal Engineering Research Center, Washington, D.C.

Bredehoeft, J.D. and Pinder, G.F. 1973. Mass Transport in Flowing Groundwater. Water Resources Research, Vol 9, p 194-210.

Bretschneider, C.L. 1954a. Field Investigation of Wave Energy Loss of Shallow Water Ocean Waves. Technical Memorandum 46. U.S. Army Corps of Engineers, Beach Erosion Board, Washington, D.C.

Bretschneider, C.L. 1954b. Generation of Wind Waves Over a Shallow Bottom. Technical Memorandum 51. U.S. Army Corps of Engineers, Beach Erosion Board, Washington, D.C.

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For Information Only

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2.5.4.6.1 Design Basis for Groundwater

Groundwater observations at the site prior to construction were made in piezometers installed in several borings. Listings of the water elevations and dates of reading are presented in Table 2.5.4-17. Three borings, 303, 310, and 311, were continually monitored over a 2-year period. A plot of elevation vs date for water levels in these boreholes is shown on Figure 2.5.4-38. As a result of these observations, a stabilized groundwater level contour map, based on the water levels measured in January 1972, shown on Figure 2.5.4-37, is used as the basis for determining hydrostatic loadings on structure foundations.

Localized perched groundwater conditions probably exist because of the irregular distribution of ablation till materials of varying gradation and porosity. It is also likely that shallow, ponded water exists in localized bedrock troughs. The prevalence of bedrock outcrops to the north and northwest of the site indicates that bedrock acts as a groundwater divide, isolating the soils of the tip of Millstone Point from soils further inland. Thus, groundwater recharge would primarily be due to absorption of local precipitation, with probable migration of the waters to the immediately adjacent Long Island Sound. Little groundwater is present in the crystalline bedrock, and virtually all of the groundwater movement is restricted to the soil overburden.

Measurements taken during previous investigations (Bechtel Corporation 1969) showed average influx rates into test pits of about 8 gallons per hour, and it was concluded that both the ablation and basal tills were relatively impervious. The ablation till soils are more pervious than the basal tills and occasionally exhibit partial stratification, including sporadic sand lenses. Thus, the upper portions of the soil transmits water more readily than the underlying dense basal tills.

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All structures are designed for the groundwater levels shown in Table 2.5.4-14 which are based on groundwater contours plotted on Figure 2.5.4-37. No safety-related permanent dewatering system is required to lower groundwater levels. These groundwater contours represent average groundwater elevations of the site prior to the start of construction. A comparison of groundwater contours with the top of basal till contours on Figure 2.5.4-36 verifies that the primary medium for groundwater flow is the permeable surficial soil overlying the basal till. Recharge of the groundwater occurs mainly from precipitation infiltrating through the surficial soils, and flowing toward Long Island Sound and the outwash deposits above the till.

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Construction of the plant results in large changes to the site geohydraulic conditions. Site grade has been lowered to a uniform elevation of +24 feet from the original site grade which varied from elevation 26 feet to 30 feet. The major plant structures are founded at approximately elevation 0 feet on blasted rock excavations and backfilled from subgrade level to the ground surface with fill materials of relatively high permeability. The backfilled zones under and around these structures and the circulating water intake pipelines provide a continuous hydraulic conduit for groundwater flow from the plant area to Long Island Sound. Therefore, the average water levels prior to construction are not necessarily representative of post-construction groundwater conditions. Design groundwater levels used in plant design are shown in Table 2.5.4-14.

porous concrete groundwater sump

A seepage diversion system, consisting of a series of underdrains and porous concrete, has been installed under and around several structures to minimize the amount of seepage into the basement of structures founded below the groundwater table. The quantity of seepage expected to be diverted through the system is small, due to the low permeability of the basal till and rock at the site. This system is not considered safety related because dewatering is not necessary to ensure the stability of any structure. However, enough leakage occurs to require pumping for equipment protection. The containment and all other Category I structures are protected from groundwater inflow by a waterproof membrane below the groundwater level. Water which penetrates or circumvents the membrane is diverted to the engineered safety features building containment recirculation sumps via the underdrains and porous concrete. The groundwater collected in these sumps is removed during normal operation using non safety-related pumps while safety-related pumps are used for post-LOCA or LNP conditions (see Section 9.3.3 for details of this system.). 99-47 99-47

Water levels measured in borings taken at the site in early 1972 indicate a groundwater piezometric surface with a 3-percent gradient generally sloping from northeast to southwest, as shown on Figure 2.5.4-37.

As discussed in Section 2.4.5.2, Flood Design Considerations, the controlling event for flooding at the Millstone 3 site is a storm surge resulting from the occurrence of the probable maximum hurricane (PMH). The maximum stillwater level resulting from hurricane surge was calculated to be elevation 19.7 feet msl. As shown on Figure 2.4-9, the water level drops significantly with time, so that after 2 hours the flood level is at elevation 17 feet and after 6 hours the surge level subsides to elevation 10 feet. A continuous hydraulic connection would occur across the site from the main structure area to the shorefront through the backfill placed around structures and the backfill placed in the circulating water pipeline trench. It can be expected that the maximum groundwater level due to flooding would not exceed elevation 19.7 feet and would probably be less because of head losses in the soil. According to Figure 2.4-9, the water level drops to 17 feet after 2 hours.

The design groundwater levels for major safety-related structures shown on Table 2.5.4-14 are all equal to or greater than elevation 19 feet with the exception of the hydrogen recombiner building, which has a design groundwater level of 18 feet. However, founding grade is at elevation 20 feet for this structure, which is founded on concrete fill placed directly on bedrock. Design criteria for flood conditions are discussed in Section 3.4.

2.5.4.6.2 Groundwater Conditions During Construction

During construction, the inflow of water into the excavations was controlled by pumping from sumps located outside of the building lines adjacent to structures. Most flow through the overburden was transported through the sand lenses. All water-softened material was removed and replaced with a fill concrete working mat as described in Section 2.5.4.5.1. The rate of inflow was sufficiently low to allow enough time to pour the concrete working mat without further softening of the till.

Drainage pipes were installed in the southwest face of the containment excavation in order to relieve the hydrostatic pressure on the bedrock joint and foliation surfaces. Very little

3.4.1.2 Permanent Dewatering System

There is no safety-related dewatering system for lowering groundwater levels for Millstone 3. This system is not applicable. Removal of water which bypasses the membrane installed below the Containment Structure is collected in the engineered safety features building ~~recirculation spray system cubicle sumps~~ and is removed by the ~~Reactor Plant Aerated Drains~~ System (see Section 9.3.3).

Underdrain

porous concrete groundwater sump

99-47 CAPR

3.4.2 Analytical and Test Procedures

Ground levels of all Category I structures, except for the circulating and service water pumphouse and the discharge structure, are located above the design basis flood (DBF) level. This level is based on the maximum combination of storm surge due to the PMH and associated wave run-up (Section 3.4.1). Structures located above this level are designed for the hydrostatic effects of uplift and lateral water pressure resulting from the DBF or normal groundwater, whichever is more severe. Groundwater levels are based on piezometric readings taken at the site (Figure 2.5.4-37).

The circulating water discharge structure and discharge tunnel and the circulating and service water pumphouse are located below the DBF level.

The circulating water discharge structure and discharge tunnel are designed for the hydrostatic and dynamic effects of the DBF as described in Section 3.4.1.

The circulating and service water pumphouse is designed laterally for a standing wave and for uplift on the operating floor due to confined wave action within the pumphouse (Section 3.4.1).

Foundation loadings used in the design reflect saturated soil conditions, where applicable.

The design wind loading described in Section 3.3.1 is applied concurrently with the hydrostatic and dynamic effects of the DBF (Sections 3.8.1.3, 3.8.3.3 and 3.8.4.3). Tornado loading is not applied concurrently with the DBF.

3.4.3 Reference for Section 3.4

Hansen, E.M., Schreiner, L.C., and Miller, J.F, 1982. Application of Probable Maximum Precipitation Estimate - U.S. East of the 105th Meridian. Hydrometeorological Report No. 52, National Weather Service, NOAA, U.S. Department of Commerce, Washington, D.C.

Construction Techniques

Structural steel material, erection, and fabrication tolerances are in accordance with the AISC Specification for the Design Fabrication, and Erection of Structural Steel for Buildings.

Welding of structural steel is in accordance with AWS D 1.1-72, Revision 1-73.

3.8.1.6.4 Waterproofing Membrane

porous concrete groundwater sump

A waterproofing membrane (Figure 3.8-57) was placed below the containment structure mat and Engineered Safety Features building and carried up the containment wall and capa Engineered Safety Features building walls to above groundwater level. Attached to and capa entirely enveloping the part of the containment structure and Engineered Safety Features building below ground level, the membrane protects the structures from the effects of capa 99-47 groundwater and the steel liner from external hydrostatic pressure. When water penetrates or otherwise circumvents the membrane, the water drains to a layer of porous concrete directly below the mats and above the membrane. This layer of porous concrete serves as a horizontal drain under the entire containment structure and Engineered Safety Features capa building. The porous layer is drained into ~~two sumps in~~ the Engineered Safety Features capa building. Non safety-related pumps ~~are~~ is used as necessary to remove the water during 99-47 normal plant operation, ~~while safety-related pumps are used for~~ post-LOCA or LNP conditions (see 9.3.3.2.4.1 for additional information).

A non

and

A standpipe assembly has been installed through the waterproofing membrane extending to the floor at elevation (-) 34'-9" in the Engineered Safety Features Building. This assembly consists of a one inch diameter pipe with a ball valve, a pressure indicator and a globe valve. The purpose of this assembly is to measure the hydrostatic pressure and sample the water below the membrane. Essentially, the standpipe and valve assembly replace a small piece of the membrane. The standpipe has been securely grouted and sealed into place to preclude membrane leakage.

Core samples have been removed from the high alumina cement porous concrete layer from under the Engineered Safety Features building basemat. The coring process has capa disturbed the membrane at these locations. The waterproofing membrane has been replaced with grout at these locations.

The surface of the containment structure steel liner in contact with concrete is not subject to corrosion because of the alkaline nature of the concrete.

3.8.1.6.5 Steel Liner and Penetrations

Materials

Liner plate up to 1-1/4-inches inclusive and bridging plate are made from SA 537 Class 2 Quenched and Tempered, nil-ductility transition temperature (NDTT) test not higher than -10°F, with the exception of dome liner plate which is made from SA 537, Class 2 normalized to Class 1 practice, NDTT not higher than -10°F. All liner insert plates and embedment material greater than one-inch thick was ultrasonically tested prior to installation for the purpose of detecting possible laminations.

Significant amounts of groundwater are not expected. Figure 2.5.4-37 shows the design levels for groundwater. No Seismic Category I dewatering system is required. However, the following features have been incorporated to prevent seepage of groundwater into portions of structures below the piezometric surface:

1. All structures, except the containment, have waterstops installed at construction joints below grade.

2. The containment substructure is encased with a waterproof membrane to el 25 feet-0 inches or to the bottom or approximate midpoint at slabs abutting the containment structure below el 25 feet-0 inches. Such slabs are provided with waterstops or the membrane is continued as an encasement for the abutting structure to preclude seepage at the interface of the slab and the containment wall. A drainage system is provided within the membrane and connects to sump located in the engineered safety features building to remove groundwater which leaks into the membrane. Non safety-related pumps are used as necessary to remove the water during normal plant operation, while safety-related pumps are used for post-LOCA or LNP conditions (see 9.3.3.2.4.1 for additional information).

3. The service, control, auxiliary, and engineered safety features building substructures are encased with a waterproof membrane to el 23 feet-6 inches and have drainage systems located under the mat of each building. These run into sumps for collection and then discharge. The coefficient of friction between the membrane and the concrete is equal to or greater than that between the concrete below the membrane and the soil or rock. Sliding stability is therefore not affected by the presence of the membrane.

4. The Technical Support Center, fuel, and waste disposal buildings are provided with perimeter and substructure drains.

3.8.5.2 Applicable Codes, Standards, and Specifications

Section 3.8.3.2 contains the codes, standards, specifications, and NRC regulatory guides used in establishing design methods and material properties for foundations and concrete supports.

3.8.5.3 Loads and Loading Combinations

Foundation design is based upon appropriate loading combinations. The loads and loading combinations given in Section 3.8.1.3 are used for the containment foundation design. The loads and loading combinations given in Table 3.8-3 are used for the design of all other Seismic Category I foundations.

In addition to the above loads and load combinations, the following were used to check against sliding and overturning due to earthquakes, winds, tornadoes, and the design basis flood:

1. D + H + OBE

The containment air sample module is operated from the containment air sample remote panel and the reactor coolant module is operated from the reactor coolant remote panel in the hydrogen recombiner building.

9.3.3 Reactor Plant Vent and Drain Systems

The reactor plant vent and drain systems collect waste gases and liquids from valve and pump leakoffs, tank drains, and other equipment and floor drains containing radioactive contamination, and transfer them to the gaseous and liquid waste systems for treatment and/or disposal. These systems consist of the reactor plant gaseous vent system, the reactor plant aerated vent system, the reactor plant gaseous drain system, and the reactor plant aerated drain system (Figures 9.3-4 through 9.3-6, respectively).

9.3.3.1 Design Bases

Two of the three sumps (3DAS*SUMP7A & B) collect miscellaneous equipment drainage. The third sump is the porous concrete groundwater sump that collects groundwater that has circumvented the waterproof membrane that surrounds the containment structure and containment structure contiguous buildings

The reactor three plant vent and drain systems are nonsafety related, except for the lines penetrating the containment structure and the safety related ~~containment recirculation~~ cubicle sumps ~~water removal system~~ located in the Engineered and Safety Features Building. For containment penetration areas, isolation valves on both sides of the containment structure wall and the piping between them are Safety Class 2.

99-47

The gaseous vent system handles vents where hydrogen and radioactive gases predominate, while the aerated vent system handles vents where air predominates. These vent systems flow separately to the radioactive gaseous waste system (Section 11.3).

The gaseous drain system handles drains containing nonaerated reactor coolant. These drains may be directed to the radioactive gaseous waste system for degasification and return to the reactor coolant system (Chapter 5) via the chemical and volume control system (Section 9.3.4). Altemately the drains may be directed to the Boron Recovery System (Section 9.3.5). The aerated drain system handles drains containing air and flows to the radioactive liquid waste system (Section 11.2).

9.3.3.2 System Description

9.3.3.2.1 Reactor Plant Gaseous Vents System

Gaseous vents (Figure 9.3-4) are vented during normal operation from the containment drains transfer tank (Figure 9.3-5), pressurizer relief tank (Chapter 5), primary drains transfer tank (Figure 9.3-5), volume control tank (Section 9.3.4), and reactor plant sampling hydrogenated gaseous purge header (Figure 9.3-2). The radioactive gaseous waste system process effluent gas is discharged to the gaseous vents system header. These vents are transferred by the gaseous vent system to the radioactive gaseous waste system.

9.3.3.2.2 Reactor Plant Aerated Vents System

Aerated vents (Figure 9.3-4) from the following tanks, condenser, and container in the boron recovery system (Section 9.3.5), radioactive liquid waste system (Section 11.2), and radioactive solid waste system (Section 11.4) are transferred by the aerated vent system to the radioactive gaseous waste system (Section 11.3): boron recovery tanks, boron distillate tank, boron evaporator condenser, waste distillate tank, high level waste

drain tanks, waste bottoms hold tank, low level waste drain tanks, spent resin dewatering tank, disposable waste shipping container.

9.3.3.2.3 Reactor Plant Gaseous Drains System

Gaseous drains (Figure 9.3-5) originate from systems containing reactor coolant or from systems which potentially could contain reactor coolant and are collected in the pressurizer relief tank, the containment drains transfer tank, and the primary drains transfer tank.

The pressurizer relief tank is located in the containment structure and receives gaseous drains from the pressurizer safety valves (Section 5.4.11). (97-405)

The containment drains transfer tank is located inside the containment structure and collects gaseous drains from the reactor coolant pumps seal leakoffs (Section 9.3.4), valve stem leakoffs, reactor vessel flange leak detection line (Section 5.2.5), and from the safety injection accumulator tanks (Section 6.3). The reactor coolant loops can be drained to the containment drains transfer tank directly or via the excess letdown heat exchanger in the chemical and volume control system.

The primary drains transfer tank is located in the auxiliary building (Section 3.8.4) and receives drains from the reactor plant sampling system hydrogenated contaminated liquid purge header (Figure 9.3-2); valve stem leakoffs outside the containment structure; relief valve discharges from the radioactive gaseous waste system, chemical and volume control system, and high and low pressure safety injection systems (Chapter 6); and drains from the volume control tank.

The containment drains transfer tank, pressurizer relief tank, and primary drains transfer tank each has two full capacity drain transfer pumps to transfer gaseous drains to the degasifier recovery exchangers (Figure 11.3-1) in the radioactive gaseous waste system or the cesium removal ion exchangers (Figure 9.3-9) in the boron recovery system. The pumps are started manually and stopped automatically.

9.3.3.2.4 Reactor Plant Aerated Drains System

INSERT (A)

Aerated drains are collected in sumps located inside the containment structure (incore instrument room sump, unidentified leakage sump, and containment drains sump); engineered safety features building (two residual heat removal cubicle sumps, two containment recirculation cubicle sumps, and engineered safety features building sump); auxiliary building; pipe tunnel; fuel building; waste disposal building (two sumps); and turbine building (two turbine plant component cooling drain sumps and turbine building floor drain sump). The aerated drain system also contains three underdrain sumps that collect drainage from under the engineered safety features, fuel, waste disposal, auxiliary, service, control, and pumps these uncontaminated sumps directly to the yard storm sewer system. There is no connection between the underdrain sumps and the contaminated section of the aerated drains system.

Except for the containment drains sump, each sump collects aerated drains from equipment, filters, and the floor drains in their respective areas. The containment drains sump collects aerated drains directly from equipment and systems inside the containment structure. Depending on the activity level, all aerated drains except the turbine building floor drain sump are transferred by sump pumps through either the high or low level waste

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drain header (Figure 9.3-6) to the high or low level waste drain tank, respectively (Figure 11.2-1) in the radioactive liquid waste system.

The turbine building floor drain sump is monitored for radioactivity. It is normally pumped to the yard drainage system, but is directed to the liquid radioactive waste system via the turbine plant component cooling drain sump on a predetermined radioactivity level.

The neutron shield tank cooling system (Section 9.2.2.3) uses potassium dichromate as a corrosion inhibitor. Whenever this system is drained to the containment drains sump, the sump is pumped directly, under administrative control, to the high level waste drain header. Drainage from the radioactive solid waste system (Figure 11.4-1) flows directly to the high level waste drain header.

INSERT (B)

9.3.3.2.4.1 Safety-Related Containment Recirculation Cubicle Sump

The containment recirculation cubicle sumps are located in the engineered safety features building. These sumps collect non-radioactive, non-contaminated discharges from equipment via aerated drains. In addition, these sumps also serve to collect (via an underdrain and porous concrete media) any significant amounts of groundwater seepage which has circumvented the non-safety-related waterproof membrane. During normal operation, non-safety-related pumps transfer the contents of the sumps to the waste disposal building via the engineered safety features building sump pumps. Following a LOCA or during extended losses of normal power, the removal of groundwater seepage will be performed by safety-related air driven pumps also located within the containment recirculation cubicle sumps.

99-47

Each sump contains one safety related air driven sump pump. Air inlet and outlet lines and water discharge lines are run from each pump to the outside yard at grade elevation outside of the engineered safety features building. The pumps were sized to remove water from the sumps and deliver the contents to temporary storage containers and the operating time for the pumps will be approximately 20 minutes per day. The pump out frequency was determined based upon daily groundwater inflow rates and sump volumes to avoid sump overflow. The frequency required for sump pump out is approximately twice a day as stated in the system operating procedure. The air supply for each pump is supplied by its own dedicated portable air compressor. The compressors were selected based upon the pump air supply requirements. The permanently installed portion of the system ends with closed isolation valves outside of the engineered safety features building wall. Prior to operation of the system, a spool piece containing a filter, oiler and relief valve is attached to each air supply line. The associated air supply is attached to each spool piece. The system is safety related with the exception of the air compressors, which are non safety related.

The air driven pumps will discharge water to temporary storage tanks also located outside of the engineered safety features building when needed. The tank contents will be sampled and processed as directed by the Chemistry Department. Liner extensions and hoods have been installed for the sumps to prevent the accidental introduction of contaminated fluids. These modifications are safety-related to ensure that water transferred from the sumps during post-LOCA conditions remains radiologically uncontaminated. Equipment accessible for repair (such as the portable diesel compressors), is non-safety related.

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9.3.3.2.5 Containment Isolation Valves

Containment isolation valves are provided in all lines penetrating the containment structure (Section 6.2.4). Both containment isolation valves in the gaseous vents system are open during normal operation. During normal operation for both the gaseous and aerated drains systems, the containment isolation valve inside the containment structure is closed and the one outside the containment structure is open. A containment isolation, phase A (CIA) signal overrides all other signals and closes the containment isolation valves.

9.3.3.3 Safety Evaluation

The reactor plant vent and drain systems are designed and sized to handle the maximum flow rate of vents and drains expected during unit operation.

Austenitic stainless steel piping and tubing is used to transfer all fluids in the reactor plant vent and drain systems.

The containment drains transfer pumps, pressurizer relief tank drains transfer pumps, and primary drains transfer pumps drain their respective tanks in the reactor plant gaseous drain system. Two pumps are provided for each tank. The pumps are started manually and stop automatically.

On receipt of a high level alarm for the containment drains transfer tank or the primary drains transfer tank, one of the pumps associated with the alarming tank is started by remote manual control. If the level does not decrease, the second pump is started remote manually. The pumps are stopped automatically on receipt of the tank low level signal.

Upon receipt of the pressurizer relief tank high level alarm, the normally closed air-operated valve in the suction line from the pressurizer relief tank to the pressurizer relief tank drains transfer pumps is opened remote manually and one of the pumps is started remote manually. If the level does not decrease, the second pump is started remote manually. The pressurizer relief tank drains transfer pumps stop automatically on receipt of a pressurizer relief tank low level signal. The air-operated valve in the suction line to the pumps is closed remote manually.

A CIA signal closes the containment isolation valves in the reactor plant gaseous drain system, which stops the pressurizer relief tank drains transfer pumps and containment drains transfer pumps. This CIA signal terminates any potential radioactive release from containment by this pathway.

A duplex pump arrangement is provided for each of the following reactor plant aerated drains system sumps (Figure 9.3-6): containment drains sump, turbine building floor drain sump, auxiliary building sump, fuel building sump, two waste disposal building sumps, and three underdrain sumps. One pump is in automatic service and the other on standby, and each pump is independently controlled. When the water level in a sump reaches a specified height, the associated sump pump starts automatically. If the water in the sump reaches a specified higher level, the associated standby sump pump also starts automatically. The sump pumps stop automatically when the water has decreased to a specified level in the associated sump. A CIA signal closes the containment isolation valves in the reactor plant aerated drain system, which stops the containment drains sump pumps terminating any potential radioactive release from containment by this pathway.

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Single pumps are provided in the following sumps (Figure 9.3-6): incore instrument room sump, unidentified leakage sump, two turbine plant component cooling drains sumps, pipe tunnel sump, two residual heat removal cubicle sumps, two containment recirculation cubicle sumps, and engineered safety features building sump. Each pump starts automatically when the water level in the associated sump reaches a specified level, and stops when the level drops to a specified level. Alarms are activated if the level rises above a specified level, except for the unidentified leakage sump. The unidentified leakage sump alarm (KA) initiates if P10 restarts too soon after stopping or if P10 runs too long. The frequency of operation of the unidentified leakage sump pump is monitored as one method of detecting excess leakage inside the containment structure (Section 5.2.5).

INSERT (C)

99-47

In addition to the pumps mentioned above, each containment recirculation cubicle sump is equipped with one safety-related air driven pump which is designed to provide for (following a LOCA or during extended losses of normal power) the removal of groundwater seepage which has circumvented the non-safety related waterproof membrane. Each sump pump and its associated air and water piping are completely independent of the other and are located in separate cubicles within the engineered safety features building. Portable air compressors are dedicated to each train. This provides independence of the two trains. The sumps communicate via the underground porous concrete, therefore, if one sump pump or it's associated system should fail, the other is capable of removing the contents of both sumps. This provides redundancy of the two trains assuring that the two safety functions; preventing containment recirculation cubicle flooding which could result in the loss of both trains of the recirculation spray system and preventing the development of undesired hydrostatic buoyancy forces from forming on the containment steel liner are maintained. The air compressors are non-safety-related and are dedicated to their associated trains, but can be interchanged if necessary. A third, spare air compressor is available on site and is dedicated to this system. For these reasons, use of the non-safety-related compressors supports safe operation of the containment recirculation cubicle safety-related sump pumps. Because the area may be inaccessible due to high radiation following a LOCA, the system has been designed such that no components within the system require maintenance or replacement for up to one year post LOCA.

The residual heat removal cubicle sumps and pumps are located in safety related areas, although they are not safety related themselves. The cubicles are completely separate from one another. Furthermore, drain piping is run to an elevation high enough to prevent back flooding from the engineered safety feature building back to these cubicles. The other pumps are in nonsafety related areas.

All lines in the systems penetrating the containment structure have two containment isolation valves in series (Figure 9.3-4 through 9.3-6). The power to each solenoid-operated pilot valve for the redundant containment isolation valves is supplied from a separate emergency bus. All of these containment isolation valves fail closed on loss of actuating air, loss of actuating signal, or loss of power.

When systems or components containing potassium dichromate are drained, the affected sump is pumped directly, by administrative control, to the high level waste drain tanks via the high level waste drain header for processing in the waste evaporator (Figure 11.2-1). This administrative control procedure ensures that drained potassium dichromate inhibitor is not released to the environment.

9.3.3.4 Tests and Inspections

Periodic testing of the reactor plant vent and drain systems is not necessary because they are used in normal operation. Inspection is performed in accordance with normal maintenance procedures. Containment isolation valves are tested in accordance with the procedures in Section 6.2.4. INSERT (D)

The safety-related containment recirculation sump pump systems were tested after installation to confirm the system's ability to remove the accumulated groundwater from the sumps. This testing confirmed that the two sumps communicate hydraulically even though they are not directly linked via the underdrain system. The sump pumps were qualified for seismic loading and post accident conditions and performance testing was performed to confirm that the pumps would operate as required post LOCA without maintenance. The air compressors will be run periodically to assure they remain operable. The sub-systems will periodically be demonstrated as operable. 99-47

9.3.3.5 Instrumentation Requirements

9.3.3.5.1 Reactor Plant Gaseous Vent System

The reactor plant gaseous vent system operating parameters are monitored, indicated, and controlled, locally or remotely as follows:

Main Control Board

1. The main control board has pushbuttons with open and close indicating lights for the inside and outside containment isolation valves in the reactor plant gaseous vent system.

2. Status windows monitor the inside and outside containment isolation valves, in reactor plant gaseous vent system, closed position.

3. Computer inputs are for the inside and outside containment isolation valves, in the reactor plant gaseous vent system, open and closed positions.

A pressure control valve, located in the reactor plant gaseous vent system discharge line to the condenser air removal system, maintains back pressure in the line. A local pressure indicator is provided in the reactor plant gaseous vent system discharge line.

9.3.3.5.2 Reactor Plant Aerated Vent System

No instrumentation is associated with this system.

9.3.3.5.3 Reactor Plant Gaseous Drain System

The reactor plant gaseous drain system operating parameters are monitored, indicated, and controlled, locally or remotely as follows:

12.3.1.3.2 Post-Accident Access to Vital Areas

A radiation and shielding design review was performed in accordance with NUREG-0737, Action Item II.B.2 (USNRC, 1980), in order to ensure personnel accessibility after a design-basis accident (DBA). The DBA considered for this evaluation was the loss-of-coolant accident (LOCA). The projected dose to complete each activity necessary to mitigate a DBA LOCA, en route to and in vital areas, is less than the 5 rem design limit of NUREG-0737. At Millstone 3, this requirement is met by providing sufficient shielding of components containing post-accident radioactive inventories, consistent with anticipated access routes and stay times.

One activity evaluated as part of the review was the post-LOCA hydrogen purge of containment. Because this activity requires multiple failures resulting in a loss of both trains of the Hydrogen Recombiner, this is considered beyond the design basis of a DBA LOCA. As such, the design guidance for performance of an activity within 5 rem is no longer applicable. The projected dose for this activity is less than 25 rem, which falls within the authorized limit of 25 rem as described in the Emergency Plan for severe accident mitigation.

Areas requiring accessibility (vital areas) are those areas where post-LOCA actions can be taken over the short-term to ensure the capability of operators to control and mitigate the consequences of an accident. A description of the post-accident activities is summarized below and in Table 12.3-3.

98-103

1. Locally trip the reactor trip breakers and bypass breakers

   This action is performed at the 43'6" elevation in the auxiliary building MCC rod control area. This is done in the event that the reactor failed to trip. This action must take place as soon as possible. Thus, the 0 to 30 minute time frame is assumed. While this step is done only in the event of an ATWS (beyond the design basis scenario), it is conservatively included as a required operator action.

2. Sampling

   PASS (Post Accident Sampling System) samples are required for isotopic and gas composition analyses of containment air and isotopic, pH, boron and chloride analyses of reactor coolant/sump samples. NUREG-0737 II.B.3 states that the combined time for sampling and analysis should be 3 hours or less from the time a decision is made to take a sample. In a design basis LOCA where fuel failure would occur almost immediately, the 0 to 30 minute time is assumed.

3. Local actions needed to realign Spent Fuel Pool Cooling, RBCCW and Service Water for spent fuel pool cooling

   FSAR 9.1.3.3 states that spent fuel pool cooling will be initiated approximately 4 hours after the LOCA. This requires operator action in the spent fuel pool building. The 2 to 8 hour time frame is assumed.

4. Powering the Plant Process Computer

The Plant Process computer is normally not powered from an Emergency Bus. It is powered from an uninterruptible power supply that may last for only 30 minutes. Thus, the 0 to 30 minute category is assumed. The plant process computer is used for SPDS and OFIS. In order to restore power to the plant process computer, MCC 32-3T is energized on the 38' level in the turbine building.

5. Powering the SI accumulator valves

For post-LOCA cooldown and depressurization, the SI accumulator isolation valves are closed to prevent injection of nitrogen that might interrupt natural circulation. It is necessary to repower the valves from the 24'6" level in the auxiliary building. Since this would be done only after the plant is stabilized in preparation for a cooldown, the 30 minute to 2 hour time frame is assumed.

6. Initiate hydrogen monitor

FSAR Section 6.2.5.2 states that this system will be available to provide continuous monitoring within 1 hour and 30 minutes of an accident. For dose consequence evaluation, availability within 30 minutes was assumed for conservatism. Thus, the 0 to 30 minute category is assumed. Access to the hydrogen recombiner building is needed in order to initiate hydrogen monitoring.

7. Initiate hydrogen recombiner

FSAR Section 6.2.5.3 assumes that the hydrogen recombiner will be placed in service within 24 hours at which time the hydrogen concentration is 1.6%. However, it also states that the hydrogen recombiner is started well before this concentration is attained. To meet the latter requirement, emergency procedures specify initiation of the hydrogen recombiner when hydrogen concentration exceeds 0.2%. Thus, the 30 minute to 2 hour time frame is assumed. Access to the hydrogen recombiner building is needed in order to initiate the hydrogen recombiner. 98-103

8. Initiate hydrogen purge

FSAR Section 6.2.5.3 states that if hydrogen purge is initiated at 4 days, the 50 scfm purge flow rate is sufficient to maintain hydrogen concentration below 4%. Thus, the 4 day to 30 day category is assumed. Access to the 4'6", 24'6" and 43'6" levels of the auxiliary building are needed.

9. Locally open the breakers for RWST/Charging pump suction valve

Valves 3CHS*LCV112D and 3CHS*LCV112E are closed and associated breakers are opened as a backup to the check valve to prevent back leakage to the RWST when post-LOCA recirculation is established. As stated in FSAR Section 6.3.2.8, the minimum time frame for post-LOCA recirculation is 33 minutes. Thus, the 30 minute to 2 hour category is assumed. This action is performed on the 24'6" level of the auxiliary building.

INSERT (E)

10. Install and Operate air compressors for RSS sump pumps

Safety grade sump pumps were installed because of the potential for ground water intrusion flooding the RSS sump pumps. Installation of air compressors is necessary to operate the sump pumps. It is assumed that operation of the sump pumps would take place roughly 10 hours post accident. Thus, the 8 hour to 24 hour category is assumed. The air compressors will be operated periodically, once every twelve hours. Thus, this also should be evaluated for the 1 to 4 day and the 4 day to 30 day category. The air compressors are installed outside of the ESF building.

11. Open the breakers for the non-safety grade sump pumps

The operation of the non-safety grade sump pumps may mask the presence of a leak. Thus, the need to secure sump pumps in ECCS pump cubicles and common areas in the Auxiliary and ESF buildings. The 1 day to 4 day time frame is assumed. This action requires access to the 21' elevation of the ESF building and the 24'6" elevation of the auxiliary building.

12. Stopping non-safety grade HVAC fans to maintain the SLCRS boundary

Prior to placing the Control Room on emergency ventilation, the operators will verify that the non-safety grade fans that could affect the SLCRS boundary are tripped. If not, local actions in the auxiliary building (43'6" level) and service building are necessary to trip fans 3HVV-FN1A, 3HVV-FN1B, 3HVQ-FN2, 3HVR-FN5 and 3HVR-FN7. This will be done after Control Building Isolation has been actuated for one hour. Thus, the 30 minutes to 2 hour category is assumed.

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13. Align Service Water to AFW to provide long term SG decay heat removal

For LOCAs where the break is not big enough to remove decay heat, the design basis long term cooling method is service water as back up to auxiliary feedwater in conjunction with post-LOCA recirculation. As discussed in the basis for Technical Specification 3/4.7.1.3, the Demineralized Water Storage Tank supply will last a minimum of 16 hours. Thus, the 8 hour to 24 hour category is assumed. This action is performed on the 21' elevation of the ESF building.

14. Reset MCC breakers for Diesel Generator keep warm systems

This action is taken when offsite power is available and the running diesel generator is stopped. The keep warm system assures that the diesel generator would be maintained in the optimum condition for a subsequent start if a loss of offsite power occurs later in the transient. This action is performed in the emergency diesel generator building.

In addition to the areas and activities defined above, the following areas require post-accident access and continued occupancy:

1. Control Room - post accident control room habitability is discussed in Section 6.4 and control room post-LOCA doses are presented in Section 15.6.5.

- Shine from the fuel pool cooling pumps.

4. ESF Building

- Shine from RSS and SIH piping
- Shine through the wall from the Recirculation Coolers
- Shine from RWST piping
- Shine from Auxiliary Steam piping

5. Along routes from control building to the vital areas.

98-103

- Skyshine from containment
- Direct shine from containment.
- Plume shine.

Systems containing sources of radiation which are identified in NUREG-0737 but which have not been identified in buildings discussed above are considered to be either irrelevant following an accident or negligible contributors to personnel exposure following an accident. For example, the GWS system is a negligible contributor of radiation following an accident because when an accident occurs, the only use of this system is for post-LOCA hydrogen purge. Use of this system occurs no sooner than 4 days post-LOCA. Upon completion of the initiation of hydrogen purge, the only other activity required for mitigation is ~~operation of air compressors for RSS sump pumps~~ (Activity 10 in Table 12.3-3). That activity is performed outside of the ESF Building and there is no impact from GWS piping in that area.

the monitoring and maintenace of the porous concrete groundwater removal system

The results of the dose calculations indicate that the plant shielding and design provide adequate protection to operators following a design basis LOCA to ensure compliance with the NUREG-0737 design dose requirements.

12.3.2 Facility Design Features

The Millstone 3 design is consistent with the guidance presented in Regulatory Guide 8.8, Revision 4, C2, which discusses specific features in the facility and equipment design that limit radiation exposure to levels that are ALARA. The following features have been incorporated.

12.3.2.1 Location and Design of Equipment to Minimize Service Time

In the auxiliary building, nonradioactive equipment, such as the reactor plant component cooling system and components used to process the waste evaporator distillate, are located outside high radiation cubicles in areas designated as Radiation Zones II or III (defined in Table 12.3-1). In the containment structure, nonradioactive equipment requiring servicing is typically located in Radiation Zone IV areas. Exceptions include those components attached to the reactor coolant system, such as the reactor coolant pump motor cooling equipment and the equipment support snubbers.

(A)

The aerated drain system also contains four underdrain sumps. Three of these sumps collect drainage from under the Engineered Safety Features, Fuel, Waste Disposal, Auxiliary, Service and Control Buildings. The uncontaminated effluent from these sumps is pumped directly to the yard storm sewer system. The fourth underdrain sump is located in the basement of the Engineered Safety Features Building. This sump collects groundwater that has circumvented the waterproof membrane that was installed around the Containment Structure and the Containment Structure contiguous buildings. The effluent from this sump is pumped to a storage tank in the yard. The effluent is not radiologically contaminated, but the groundwater has a high pH and is treated as necessary to achieve satisfactory effluent limits prior to discharge. There is no connection between the underdrain sumps and the contaminated section of the aerated drains system.

The contaminated portion of the aerated drains system includes several sumps. Except for the containment drains sump, these sumps collect

(B)

9.3.3.2.4.1 Safety Related Porous Concrete Groundwater Sump (Underdrain System Sump)

The porous concrete groundwater sump is located in the Engineered Safety Features Building. This sump collects (via an underdrain and porous concrete media) any significant amount of groundwater seepage which has circumvented the waterproof membrane. The sump is equipped with a non-safety related electric sump pump. The sump pump transfers groundwater collected in the sump to a tank in the yard. Sampling and pH treatment is performed as necessary on the tank contents prior to discharge. The sump pump is accessible via the Engineered Safety Features Building roof and is outside the SLCRS boundary (i.e. the sump pump can be removed and installed from the roof). The electric sump pump is powered by non-safety related electrical circuits which derive power from a safety related electrical bus (see Table 8.3-3). Utilizing a safety related power source to provide power to the non-safety related pump provides greater assurance of a reliable energy source. A spare sump .pump is stored on site.

C

In addition to the pumps described above, the Engineered Safety Feature Building (ESFB) is equipped with a non-safety related sump pump to remove groundwater that has circumvented the waterproof membrane surrounding the Containment Structure and the Containment Structure contiguous buildings. This pump is credited with groundwater removal during normal operation, following a LOCA and during loss of normal power scenarios. The ESFB roof is accessible after 24 hours post LOCA with respect to radiation. The single non-safety related sump pump design is acceptable because the sump pump is accessible from the ESFB roof and sufficient time is available to perform maintenance activities for the pump without overfilling the sump and without compromising safety related structures, systems or components. A spare sump pump is stored on site.

D

The safety related Engineered Safety Feature Building (ESFB) sump and associated non-safety related sump pump were tested after installation to confirm the system's capability to remove the accumulated groundwater from the sump. The testing also confirmed that the ESFB basement area is water tight up to an elevation that is equal to the top of the safety related sump. The sump is qualified for seismic loading and post accident conditions and performance testing was conducted to confirm that the subsystem would operate as required post LOCA.

E

10. <u>Monitor and Maintain the porous concrete groundwater removal system</u>
A non-safety related pump is credited with groundwater removal that circumvents the waterproof membrane that surrounds the containment structure and the containment structure contiguous buildings. The status of the groundwater removal system will be monitored daily. Thus the 8 hour time frame and beyond is assumed for monitoring. Should the single non-safety related groundwater sump pump become nonfunctional, approximately four days is available before the sump pump needs to be restored to a functional status. Due to dose considerations, the 1 day time frame and beyond is assumed for maintenance and repair activities for the sump pump (note: The pump repair is required prior the elapse of 4 day from the time when the pump becomes non-functional). Monitoring activities take place in the yard on the east side of the Engineered Safety Features Building (ESFB). The sump pump is accessible from the ESFB roof. Access to the ESFB roof is achieved via the Hydrogen Recombiner Building stairway.

PORC Comment

PORC Comment

TABLE 1.8-1

NRC REGULATORY GUIDES

R.G. No.	Title	Degree of Compliance	FSAR Section Reference
		• Average burn-up of 25,000 MWD/MTU • Maximum fuel rod pressurization of 1,200 psig Presumably more conservative assumptions should be applied in the fuel handling accident analysis for more highly rated fuel. However, since present LWR fuel exceeds these ratings by negligible amounts, if at all, the assumptions are used as is.	
1.26*	Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste Containing Components of Nuclear Power Plants (Rev. 3, February 1976)	Comply, with the following exceptions: 1. The safety class terminology of ANSI N18.2 and ANSI N18.2-a, 1975 is used instead of the quality group terminology. Thus, the terms Safety Class 1, Safety Class 2, Safety Class 3, and non-nuclear safety (NNS) are used instead of Quality Groups A, B, C, and D, respectively. 2. Regarding Regulatory Positions C.1.e and C.2.c, one safety valve designed, manufactured, and tested in accordance with ASME III Division 1 (i.e., a code safety valve) is considered acceptable as the boundary between the reactor coolant pressure boundary and a lower safety class or NNS line. 3. Regarding Regulatory Positions C.1 and C.2, all instrument tubing, classified as Safety Class 2 or 3, is designed to ASME Section III rules, with Seismic Category I supports installed with a 10CFR50, Appendix B program as described in Section 3.2.3.	3.2.2
1.27	Ultimate Heat Sink for Nuclear Power Plants (Rev. 2, January 1976)	Comply	2.4.11.6 9.2.5
1.28*	Quality Assurance Program Requirements (Design and Construction) (Rev. 2, February 1979)***	Comply as follows: 1. Construction Millstone 3 complied with R.G. 1.28, Rev. 0. 2. Operation Millstone 3 complies with R.G. 1.28, Rev. 2.	17.1.2 17.2
1.29*	Seismic Design Classification (Rev. 3, September 1978)	Comply	3.2.1

INSERT (1)

INSERT ①

4. Groundwater removal post accident via the porous concrete groundwater removal system is a safety-related function. The components within the Engineered Safety Features Building (ESFB) that are accessible / retrievable from the roof are classified as non-nuclear safety instead of Safety Class 3 commensurate with their importance to safety. The sump and piping in the ESFB are Safety Class 3, however, the sump is designed to the AISC Code and the piping is designed to the ANSI B31.1 Code. The electrical power for the sump pump is supplied from a single safety related source and is routed via non-safety related power cables.

TABLE 3.2-1

LIST OF QA CATEGORY I AND SEISMIC CATEGORY I STRUCTURES, SYSTEMS, AND COMPONENTS

	ANS Safety Class	Code (1)	Code Class	Location	Tornado Criterion	Notes
Sample lines originating from safety-related components, up to and including remotely operated sample selection valve or second manual isolation valves	2 or 3	ASME III	2 or 3	AB/ESB	P	Figure 9.3-2 (P&ID144) delineates SC boundaries.
Supports for QA Category I Components*	Same as component being supported.					
Reactor Plant Aerated Drains						
Instrumentation and Control (sump level indication) required to provide leak detection	N/A	IEEE-279-71 IEEE-336-71 IEEE-323-74	N/A	AB/ESB	P	Figure 9.3-6 (P&ID 10GD) delineates SC boundaries
Porous Concrete Groundwater ~~Containment Recir~~ Sump, Piping Pumps* and Valves & Containment Recirculation Sumps Cubicle	3	ANSI B31.1	N/A	ESB	P	ANS Safety Class 3 for piping from air-driven sump pumps to isolation valves 99-47
Containment Monitoring System						
Instrumentation and Controls required to monitor hydrogen concentration	N/A	IEEE-279-71 IEEE-336-71 IEEE-323-74	N/A	CS	P	
Heating, Ventilation, and Air Conditioning System*						
ESF Building						
All air-conditioning systems	3	SMACNA ARI, AMCA	ASME III	ESB	P	ASME III, Class 3 for service water side of refrigeration condenser.

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TABLE 8.3-3

NONSAFETY-RELATED EQUIPMENT
CONNECTED TO SAFETY-RELATED BUSES

Equipment ID No.	Description	Power Source ID. No.	Justification	
All Turbine Auxiliaries on		3EHS*MCC1A3 (32-3T)	3EHS-MCC1A3	98-15 3/98
3HVK-P4A	Control Building Water Chiller Pumpout Unit	3EHS*MCC1A2 (32-2T)	(1)	
3HVK-P4B	Control Building Water Chiller Pumpout Unit	3EHS*MCC1B2 (32-2U)	(1)	
3EGA-PNLDRY1A	Emergency Diesel Generator Air Dryer	3SCV*PNL250	(1)	
3EGA-PNLDRY1B	Emergency Diesel Generator Air Dryer	3SCV*PNL25P	(1)	(97-39 8/97)
3EGA-PNLDRY2A	Emergency Diesel Generator Air Dryer	3SCV*PNL250	(1)	
3EGA-PNLDRY2B	Emergency Diesel Generator Air Dryer	3SCV*PNL25P	(1)	
3HTS*XF1A,B,C	Heat Tracing panel 3HTS-PNLFI Isolation Transformer	3EHS*MCC3B1 (32-1W)	(1)	(97-185 1/97)
3HTS*XF2A,B,C	Heat Tracing panel 3HTS-PNLF2 Isolation Transformer	3EHS*MCC3A1 (32-1R)	(1)	
3SRW-P5	ESF POROUS CONCRETE GROUNDWATER. SUMP PUMP	3EHS*MCC 1A4	(8)	

JUSTIFICATIONS:

1. Supplied through two separate breakers connected in series, both of which are qualified as Class 1E equipment. The connecting cable is colored the same as the Class 1E bus.

2. Same as No. 4, except the connecting cable is black and is routed separately in rigid conduit.

3. Same as No. 4, except the connecting cable is black and is routed separately in rigid conduit up to the MCC.

For Information Only

TABLE 8.3-3

NONSAFETY-RELATED EQUIPMENT
CONNECTED TO SAFETY-RELATED BUSES

Equipment ID No.	Description	Power Source ID. No.	Justification

4. In accordance with Regulatory Guide 1.75, September 1978, Position C.1., automatically tripped on SIS (accident signal) or LOP (loss of power). Reconnection is administratively controlled and requires two operator actions: resetting the SIS or LOP signal in the control room, and then resetting the starter remotely at the Class 1E bus. The connecting cable is colored the same as the Class 1E bus.

5. In accordance with IEEE 384-1974, is an insolation device. The incoming cable is colored the same as the Class 1E bus; thereafter, the cable is colored black. For all transformers except 3LAR*EXL1O and 3LAR*EXL2P, the black cable is routed in conduit to the distribution panel.

6. The motor is qualified and identified as Class 1E. The connecting cable is colored the same as the Class 1E bus.

7. Same as No. 4. The distribution panel is qualified Class 1E; some branch circuits are non-Class 1E.

8. Same as No. 1, except the connecting cable is black and routed separately in rigid conduit.

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TABLE 12.3-3

OPERATOR ACTIVITY LOCATIONS AND TIME DURATIONS

Activity	Location	Approx. Duration (minutes)	Travel Route*
1 Locally trip the reactor trip breakers and bypass breakers	43'6" Aux. Bldg. (MCC Rod Control)	<5	9
2 PASS Samples Sample Collection Sample Analysis	Hydrogen Recombiner Building (HRB) Laboratory	<100 <130	4
3 Local actions needed to realign Spent Fuel Pool Cooling, RBCCW and Service Water for spent fuel pool cooling	Spent Fuel Bldg.	<15	5
4 Powering the Plant Process Computer	38' Turbine Bldg.	<10	6
5 Powering the SI accumulator valves	24'6" Aux. Bldg.	<5	9
6 Initiate hydrogen monitor	HRB	<30	3
7 Initiate hydrogen recombiner	HRB	<60	3
8 Initiate hydrogen purge	4'6" Aux. Bldg. 24'6" Aux. Bldg. 43'6" Aux. Bldg.	<60	1
9 Locally open the breakers for RWST/CHG pump suction valves	24'6" Aux. Bldg. INSERT (F)	<5	9
10 Install and operate air compressors for RSS sump pumps a. install air compressors b. operate air compressors	Outside of ESF Bldg.	<120 <20	2
11 Open the breakers for the non-safety grade sump pumps in the ESF and Auxiliary buildings	21' ESF Bldg. 24'6" Aux. Bldg.	<15 <15	2 1
12 Stopping non-safety grade HVAC fans to maintain the SLCRS boundary	43'6" Aux. Bldg. 4'6" Service Bldg.	<5 <5	9
13 Align Service Water to AFW to provide long term SG decay heat removal	21' ESF Bldg.	<60	8
14 Reset MCC breakers for Diesel Generator keep warm systems	Emergency Diesel Generator Building	N/A**	7

*Figure 12.3-10 graphically depicts each route by route number.

**There are no appreciable dose rates in the Emergency Diesel Generator Building.

98-103

TABLE 12.3-4

ACTIVITY INITIATION TIME

Time Frame*	Activity
0 to 30 minutes	1 Locally trip the reactor trip breakers and bypass breakers 2 Sampling 4 Powering the process computer 6 Initiate hydrogen monitor 14 Reset MCC breakers for Diesel Generator keep warm systems
30 minutes to 2 hours	5 Powering the SI accumulator valves 7 Initiate hydrogen recombiner 9 Locally open the breakers for RWST/CHG pump suction valves 12 Stopping non-safety grade HVAC fans to maintain the SLCRS boundary 98-103
2 hours to 8 hours	3 Local actions needed to realign Spent Fuel Pool Cooling, RBCCW and Service Water for spent fuel pool cooling
8 hours to 24 hours	~~10 Install and operate air compressors for RSS sump pumps~~ INSERT G 13 Align Service Water to AFW to provide long term SG decay heat removal
1 day to 4 days	~~10 Operate air compressors for RSS sump pumps~~ 11 Open the breakers for the non-safety grade sump pumps in the ESF and Auxiliary Building
4 days to 30 days	8 Initiate hydrogen purge INSERT H ~~10 Operate air compressors for RSS sump pumps~~

*The starting time of the time frame listed is used for source term decay correction.

F

10. Monitor and maintain the porous concrete groundwater removal system			
a. Monitor sump pump / system	Outside of ESF Bldg	<10	2
b. Maintain / repair sump pump	ESF Bldg roof	<240	3

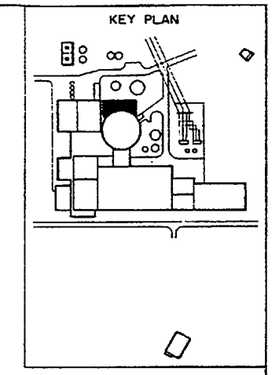
G

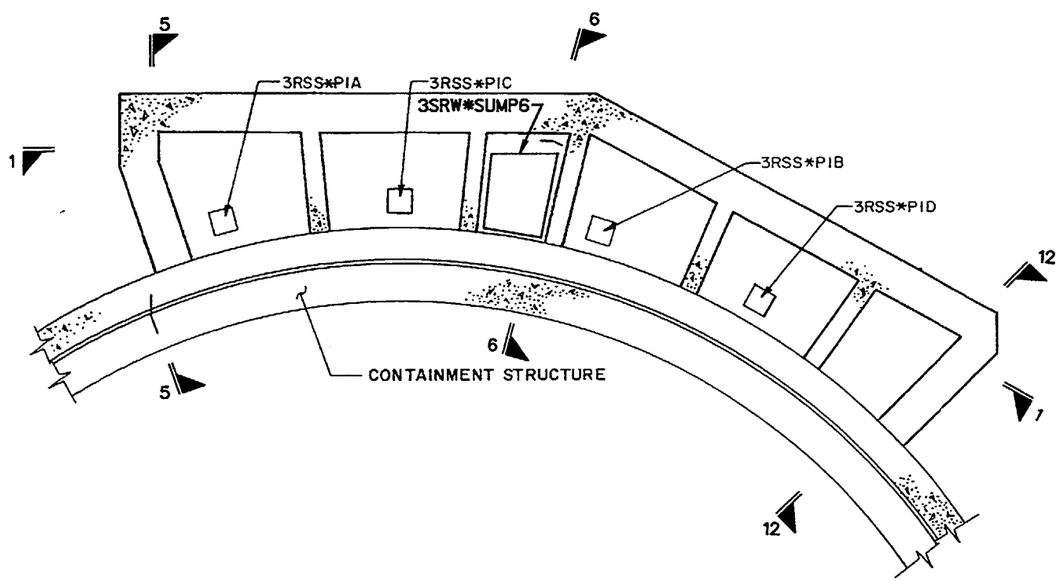
10. Monitor porous concrete groundwater system

H

10. Monitor and maintain the porous concrete groundwater system

00-MP3-27



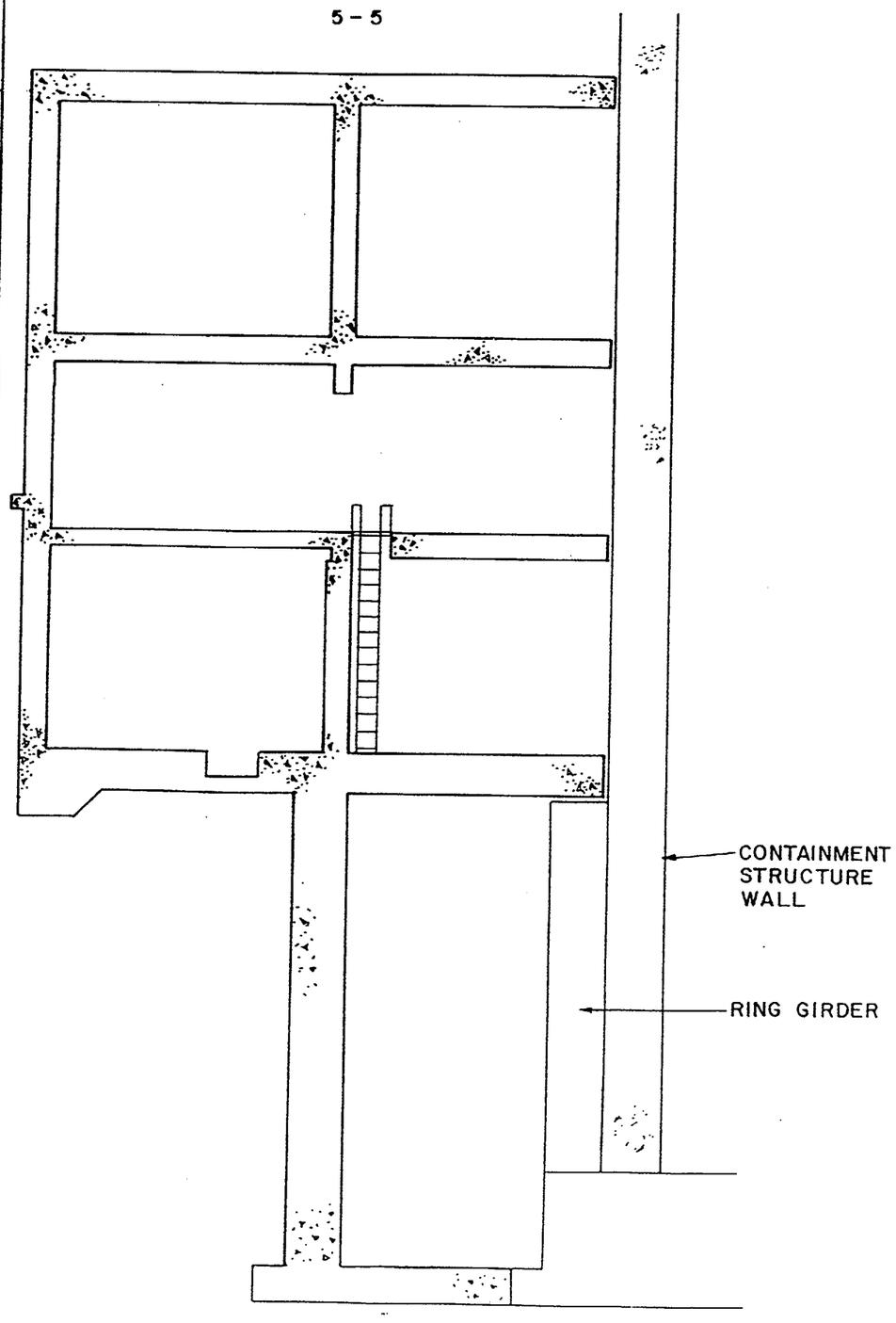


PLAN – EL. (-) 34'-9"

FIGURE 3.8-67 (1 OF 9)
ENGINEERED
SAFETY FEATURES BUILDING
MILLSTONE NUCLEAR POWER STATION
UNIT 3
FINAL SAFETY ANALYSIS REPORT

00-MP3-27

For Info Only



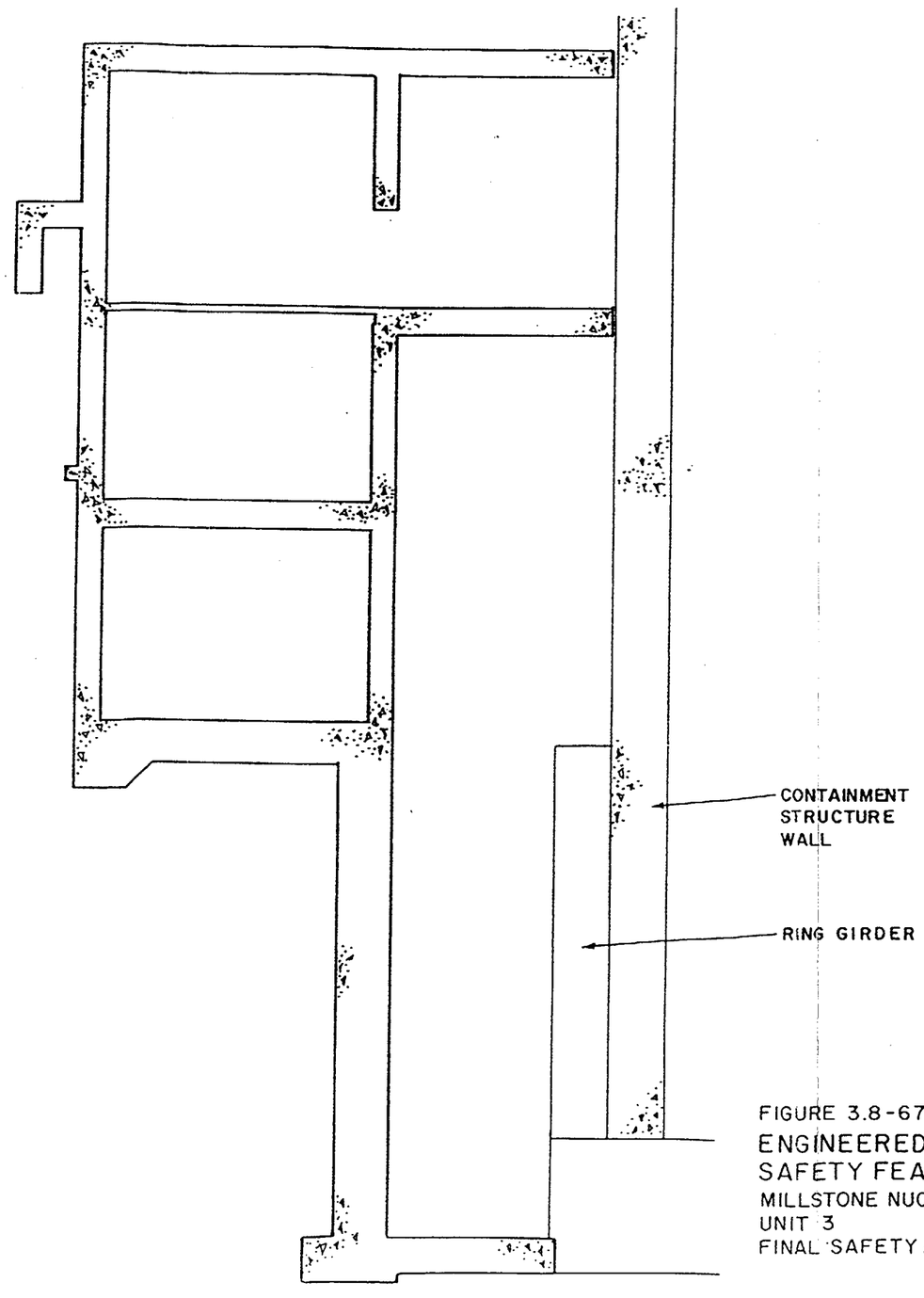
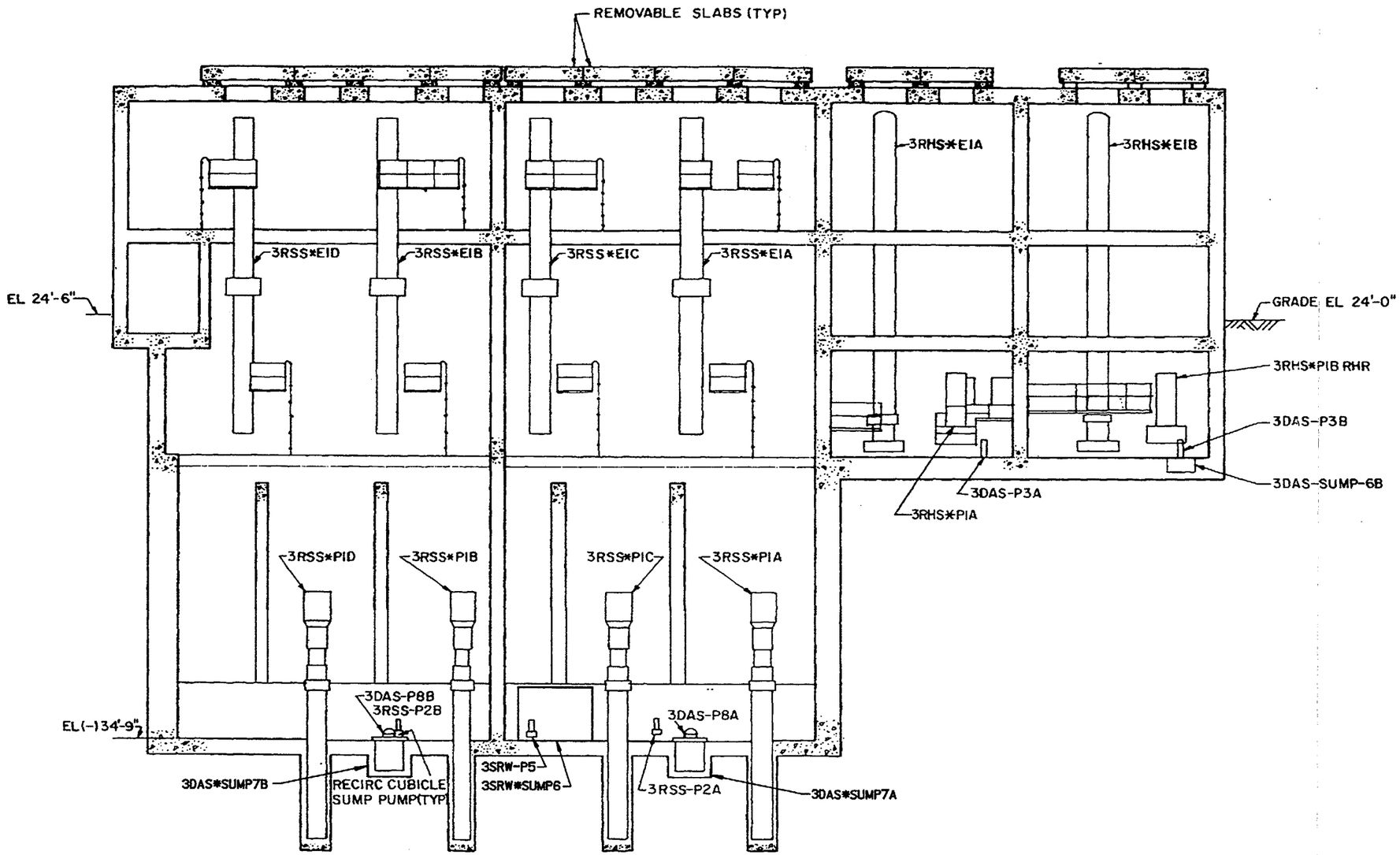


FIGURE 3.8-67 (8 OF 9)
ENGINEERED
SAFETY FEATURES BUILDING
MILLSTONE NUCLEAR POWER STATION
UNIT 3
FINAL SAFETY ANALYSIS REPORT



I-I

FIGURE 3.8-67 (9 OF 9)
ENGINEERED
SAFETY FEATURES BUILDING

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