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J. L. Wilson
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April 15, 1992

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

Gentlemen:

TENNESSEE VALLEY AUTHORITY - SEQUOYAH NUCLEAR PLANT UNIT 1 AND UNIT 2 - DOCKET NOS. 50-327 AND 50-328 - FACILITY OPERATING LICENSES DPR-77 AND DPR-79 - LICENSEE EVENT REPORT (LER) 50-327/92007

The enclosed LER provides details concerning the inoperability of the Unit 1 and Unit 2 ice condenser lower inlet doors as a result of wear slab upward movement. This event is being reported in accordance with 10 CFR 50.73(a)(2)(i)(B) as a condition prohibited by technical specifications and 10 CFR 50.73(a)(2)(ii)(B) as a condition that was outside the design basis of the plant.

Some planned corrective actions and commitments in this LER are in addition to, or are revisions to, corrective actions and commitments identified in TVA's letter to NRC dated March 27, 1992. Based on continuing evaluations, changes to these corrective actions will be included in planned supplements to this LER.

Sincerely,

R. J. Bucken for

J. L. Wilson

Enclosure
cc: See page 2

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NRC Form 366 (6-89)

U.S. NUCLEAR REGULATORY COMMISSION

Approved OMB No. 3150-0104
Expires 4/30/92

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Sequoyah Nuclear Plant, Unit 1	0 5 0 0 0 3 2 7	1 OF 1 0

TITLE (4)
Inoperable Ice Condenser Lower Inlet Doors Because of Upward Movement of the Floor.

EVENT DAY (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
0 3	1 6	9 2	9 2	0 0 7	0 0	0 4	1 5	9 2	Sequoyah, Unit 2	0 5 0 0 0 3 2 8
										0 5 0 0 0

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following)(11)			
POWER LEVEL (10)	1 0 0	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	XX 50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	XX 50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (AREA CODE)
J. W. Proffitt, Compliance Licensing	6 1 5 8 4 3 - 6 6 5 1

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
X YES (If yes, complete EXPECTED SUBMISSION DATE)	NO		0 7	0 2	9 2

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On March 16, 1992, with Unit 2 shut down, it was identified that several of the ice condenser inlet doors on Unit 2 were found to be inhibited from opening. Following an inspection, it was determined that the floor wear slab had moved upward, causing interference with and binding of the doors. In evaluating the mechanism and extent of condition, a decision was made to inspect Unit 1, which was operating near 100 percent power. On March 18, 1992, at approximately 2100 Eastern standard time (EST), the Unit 1 inspection was completed. Eleven doors showed evidence of binding and would have required an opening force in excess of technical specification limits. As a result, Unit 1 was shut down at 0234 EST on March 19, 1992. The failure mechanism was determined to be floor uplifting caused from ice expansion within the floor assembly resulting from water intrusion. The immediate actions taken to address the binding of the Unit 1 ice condenser doors included eliminating the interference with the doors, inspections and evaluation of structural and operational acceptability, and implementation of an at-power floor monitoring program. Additional long-term actions are being evaluated.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

I. PLANT CONDITIONS

Unit 1 was operating at approximately 100 percent reactor thermal power and Unit 2 was in a refueling outage in Mode 5.

II. DESCRIPTION OF EVENTS

A. On March 16, 1992, Technical Support and Systems (TSS) personnel were informed by the ice condenser maintenance crews that several of the Unit 2 ice condenser (EIIS Code BC) lower inlet doors were inhibited from opening. TSS personnel performed a walkdown of the ice condenser doors and confirmed that the doors would not move as freely as required. TSS then initiated a problem evaluation report. The TSS personnel initially believed that the insulation beneath the doors had absorbed water, frozen, and expanded up underneath the doors, thus "jamming" the doors. On March 17, 1992, a team of TSS and Nuclear Engineering (NE) personnel inspected the Unit 2 ice condenser doors. During the inspection, ice condenser maintenance personnel informed them that they had seen cracks in the floor slab. The team inspected the floor slab in detail and identified the cracks in the floor and concluded that the floor slab had moved upward in various locations resulting in interference between the sheetmetal flashing and the base of the doors (see attached Figure 1).

At 1030 Eastern standard time (EST) on March 17, 1992, Operations was notified of the Unit 2 door binding condition. Based on the conditions in Unit 2, the decision was made to inspect the Unit 1 ice condenser doors following preplanning for the at-power containment entry inside the polar crane wall. On March 18, 1992, at approximately 2100 EST, two teams consisting of engineers from TSS and NE inspected the Unit 1 doors. This inspection revealed that eleven of the doors could not be opened without difficulty and thus would not have passed the technical specification (TS) maximum pull force requirement. Although to a lesser degree than for Unit 2, wear slab movement and cracks were observed. TS Limiting Condition for Operation (LCO) 3.6.5.3 was entered at 2048 EST, and at 0247 EST on March 19, 1992, hot standby of Unit 1 was obtained.

B. Inoperable Structures, Components, or Systems that Contributed to the Event

None.

C. Date and Approximate Time of Major Occurrences

1. March 15, 1992 — The Maintenance foreman identified binding of a number of Unit 2 ice condenser doors.

2. March 16, 1992 — Maintenance notified the system engineer that some ice condenser doors on Unit 2 were inhibited.

3. March 16, 1992 — TSS system engineer performed a walkdown of the Unit 2 ice condenser.

4. March 17, 1992 — The system engineer and NE personnel performed a visual inspection of the Unit 2 ice condenser.

5. March 17, 1992 at 1030 EST — Operations was notified of the door binding condition on Unit 2.

6. March 17, 1992 — Operations notified NRC, in accordance with 10 CFR 50.72(b)(2)(i), that 27 of 48 ice condenser doors on Unit 2 were inoperable.

7. March 18, 1992 at 2030 EST — Plant personnel performed an inspection of Unit 1 ice condenser doors.

8. March 18, 1992 at 2048 EST — Operations was notified of inspection findings and LCO 3.6.5.3 was entered; personnel began an orderly shutdown.

9. March 18, 1992 at 2143 EST — Operations notified NRC, in accordance with 10 CFR 50.72(b)(1)(ii), that 11 ice condenser doors affecting seven bays were binding.

10. March 18, 1992 at 2210 EST — Notification of an unusual event was declared on Unit 1.

11. March 18, 1992 at 2249 EST — Operations notified NRC, in accordance with 10 CFR 50.72(a)(1)(i), that a notice of unusual event was declared on Unit 1 and 10 CFR 50.72(b)(1)(i)(A) that Unit 1 was being shut down.

12. March 19, 1992 at 0247 EST — Unit 1 entered Mode 3.

13. March 19, 1992 — A temporary modification was performed on Unit 1 to remove the interference with the bottom of the doors to restore operability of the doors.

D. Other Systems or Secondary Functions Affected

None.

E. Method of Discovery

The ice condenser door binding was identified by the ice condenser maintenance crew foreman preparing for the Unit 2 ice condenser outage activities.

TEXT (If more space is required, use additional NRC Form 366A's) (17)

F. Operator Actions

Upon notification of the inoperability of the Unit 2 ice condenser doors, Operations notified NRC of the identified condition. After notification of the inoperability of the Unit 1 ice condenser doors, an orderly shutdown of the unit was conducted, a notification of unusual event declared, and NRC was appropriately notified.

G. Safety System Response

Not applicable - no safety system responses were required.

III. CAUSE OF EVENT

A. Immediate Cause

The immediate cause of the wear slab degradation was water intrusion, freezing, and expansion within the floor assembly. (See Figure 2 for depiction of floor assembly.)

B. Root Cause

The root cause of this condition was determined to be the failure to install sealant material in some of the wear slab joints during initial construction, thereby providing paths for water intrusion to the floor assembly.

C. Contributing Factors

Maintenance defrosting and cleaning activities allowed water to accumulate on the floor, thereby providing a source of water.

Also, the design of the floor assembly allowed the 1/4-inch plate located beneath the wear slab to be installed on hardened grout, allowing voids to form beneath the plate.

IV. ANALYSIS OF EVENT

The ability of the ice condenser to adequately perform its intended safety function is dependent on the reliability of the lower ice doors to open as intended. The peak containment pressure analyses assume that these doors open simultaneously under a differential pressure of approximately one pound per square foot (psf). In addition, the efficient performance of the ice condenser is also dependent on the even distribution of flow directed to the ice bed via the virtually simultaneous opening of the 24 ice bay doors during any of the postulated high energy line break design basis events inside containment.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

Inspection of the SQN Unit 1 lower ice bed doors revealed that 11 of 48 of the doors were binding. The doors that experienced binding were able to be opened by an average-size man exerting a moderate amount of force on the door.

The primary containment design pressure is based upon the peak calculated containment pressure during a double ended pump suction loss of coolant accident (LOCA). For the LOCA analysis, the peak containment pressure occurs following ice bed meltout, and the time of meltout is dependent on the time of actuation of the lower ice doors. Based on the qualitative nature of the data concerning the opening force, TVA has analyzed the containment, assuming lower ice door opening pressures of 3, 4, 5, and 20 psf for the doors experiencing binding. A pressure of 20 psf is equivalent to approximately 270 pound point force. These analyses showed that the door opening time was unaffected by these assumed increases in the force required to make the 11 doors open.

Subcompartment pressure analyses are also affected by the opening times of the lower ice doors. Delayed opening of the ice doors has the effect of changing the magnitude and frequency of the impulse pressures exerted on the aforementioned structures. An evaluation of the effect of increased lower ice door opening pressure showed that the existing subcompartment pressure analyses results are unaffected.

The primary containment peak environmental temperature, which is controlled by steam line break scenarios, was also evaluated. Degradation of the lower ice doors' opening time could affect this analysis by reducing or delaying the amount of ice melt water exiting the ice compartment drains. This water is depended upon to act as a quasi-spray after exiting the ice condenser drain lines near the ceiling of the lower compartment in order to limit the lower compartment temperatures to acceptable levels. The evaluation determined that the peak environmental temperature was not affected.

The binding of eleven lower ice doors in the SQN Unit 1 ice condenser does not affect the peak calculated containment pressure or the peak containment environmental temperature, nor does this binding affect the subcompartment pressure analyses inside containment.

The analysis for Unit 2 is being performed and results will be included in the revision to this LER.

V. CORRECTIVE ACTIONS

A. Immediate corrective actions for Unit 1

1. As a result of the condition identified, an inspection of the Unit 1 doors was performed.

2. An orderly shutdown of Unit 1 was initiated.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

3. A temporary modification was performed to remove the lower "L-shaped" sheetmetal flashing and gasket mounted on the wear slab and connected to the flashing piece that forms the jam for the lower inlet doors (see Figure 1). This removed the interference with the bottom of the doors and provided physical margin for wear slab growth without interference with the doors.

4. Following removal of the flashing and gasket, a pull-force surveillance test was successfully performed for each of the Unit 1 lower inlet doors, verifying TS operability.

5. A second temporary modification was implemented to replace the insulation bags installed under the flashing with a double layer of Armaflex rubber insulation. This provided improved sealing of air-leakage paths and ensured retention under accident conditions (see Figure 1).

6. Detailed walkdowns and inspections were performed to identify and assess impacts on interfacing components and to establish the baseline configuration for future monitoring.

7. The turning vanes were inspected to assess if the floor had displaced to the point of contact with the vanes, if the bolting was deformed, and if the wear slab, in contact with the vanes, was cracked.

8. Visual observations, review of configuration, and operating history were performed for the glycol floor piping to identify any evidence of damage and operational impacts. No evidence of glycol piping damage was identified through conducted inspections and a review of ice condenser or glycol temperatures.

9. The 12-inch floor drains were inspected for deformation, and sealing joints were inspected for damage and consistency with the as-designed configuration.

10. A localized boroscope was utilized to verify the absence of indications of excessive corrosion on the steel containment vessel in the vicinity of affected ice condenser components.

11. A boroscope was similarly utilized to inspect selected exposed, interior floor assembly passages of the floor drain for assessment of ice formation extent and location.

12. A detailed elevation survey and crack mapping of the wear slab were performed to document the present configuration.

13. A structural slab inspection and evaluation were performed.

14. A 10 CFR 50.59 safety evaluation utilizing bounding evaluations was performed for Unit 1 that verified the structural integrity of components necessary to ensure functional capability of the ice condenser system and acceptability of the existing configuration relative to ice condenser operability.

15. A periodic monitoring plan has been established that will consist of at-power monitoring of floor movement. The monitoring instruction provides criteria for assessing inlet door operability impacts and conducting further engineering assessment to ensure the continued validity of the operability evaluation.

B. Additional Actions to be Taken

1. The immediate corrective actions taken on Unit 1 are similarly being performed on Unit 2.

2. A full structural and performance evaluation will be performed for Unit 2 similar to that performed for Unit 1 and will receive the same level of reviews for acceptability. This will be completed before Unit 2 restart (Mode 4) from the Cycle 5 refueling outage.

3. To restore operability of the Unit 2 inlet doors, a modification will be implemented before Mode 4 to remove door interference and allow for vertical movement.

4. Sealing of the wear slab interfaces, joints, and significant cracks in the ice condenser bays is being evaluated and will be performed on eight bays if determined acceptable.

5. Voids and separation in the Unit 2 floor drains will also be repaired as appropriate before Mode 4.

6. On-line monitoring of Unit 2 will be performed as previously described for Unit 1 to verify continued ice condenser operability and assess the effectiveness of the described actions. Monitoring will be established before Mode 4.

7. An evaluation to determine the effectiveness of the corrective actions will be performed during the Unit 2 Cycle 6 refueling outage to determine additional corrective actions.

VI. ADDITIONAL INFORMATION

A. Failed Components

None.

B. Previous Similar Events

A review of previously reported events was conducted to determine if similar past events had occurred and if so, why corrective actions had been unsuccessful in preventing this event. Several events were identified that alone included inadequate construction and/or inadequate design. However, no events were identified that the construction and/or design deficiencies in combination with maintenance or operational practices resulted in an event. The review concluded that this event could not have been prevented as a result of the corrective actions of previous events.

VII. COMMITMENT
(Additional commitment beyond those identified in TVA's letter to NRC dated March 27, 1992.)

An evaluation to determine the effectiveness of the corrective actions will be performed during the Unit 2 Cycle 6 refueling outage to determine additional corrective actions.

(Revised commitments from those identified in TVA's letter to NRC dated March 27, 1992.)

1. TVA's commitment to restore operability of the Unit 2 inlet door by installing a sheetmetal flashing configuration that will allow for vertical movement is being changed to implement a modification to restore operability of the inlet door with a configuration that will allow for vertical movement.

2. TVA also made a commitment to implement a modification to seal exposed wear slab interfaces and joints at water intrusion paths and to seal wear slab cracks as appropriate. TVA is currently performing an evaluation of sealant materials in conjunction with evaluation of the need to seal joints or cracks before Unit 2 startup. Sealing of the identified areas will be performed as appropriate based on the evaluation.

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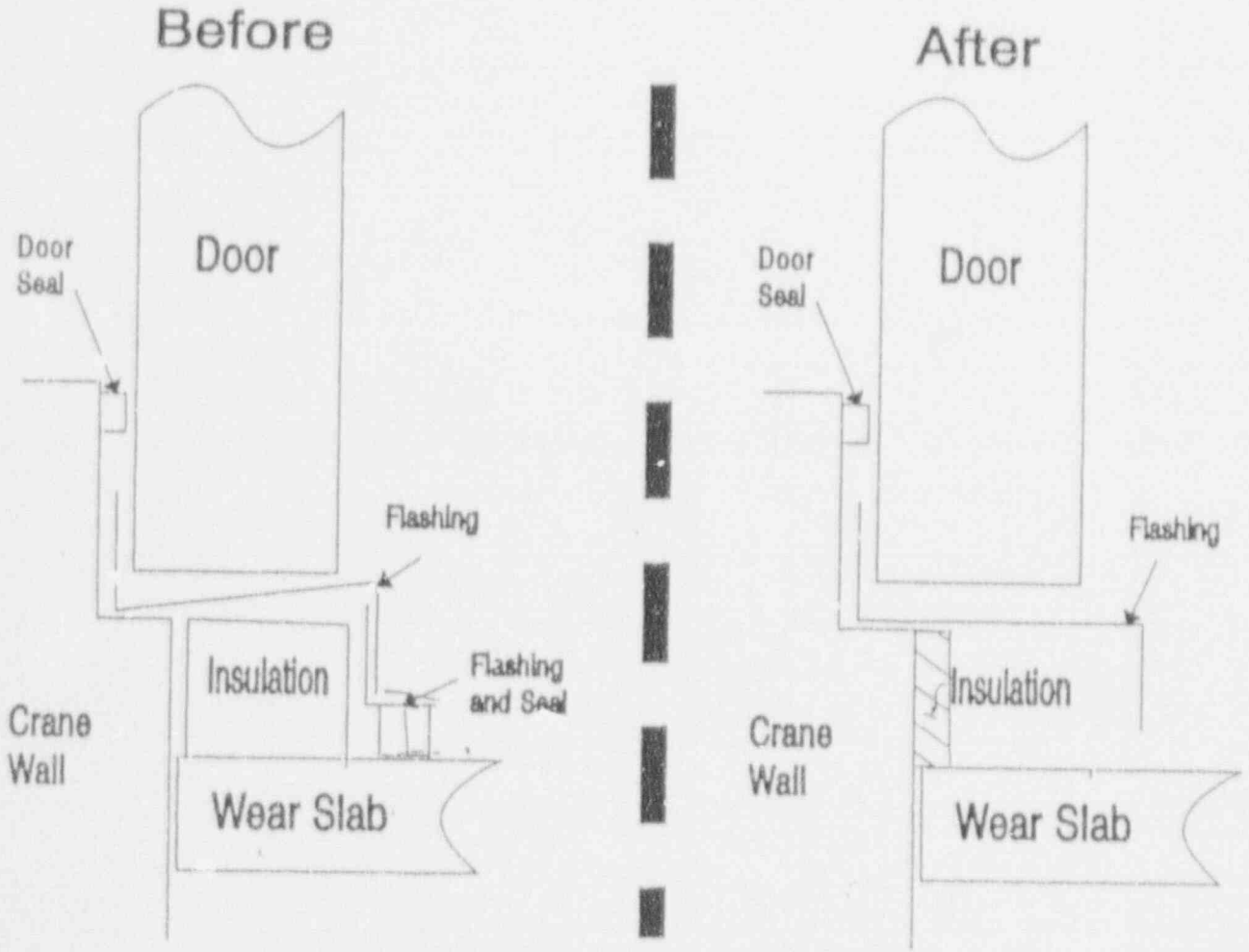
TEXT (If more space is required, use additional NRC Form 366A's) (17)



Ice Condenser Lower Inlet Door

Figure 1

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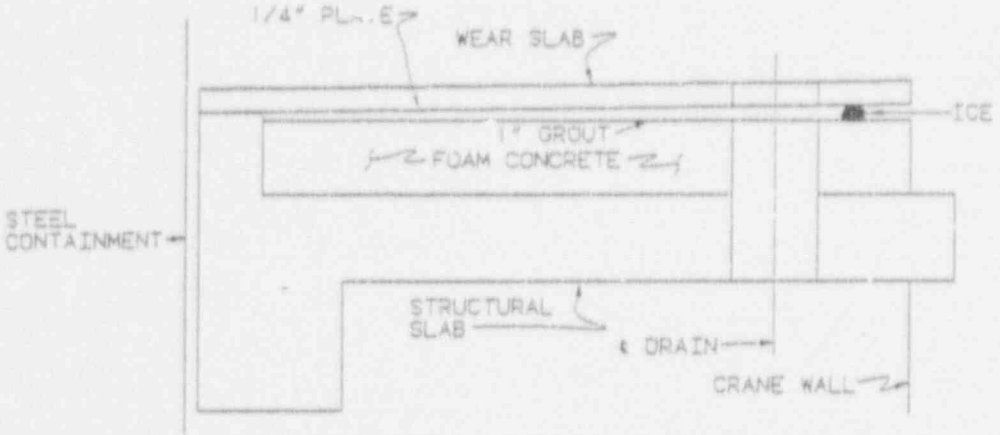
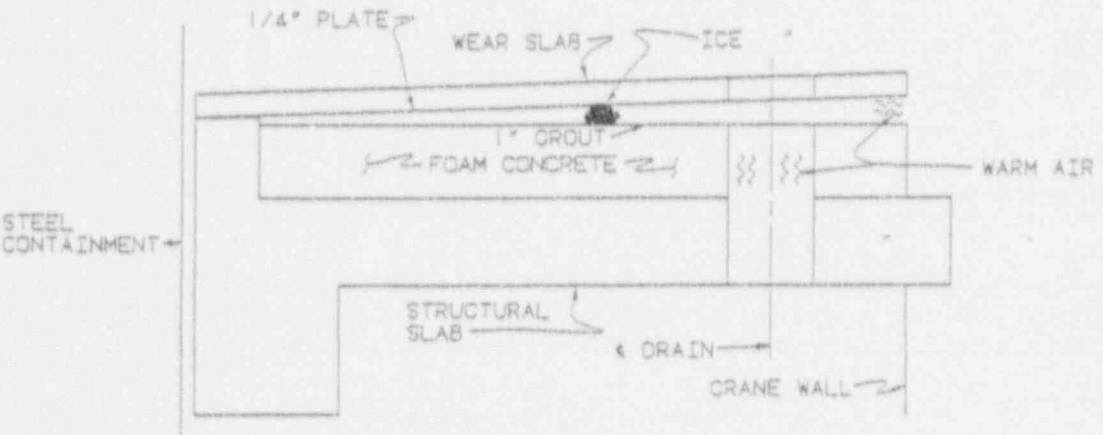
TEXT (If more space is required, use additional NRC Form 366A's) (17)

STAGE 1
INITIAL



ICE CONDENSER
FLOOR SLAB

STAGE 2
CURRENT



ICE CONDENSER
FLOOR SLAB

Figure 2