CATEGORY 1

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 9710160056 DOC. DATE: 97/10/08 NOTARIZED: NO DOCKET #
FACIL: 50-250 Turkey Point Plant, Unit 3, Florida Power and Light C 05000250
AUTH. NAME AUTHOR AFFILIATION
MOWREY, C. L. Florida Power & Light Co.
HOVEY, R. J. Florida Power & Light Co.
RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 97-008-00: on 970909, containment sump debris screens outside design basis due to stress damage was discovered. Caused by inadequate procedural guidance & personnel error. Discrepancies found on screens corrected. w/971008 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 11
TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

NOTES:

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	PD2-3 PD	1	1	CROTEAU, R	1	1
INTERNAL:	AEOD/SPD/RAB	2	2	AEOD/SPD/RRAB	1	1
	FILE CENTER	1	1	NRR/DE/ECGB	1	1
	NRR/DE/EELB	1	1	NRR/DE/EMEB	1	1
	NRR/DRCH/HHFB	1	1	NRR/DRCH/HICB	1	1
	NRR/DRCH/HOLB	1	1	NRR/DRCH/HQMB	1	1
	NRR/DRPM/PECB	1	1	NRR/DSSA/SPLB	1	1
	NRR/DSSA/SRXB	1	1	RES/DET/EIB	1	1
	RGN2 FILE 01	1	1			
EXTERNAL:	L ST LOBBY WARD	1	1	LITCO BRYCE, J H	1	1
	NOAC POORE, W.	1	1	NOAC QUEENER, DS	1	1
	NRC PDR	1	1	NUDOCS FULL TXT	1	1

CATEGORY 1 DOCUMENT

NOTE TO ALL "RIDS" RECIPIENTS:
PLEASE HELP US TO REDUCE WASTE. TO HAVE YOUR NAME OR ORGANIZATION REMOVED FROM DISTRIBUTION LISTS OR REDUCE THE NUMBER OF COPIES RECEIVED BY YOU OR YOUR ORGANIZATION, CONTACT THE DOCUMENT CONTROL DESK (DCD) ON EXTENSION 415-2083

FULL TEXT CONVERSION REQUIRED
TOTAL NUMBER OF COPIES REQUIRED: LTTR 24 ENCL 24

FPL

OCT 08 1997

L-97-250
10 CFR 50.73

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

Re: Turkey Point Units 3 and 4
Docket Nos. 50-250/251
Reportable Event: 97-008
Date of Event: September 9, 1997
Containment Sump Debris Screens Outside Design Basis Due to Screen Damage

The attached Licensee Event Report is being submitted pursuant to the requirements of 10 CFR 50.73 to provide notification of the subject event.

Sincerely,

R. J. Hovey
Vice President
Turkey Point Plant

CLM

Attachment

IE22 1/1

cc: Regional Administrator, USNRC Region II
Senior Resident Inspector, USNRC, Turkey Point Plant

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
TURKEY POINT UNITS 3 & 4	05000250	1 OF 9

TITLE (4) Containment Sump Debris Screens Outside Design Basis Due To Screen Damage

EVENT DATE (5)			LER NUMBER (6)			RPT DATE (7)			OTHER FACILITIES INV. (8)	
MON	DAY	YR	YR	SEQ #	R#	MON	DAY	YR	FACILITY NAMES	DOCKET # (S)
9	9	97	97	08	00	10	08	97	TURKEY POINT UNIT 4	05000251

OPERATING MODE (9)	1/5
POWER LEVEL (10)	100/0

10 CFR 50.73(a)(2)(ii)

LICENSEE CONTACT FOR THIS LER (12)

C.L. MOWREY, COMPLIANCE SPECIALIST	Telephone Number: (305) 246-6204

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	NPRDS?	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	NPRDS?

SUPPLEMENTAL REPORT EXPECTED (14) NO ☒ YES ☐	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
(If yes, complete EXPECTED SUBMISSION DATE)				

ABSTRACT (16)

On September 9, 1997, Turkey Point Unit 4 was in Mode 5 in preparation for a refueling. Inspection of the containment recirculation sumps revealed several gaps and a hole in the sump screens which were in excess of the design requirements. On September 11, a similar condition was found on Unit 3 while in Mode 1. The gaps would allow debris larger than 3/8 inch to enter the flow stream to the containment spray nozzles, during the recirculation phase following a loss of coolant accident. Therefore, the screen damage resulted in both units operating outside the design basis.

The causes of this event were inadequate procedural guidance, and personnel error (utility non-licensed personnel).

The Unit 3 screen was repaired on the spot. The Unit 4 screens have also been repaired. FPL is clarifying the containment recirculation sump screen design basis. Additional procedural guidance is being developed to verify containment recirculation sump screen design details. Discussion of the event will be incorporated into the continuing training program at Turkey Point.

I. BACKGROUND INFORMATION

The Emergency Core Cooling System (ECCS) containment recirculation sumps [NH:rvr] at Turkey Point Units 3 and 4 are collecting reservoirs provided to supply water to the Containment Spray (CS) [BE] and Safety Injection (SI) [BQ] Systems for long term recirculation following a Loss of Coolant Accident. Turkey Point Units 3 and 4 each have two containment recirculation sumps designated as the north and south sumps. The sumps are physically separated by reinforced concrete barriers, as shown in the attached sketch. Each sump provides the source of water, through its respective 14 inch pump suction line, to the Residual Heat Removal (RHR) pumps [BP:p], and includes a debris screen [BP:scn]. The debris screen consists of 1/2 inch mesh overlaid with 1/4 inch mesh screen, both tied to and supported by a structural steel frame.

II. DESCRIPTION OF THE EVENT

On September 9, 1997, Turkey Point Unit 4 was in Cold Shutdown (Mode 5) in preparation for a refueling. During an inspection of the ECCS containment recirculation sump, the sump screens were found to be inconsistent with design requirements. Specifically, during an inspection of the containment recirculation sump area (performed in light of recent events at St. Lucie Unit 2 and with regard to industry activity concerning containment recirculation sumps), FPL identified a 1 inch diameter hole in the top of the south sump screen and gaps at the screen/floor interface on both sumps. The two largest gaps found were 13 inches long with a varying gap up to 5/8 inch, and 19 inches long with a varying gap up to 1/2 inch. Inspection of the north sump also revealed small gaps around a pipe penetrating the screen mesh. Although these gaps were relatively small, they exceeded the 1/4 inch mesh design requirement.

The condition was immediately brought to management attention and a condition report was generated for evaluation. Since Unit 4 was in Mode 5, and since the containment recirculation sumps are not required in Mode 5, there was no immediate Unit 4 operability concern. However, immediate consideration was given to the issue of operability for Unit 3, which at the time was operating at full power. Since the particular activities causing the gaps in the Unit 4 sump screens were unknown and could have resulted from routine personnel activity in the sump screen area, FPL was concerned that similar conditions could exist on the operating

unit. On September 10, 1997, FPL decided to perform a containment entry at power to inspect the Unit 3 containment recirculation sump screens.

On September 10 and 11, 1997, preparations were made to perform on the spot repairs should any gaps be observed during the inspection. A tailboard session was held among the participating personnel to ensure that each aspect of Unit 3 containment entry and inspection was understood. On September 11, 1997, the at-power entries and inspections were made on the north and south sumps. No holes or gaps were found on the north sump screen. On the south sump screen no holes were found; however, a narrow gap (24 inches long with a varying gap up to 3/8 inch) was found at the floor/screen interface, similar to those gaps found on Unit 4. The Unit 3 gap was repaired immediately in accordance with prescribed instructions.

III. CAUSE OF THE EVENT

The causes of this event were inadequate procedural guidance, and personnel error (utility non-licensed personnel).

Procedures

Inadequate procedural guidance contributed to a delay in identifying the gaps associated with the containment recirculation sump screens. Specifically, the surveillance requirements in procedure 0-SMM-051.3, Containment Closeout Inspection, did not provide sufficiently detailed inspection guidance for the sump screen enclosure to ensure compliance with the Turkey Point Updated Final Safety Analysis Report (UFSAR) design basis.

The sump screen design and performance capability were evaluated in 1990 in response to NRC Information Notice 89-77, "Debris in Containment Emergency Sumps and Incorrect Screen Configuration" (November 21, 1989). Non-conformance reports were generated based on walkdown inspections, and indicated discrepancies between as-built sump screen dimensions and those described in a UFSAR figure. The evaluation of these discrepancies concluded that available NPSH exceeds pump required NPSH even for the extreme conditions postulated, and that screen approach velocities are low, reducing the likelihood of debris accumulation. Plant drawings were updated, and 0-SMM-051.3 was revised to provide additional inspection criteria.

On December 3, 1993, Supplement 1 to Information Notice 89-77 was issued. FPL reviewed the supplement and determined that the new information had been adequately addressed in the 1990 effort. Nevertheless, this supplement was included in the January 1994 training reports. On February 24, 1995, 0-SMM-51.3 was revised to add more specific inspection criteria including the 1/4 inch mesh requirement and an inspection hold point. This revision was initiated partly as the result of a 10CFR50.72 notification by another utility regarding sump screen configuration (later retracted by that utility). Even so, methods for ensuring strict conformance to the 1/4 inch mesh requirement were not effectively conveyed. The opportunity for earlier detection was missed, despite the substantial efforts associated with addressing the industry experience.

More recent generic communications, e.g., NRC Bulletin 93-02, "Debris Plugging of Emergency Core Cooling Suction Strainers," and Information Notice 96-10, "Potential Blockage By Debris of Safety System Piping Which Is Not Used During Normal Operation Or Tested During Surveillance," have focused on sump clogging and debris blockage rather than sump screen configuration. FPL's response to these was directed toward minimizing debris in containment. The lack of sufficient procedural guidance to ensure compliance with the UFSAR design basis was not recognized.

Personnel

The 1 inch hole found on the Unit 4 south sump screen may have been made to allow insertion of a drain hose. A similar hole found in the north sump screen in 1993 was determined to have been made to allow for a hose to pump water out of the sump. Specific causes for the gaps in the Unit 4 north and south sump screens and the Unit 3 south sump screen are unknown. These gaps may have been caused by running hoses under the screen or by incidental impact from personnel activity in the area. Personnel were not aware of the significance of maintaining sump screen configuration integrity.

Both sump screens are in highly contaminated, high radiation areas. There is no permanent lighting at either sump. The south sump is recessed several feet back under the refueling cavity, and there is less than four feet of vertical clearance between the containment floor and the underside of the refueling cavity. Because of these dose concerns, contamination concerns, and physical impediments, previous inspections of the screens were performed from several feet away using flashlights. These inspections were adequate to determine the presence of debris, and to detect major signs of degradation, structural distress or

abnormal corrosion. However, these inspections were not adequate to detect small gaps or holes in the screen mesh.

IV. ANALYSIS OF THE EVENT

The Turkey Point Units 3 and 4 containment recirculation sump screens are designed to prevent all debris larger than that screened by 1/4 inch mesh from entering the RHR pumps and containment spray nozzles [BE:nzl] during the recirculation phase of a Loss of Coolant Accident. Since the screens are required to filter debris larger than 3/8 inch (see Design Basis discussion below), the presence of the hole and gaps placed the Turkey Point sump screen configurations outside the design basis as stated in the UFSAR. However, the gaps were relatively small and not considered to create a hazard that would have compromised the ability of the ECCS or the Containment Spray system to perform their respective safety related functions. The safety significance of the as-found conditions were evaluated and the results are summarized below.

Design Basis

The Turkey Point Units 3 and 4 UFSAR, Section 6.2.2 states, "Filtration of the water entering the residual heat removal pump suction piping is accomplished by screens located over the sumps which remove all debris 1/4 inch or larger." Section 6.4.2 of the UFSAR states, "During spray recirculation operation, the water is screened through a 1/4 inch mesh before leaving the containment recirculation sump. The spray nozzles are bronze and have a 3/8 inch diameter orifice." As such, the 1/4 inch filtration is nominal based on screen design, and is necessary to prevent debris from clogging the containment spray nozzle 3/8 inch opening. Therefore, the design basis for the screen is actually to prevent passage of rigid particles larger than 3/8 inch. This is accomplished by the 1/4 inch mesh since the diagonal is less than 3/8 inch. Section 6.2.2 of the UFSAR goes on to state, "In the unlikely event that one sump is 100% clogged and the other sump is 50% clogged, required circulation flow can still be maintained." Additionally, this section states, "Recirculation may start with a water depth of 2.93 feet on the containment floor at elevation 14 feet 0 inches. This is equivalent to 249,000 gallons of water at 283 degrees Fahrenheit. The maximum velocity of approach to the screens is less than 0.5 foot/second."

Analysis of Safety Significance

The Turkey Point Units 3 and 4 containment recirculation sumps are protected against debris resulting from a postulated Loss of Coolant Accident (LOCA) by screens. The hole and gaps in the containment recirculation sump screens could have allowed larger than design basis particles to pass into the Containment Spray system. The containment spray nozzles are capable of passing rigid particles of up to 3/8 inch. The spray nozzles would also be expected to pass larger, compressible particles without clogging. The Containment Spray system is designed to aid in reducing containment temperature and pressure following a postulated LOCA. The peak temperature and pressure occur about 20 seconds in the design basis LOCA scenario. Most of the cooling and pressure reduction of the containment atmosphere by containment spray occurs during the injection phase of the LOCA event, long before suction is transferred to the containment recirculation sump from the refueling water storage tank [BP:tk](about one hour after a design basis LOCA). Further, the containment spray cooling function is supplemented by the emergency containment coolers [BK:clr], which function regardless of the condition of the containment recirculation sump screens.

The containment floor is relatively level, with no channels leading to the sumps. Flow into the sumps initially results from spillover during the flooding stage of the LOCA. Actual induced flow does not begin until recirculation operation is initiated, well after the initial blowdown subsides. By this time, most of the heavy debris is expected to have dispersed and settled out before nearing the sumps. Any debris entrainment onto the screens during blowdown is expected to be incidental with relatively little accumulation. Therefore, very little debris is available to pass through any gaps or holes in the screens.

The generated debris would be materials in the vicinity of the postulated pipe break which are dislodged by pipe whip or jet impingement forces. Since leak-before-break considerations are part of the Turkey Point design basis (NRC Safety Evaluation Report dated June 23, 1995), the dynamic effects of a main loop pipe break need not be considered in the design basis. As such, the postulated effects of pipe whip and jet impingement are from a smaller pipe in the reactor coolant pressure boundary and would significantly reduce the quantity of debris generated from a LOCA. Incidental transient materials are considered negligible and are not potential debris sources due to the current housekeeping practices and provisions for post-maintenance inspection and cleanup.

The following is a summary of the supporting rationale regarding the type of debris expected during a LOCA and the effects of that debris on the containment recirculation sump screens:

- The screens are protected from internal missiles, pipe whip and jet impingement by major intervening structures.

- Dynamic effects of a primary loop pipe break are not postulated based on leak-before-break considerations. Therefore, the next largest credible pipe breaks are in the 12 inch pressurizer surge line and the 14 inch RHR hot leg connections. Of the two, a surge line break is expected to generate more debris because of the double-ended jet effects near the break.

- The free-flow path of rising water to the sumps is arduous and hindered by intervening equipment, steel pipe supports and concrete structures. Water is expected to approach the sumps as spreading, wide, open-channel flow as opposed to directed flow. As such, the debris transport mechanisms of turbulence and flow velocity are relatively low.

- Most of the debris is expected to be from thermal insulation: reflective metal, asbestos, calcium silicate, and blanket insulation. Reflective metal is likely to settle before reaching the sumps. Some of the asbestos and calcium silicate insulation would enter into suspension and pass harmlessly through the screens and spray nozzles. The larger pieces of insulation would become saturated and, along with its lagging, likely settle before reaching the sumps. The smaller particles of blanket insulation would be suspended in the recirculation fluid, and the portion of insulation remaining in larger sections would either settle or be hung up by obstructions approaching the sumps.

Based on the preceding rationale, most of the generated debris is not likely to reach the sumps during the blowdown phase and will have settled out before nearing the screens. When the recirculation mode is initiated, the screens are expected to be relatively clean. Under these screen conditions, coupled with normal system alignment, approach velocities would be less than 0.2 foot per second, which is lower than velocities required in open-channel flow to initiate movement and transport of most settled debris. More likely the debris approaching the sump screens will be metal foil, fine solid particles, and suspended calcium silicate and other materials having specific gravities slightly greater than one. As such the potential for large particles to reach the screens, to pass through the relatively

small hole and gaps and to block the containment spray nozzles, is extremely low. Therefore, the as-found discrepancies are considered to be of low safety significance and would not compromise the ability of the ECCS and the Containment Spray system from performing their safety functions.

FPL also believes that the flow path from the sump screens to the fuel is not likely to be degraded significantly by debris. Large or heavy debris is unlikely to reach the sump screens, as demonstrated above. Debris which does have the potential to reach and pass through the gaps and holes discovered is not considered to have the capability to negatively impact the RHR, SI, or CS pumps (all large centrifugal pumps).

Nevertheless, should credible debris reach the fuel, core damage is still unlikely. Due to the reduced decay heat at the time ECCS flow is established, core cooling flow requirements are only about 300 gpm. The decay heat and the associated fuel rod temperatures remain low enough that forced convective heat removal is not required. The ECCS flow serves to remove decay heat to prevent core uncovery. In this situation, redistribution of flow at the inlet, from blocked channels to different fuel channels, is of little importance as long as the active fuel remains covered, and there is no major blockage in the upper regions to prevent water circulation to all fuel channels. The trapping of debris at the lower spacer grids will result in channels in the active fuel region remaining unblocked, and thus not jeopardize ECCS performance requirements. Therefore, the fuel will not experience any adverse effects from credible sump debris.

Based on the above assessment of Turkey Point's design basis (containment spray nozzles), and other potentially affected items (ECCS pumps, fuel), FPL has concluded that this condition did not represent a significant impact to the operation of components required for accident mitigation. Therefore, the protection of the public health and safety was not adversely affected by this event.

V. CORRECTIVE ACTIONS

1) The discrepancies found on the Unit 4 containment recirculation sump screens have been corrected. The repairs included enhancements to prevent inadvertent screen deformation due to activities in the area.

2) The discrepancy found on the Unit 3 containment recirculation sump screen was corrected on the spot. Enhancements included during the Unit 4 repair to prevent inadvertent screen deformation will be implemented on Unit 3 during the next refueling outage, presently scheduled for Fall, 1998.

3) To augment current surveillance instructions, additional procedural guidance is being developed to verify containment recirculation sump screen design details.

4) FPL is clarifying the design basis requirements for the Turkey Point Units 3 and 4 containment recirculation sump screens in the UFSAR. Additionally, design documents will provide more containment recirculation sump screen design details.

5) Training Information Bulletin No. 97-44 was issued to inform all personnel of the restrictions when working in and around the containment recirculation sumps.

6) This event report will be incorporated into the continuing training program at Turkey Point.

7) FPL is evaluating the use of foreign material exclusion covers, to be placed over the sump screens during refueling outages.

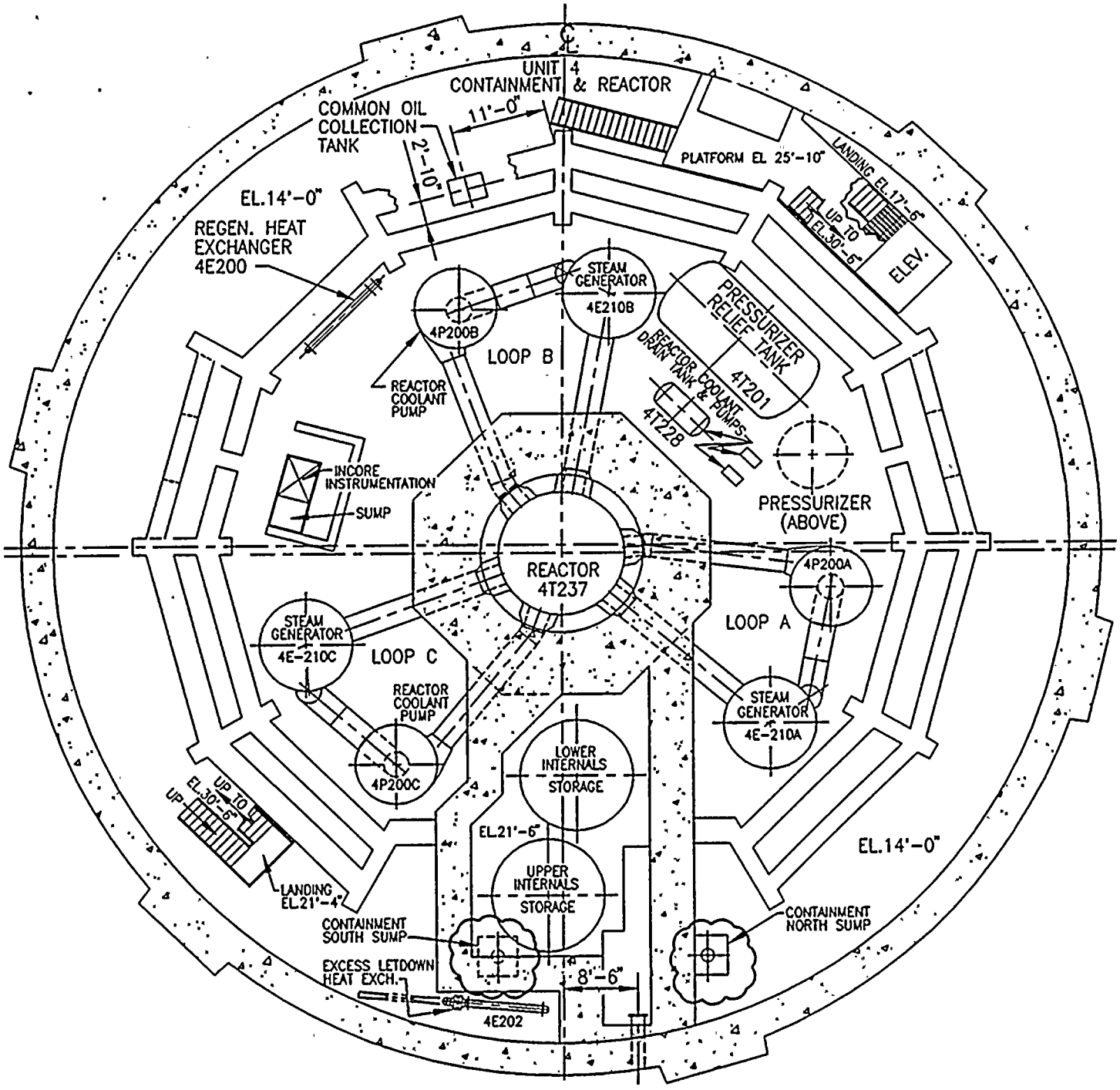
8) Personnel assigned to perform containment recirculation sump inspections will receive training on inspection criteria specific to the sumps.

VI. ADDITIONAL INFORMATION

There have been no other similar events previously reported at Turkey Point.

EIIS Codes are shown in the format [EIIS SYSTEM: IEEE component function identifier, second component identifier (if appropriate)].

A simplified sketch of the Unit 4 containment building (basement elevation) is attached.



ATTACHMENT TO LER 97-008-00

SIMPLIFIED SKETCH OF UNIT 4 CONTAINMENT BUILDING (BASEMENT ELEVATION)