Florida
Power
CORPORATION
Crystal River Unit 3
Docket No. 50-302

January 5, 1996
3F0196-03

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

Subject: Licensee Event Report (LER) 95-027-00

Dear Sir:

Please find the enclosed Licensee Event Report (LER) 95-027-00. This report is submitted as a voluntary report by Florida Power Corporation in accordance with 10 CFR 50.73.

Sincerely,

B. J. Hickle, Director
Nuclear Plant Operations

TWC:ff

Attachment

xc: Regional Administrator, Region II
Project Manager, NRR
Senior Resident Inspector

110117

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NRC FORM 366 (5-92) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES 5/31/95

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HOURS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON DC 20503.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
CRYSTAL RIVER UNIT 3 (CR-3)	0 5 0 0 0 3 0 2	1 OF 1 0

TITLE (4)

Leak in Underground Emergency Feedwater Piping Suspected to be Caused by Nearby Excavation Using Power Tools

EVENT DATE (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)
									N/A	0 5 0 0 0
1 2	0 6	9 5	9 5	0 2 7	0 0	0 1	0 5	9 6	N/A	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)	X OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	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
T.W. Catchpole, Sr. Nuclear Licensing Engineer	3 5 2 5 6 3 - 4 6 0 1

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

CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS	

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

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

On December 6, 1995, Florida Power Corporation's (FPC) Crystal River Unit 3 (CR-3) was in MODE ONE (POWER OPERATION), operating at 100% Reactor Power and generating 882 megawatts. A condition involving a breach in the Emergency Feedwater Pump suction or recirculation piping was suspected and later confirmed to be in the recirculation line on December 8, 1995. The breach was found to exceed the allowable indication standards of ASME Section XI for structural integrity of pressure boundary piping and created a concern with regard to Improved Technical Specification requirements for the minimum inventory of water in the Emergency Feedwater Tank (EFT-2). The leak in the underground Emergency Feedwater Pump recirculation line was apparently caused by operation of power tools related to previous excavation work in the vicinity. A nonconformance was documented by FPC staff and subsequently determined by FPC management to warrant a voluntary License Event Report. FPC management decided to install a mechanical clamping device as a temporary repair using ASME Code Case N-523 "Mechanical Clamping Devices for Class 2 and 3 Piping" in lieu of an ASME Code Repair which would have involved removal of the Emergency Feedwater function for an extended period of time. A permanent repair of the recirculation piping will be made during Refuel 10, scheduled for February 29, 1996.

EVENT DESCRIPTION

On December 6, 1995, Florida Power Corporation's (FPC) Crystal River Unit 3 (CR-3) was in MODE ONE (POWER OPERATION), operating at 100% Reactor Power and generating 882 megawatts. Weather conditions were dry. After detecting a puddle of water on top of the asphalt surface on the southwest berm, it was determined by chemical analysis that the water was leaking from the Emergency Feedwater system [BA] (EFW). This was confirmed by Emergency Feedwater Tank [BA,TK] EFT-2 measurements (leak rate determined from both known and unknown sources) and comparison of morpholine and hydrazine concentration. The LEAKAGE was detected at the surface of the asphalt adjacent to an electrical cable trench which was installed approximately one year ago. Based on interviews with personnel present during the installation of the trench, it was determined the excavation was performed using power tools which may have "nicked" the coating protecting the underground piping. A Problem Report was written on December 7, 1995 resulting in the Shift Supervisor on Duty (SSOD) initiating a system OPERABILITY review in accordance with Compliance Procedure CP-150 "Identifying and Processing Operability Concerns". This procedure provides a structured approach to resolution of OPERABILITY concerns utilizing a multi-disciplined team of individuals. The team noted there were five lines associated with EFT-2 in the vicinity of the cable trench (see Figure 1). They eliminated three of the lines as potential sources, which left the 8 inch suction line and the 1-1/2 inch EFW Pump [BA,P] recirculation line. The team was most concerned with a leak in the recirculation line because of the potential to decrease EFW inventory at a faster rate than anticipated based on the original design basis. FPC's Improved Technical Specifications require the plant to be in MODE 3 in 6 hours and MODE 4 within 12 hours if the volume of EFW Tank water is not within its limit of a minimum of 150,000 gallons of inventory. With the notation that tank measurements were in excess of 150,000 gallons, it was determined the system was operable, but degraded.

On December 8, 1995, excavation confirmed the presence of what appeared to be a galvanically induced throughwall leak in the EFW Pump recirculation line which is a 1-1/2 inch ASME Code Class 3, Seismic Class 1 line. This is a common line for both trains of the EFW system which is required for system testing and EFW Pump minimum flow protection. The location of the leak was such that performance of an ASME code repair could not be accomplished without affecting minimum recirculation capability for both trains. A Code repair would have required a plant shutdown which would have created unwarranted challenges to the normal feedwater system [SJ], hence increasing the potential reliance on the EFW System. Immediate action taken was to install a commercial grade (non-safety related) pipe clamp to terminate the leak. The clamp was rated for a working pressure of 450 pounds per square inch gauge (psig) and was considered to be appropriate for

use based on the results of engineering calculations which indicated a maximum pressure of 310 psig at the flaw in the recirculation line.

On December 9, 1995 at 0028 hours, a second CP-150 team was convened to determine system OPERABILITY using the commercial grade clamp and concluded the system was "operable, but degraded". Engineering judgment indicated the clamp would withstand the anticipated maximum pressure at the point of the flaw following an emergency feedwater actuation until installation of a safety related repair. The CP-150 team noted that in the unlikely event the temporary pipe clamp failed, the estimated maximum LEAKAGE rate as determined from engineering calculations, would have been 18.2 gallons per minute (gpm) based on maximum flow and pressure through the line. This would result in a reduction in "mission time" from 18 hours to approximately 16 hours to achieve a reduction in EFW inventory below the minimum tank level limit. However, in the time it would take to reduce water in the EFT to the minimum tank level, operators would have ample time to swap over to the alternate cooling sources, the Condensate Storage Tank [SD,TK] and Condenser Hotwell [SD,COND], as currently directed by plant procedures. Therefore, there was sufficient time for the EFW system to perform its safety function. As a compensatory measure, operators were informed via Operations Study Book Entry OSB 9512.05 of the need to be aware of the possible reduction in mission time. A temporary modification package was developed to design and install a safety related clamp with a rubber gasket utilizing ASME Section XI, Code Case N-523. After installation, an initial inservice run of an emergency feedwater pump verified no LEAKAGE at operating pressure to ensure structural integrity of the clamp and associated piping was maintained.

On December 9, 1995, a third CP-150 team was convened to address the OPERABILITY of the EFW system utilizing the safety related clamp. Additional information was also incorporated to further substantiate the conclusions reached by earlier OPERABILITY reviews. For example, it was noted the lowest EFT-2 tank volume between November 6 and December 6, 1995, the leak discovery date, was 160,875 gallons. The additional volume above the 150,000 gallons would have allowed the 18 hour mission time to be met based upon the calculated maximum leak rate of 18.2 gpm through the hole. FPC staff determined that, although installation of the safety related clamp allowed the EFW system to be considered operable, the system would be considered degraded until the piping is restored to its original configuration.

This event is being submitted as a voluntary License Event Report (LER).

EVENT EVALUATION

This voluntary report was a result of a condition which exceeded the allowable indication standards for ferritic piping prescribed by ASME Section XI, subparagraph IWB-3514.2, necessary to assure structural integrity requirements

of pressure boundary piping. Florida Power Corporation consulted the guidance contained in Generic Letter 90-05 "Guidance for Performing Temporary Non-Code Repair of ASME Code Class 1, 2, and 3 Piping" and additional guidance available in internal NRC Memorandum dated August 15, 1990 from the Division of Engineering Technology to Regional Directors. This guidance indicates "stopgap measures" to limit leakage in Class 3 moderate energy piping may be used pending approval of a relief request for a temporary non-code repair as long as the measures are reversible. FPC decided to use a 1994 ASME-approved Code Case to temporarily repair a breach in ASME Code Class 3 piping using a mechanical clamping device. Other options for ASME Code repair were not practical and would have produced unnecessary stress on plant systems and components by requiring a plant shutdown. This decision process was coordinated with NRC personnel and followup conversations have taken place (see Additional Corrective Action, Item 1). Throughout this event, the health and safety of the public has not been affected. This report is being provided to ensure a full understanding of FPC actions related to an engineered safety system determined to be degraded.

The principle function of the EFW system is to remove decay heat from the Reactor Coolant System [AB] upon unavailability of the normal feedwater [SJ] supply. To achieve this, the EFW system provides secondary coolant to the Once Through Steam Generators [AB,SG] (OTSG). EFW is also used to promote and enhance natural circulation in the Reactor Coolant System. The EFW system consists of two full-capacity independent systems which include two pumps and associated valves and piping. The EFW system piping is designed to ANSI B31.1 ES (Essential Services), Seismic Class I. Each train is capable of supplying sufficient emergency feedwater to either or both OTSG's, from any one of three water sources, the Emergency Feedwater Tank (EFT-2), the Condensate Storage Tank [SD,TK], and the Condenser Hotwell [SD,COND]. The EFW pumps are normally aligned to take water from the Emergency Feedwater Tank (EFT-2) through suction penetrations located on the tank. In the event EFT-2 becomes inoperable, the pump suction may be aligned to the Condensate Storage Tank or the Condenser Hotwell. See Figure 2.

Each of the EFW pumps has a 1-inch minimum recirculation line that directs flow back to the Emergency Feedwater Tank through a common 1-1/2 inch header. The recirculation line is required for system testing and to ensure minimum required recirculation flow of 250 gpm during accident conditions. The common recirculation line is then split into 2 lines where it enters the EFT.

As noted in the Event Description section, above, the minimum required emergency feedwater inventory was available at all times. FPC's design basis assumes an EFT-2 volume of 150,000 gallons which will provide HOT STANDBY cooling for approximately 18 hours assuming conservative decay heat [BP] conditions. Since identification of the problem, Operators were well aware of the possible reduction in "mission time" and the need to swap over to alternate cooling sources. EFT-2 has redundant level instrumentation with low level and low-low level alarms to alert operators of the need for swapover. Emergency Operating

Procedure EOP-9 "Natural Circulation Cooldown" requires operators to establish suction from the Condensate Storage Tank when EFT-2 level cannot be maintained greater than or equal to 8.5 feet which is equivalent to 32,896 usable gallons.

As part of the third CP-150 review, a Justification for Continued Operation was developed which recognized, based on engineering evaluation of both the commercial grade and safety related pipe clamps, the EFW System was still capable of performing its safety function and remained fully operable. The redundancy in available secondary coolant sources, along with the use of the mechanical clamp designed to withstand the full operating pressure of the system, provided the assurances needed to resolve any concerns regarding OPERABILITY of the emergency feedwater system.

CAUSE

The primary suspected cause for this event was personnel error which contributed to improper work control practices during a previous excavation activity in the vicinity of EFW pump recirculation piping. The excavation was conducted approximately one year ago (December, 1994) and utilized power tools to dig an electrical cable trench which runs from the fire service pump house to the edge of the berm (see Figure 1). Improper work practices apparently allowed for accidently removing the coating from a small area of the 1-1/2 inch underground piping. This piping is carbon steel, 1-1/2 inches in diameter and has an enamel coating. It is believed a breach in this protective coating could have set up a galvanic cell between the carbon steel pipe and the alkaline (limestone) fill around the pipe. A formal root cause analysis will be conducted by February 10, 1996 to determine if this preliminary evaluation can be confirmed.

IMMEDIATE CORRECTIVE ACTION

1. The area of the expected leak was excavated on December 8, 1995 and the exact location was identified (see Figure 1).

2. A non-safety, commercial pipe clamp was installed on December 8, 1995 to stop the LEAKAGE.

3. A calculation was performed on December 9, 1995 to determine the internal pressure and leak rate at a hole in the EFW pump recirculation line. The calculation yielded a total recirculation flow of approximately 260 gpm with a corresponding pressure of 310 psig with a leak rate of approximately 1.0 gpm.

4. A structural calculation was performed on December 9, 1995 to provide technical justification for attaching a mechanical clamping device to the

EFW recirculation piping. The calculation considered pressure stresses and bending stresses due to external loads, seismic loading on the pipe since it will not be buried pending permanent repair, and loading of the clamp on the piping for the added mass. This calculation used stress limits from tables contained in ASME Section III dated 1989. Upon further review on December 22, 1995 it was determined the correct code should have been ANSI B31.1, 1967. Additional calculations were performed using information from ANSI B31.1 which confirmed and further supported the structural data completed on December 9, 1995.

5. A safety related pipe clamp was installed on December 9, 1995 in accordance with ASME Section XI, Code Case N-523.

6. An initial service leak test was performed on December 9, 1995 with EFP-1 running and no LEAKAGE was detected.

7. A plan was developed on December 9, 1995 to monitor defect growth in the area immediately adjacent to the clamping device. In accordance with this plan, a volumetric inspection was performed on December 10, 1995 to obtain baseline ultrasonic data.

8. The exposed piping and clamp have been environmentally protected by use of a tarpaulin cover.

ADDITIONAL CORRECTIVE ACTION

1. On December 11, 1995, Inservice Inspection Relief Request (95-055) was forwarded to the Nuclear Regulatory Commission (NRC) requesting approval for FPC to use ASME Code Case N-523 for the temporary repair of the emergency feedwater piping. Additional information was provided to the NRC reviewer on December 22, 1995 to clarify the request in the area of piping stresses.

2. Weekly visual inspections and a quarterly ultrasonic examination will be performed of the temporary clamping device for LEAKAGE as required by ASME Code Case N-523.

3. Additional inspections will be performed by January 12, 1996 of the remaining 1-1/2 inch recirculation piping under the electrical cable trench as well as other carbon steel piping in the vicinity of the repair, to determine the existence of other examples of corrosion where pipe coating may have been damaged. Additional lines include a 1-1/2 inch nitrogen line, a 6 inch fill line, and a 8 inch suction line.

4. A work package will be developed to be installed during Refuel 10R (scheduled to begin February 29, 1996) to replace the temporary clamping device with the appropriate 1-1/2 inch enamel coated carbon steel pipe.

ACTION TO PREVENT RECURRENCE

There are currently no actions identified related to the cause of the event (personnel error and poor work practices). This is due to the need to develop a formal root cause analysis due February 10, 1996 as described in the above Cause section. It is expected for example, that preventive measures will be needed to address the adequacy of directions in the original modification package for the electrical conduit trench.

PREVIOUS SIMILAR EVENTS

Based on a search of previous LER's, there have been no similar reportable events involving construction practices utilizing power tools which have caused leaks in engineered safety system piping.

ATTACHMENT

Attachment 1	Abbreviations, Definitions and Acronyms
Figure 1	Underground Piping to/from Emergency Feedwater Tank
Figure 2	EFW System Schematic

ATTACHMENT 1 - ABBREVIATIONS, DEFINITIONS AND ACRONYMS

ASME	American Society for Mechanical Engineers
ASME Section XI	"Rules for Inservice Inspection of Nuclear Power Plant Components"
ANSI B31.1	Standard Code for Pressure Piping
CR-3	Crystal River Unit 3
FPC	Florida Power Corporation
EFW	Emergency Feedwater
Mission Time	The total time frame the component is required to be OPERABLE or operating to mitigate the most limiting accident.
MODE ONE	POWER OPERATION (Greater Than 5 Percent Rated Thermal Power)
MODE THREE	HOT STANDBY
MODE FOUR	HOT SHUTDOWN
Problem Report	A Problem Report documents a condition or event which impacts CR-3 and warrants evaluation, root cause analysis, or corrective actions beyond what it would receive if documented and processed by other methods.

NOTES: ITS defined terms appear capitalized in LER text (e.g. MODE ONE)

Defined terms/acronyms/abbreviations appear in parentheses when first used (e.g. Reactor Building (RB)).

EIIS codes appear in square brackets (e.g. Makeup Tank [CB,TK])

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EXPIRES 5/31/95

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
CRYSTAL RIVER UNIT 3 (CR-3)	0 5 0 0 0 3 0 2	9 5	0 2 7	0 0	0 9 OF 1 0

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

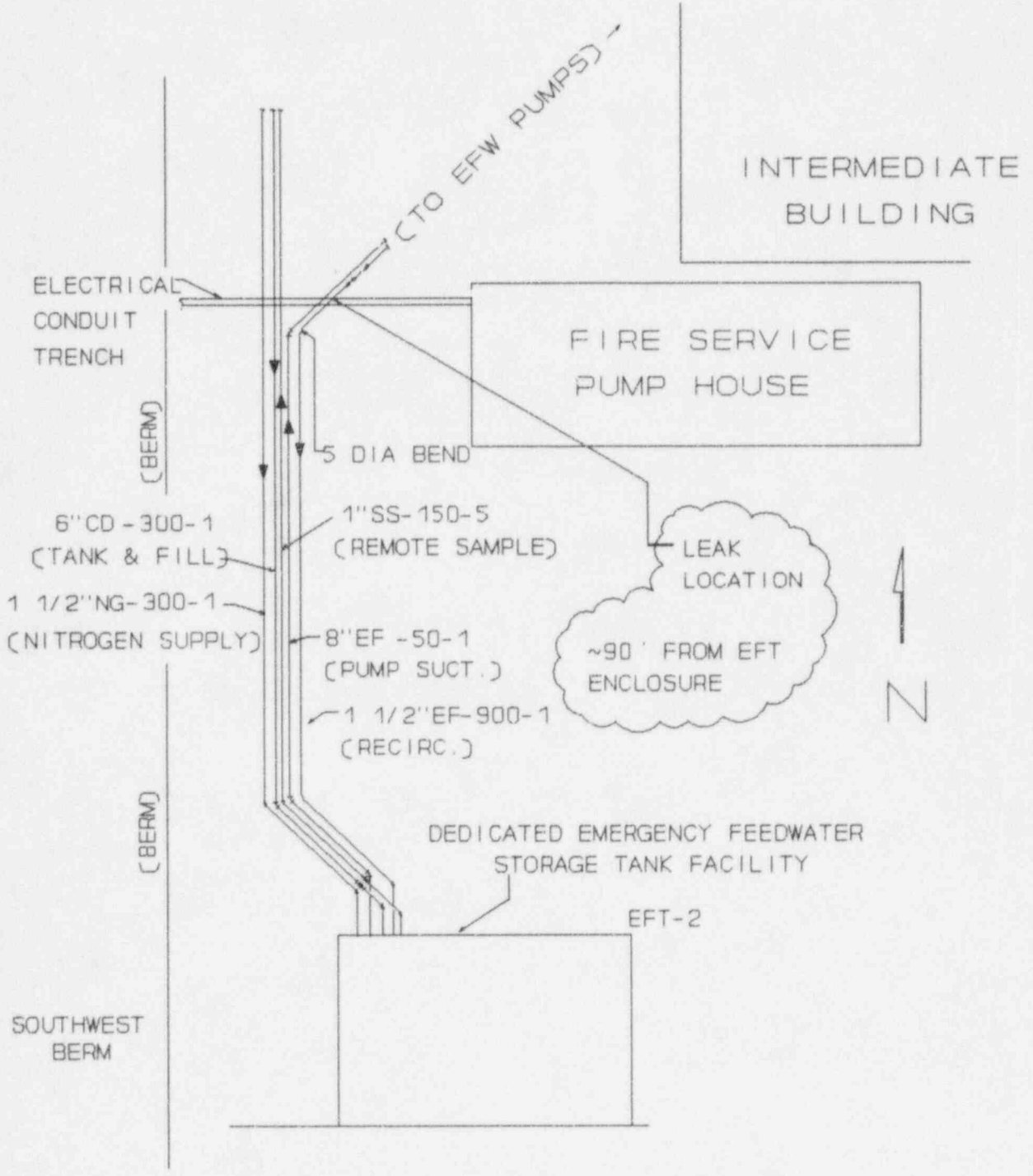

FIGURE 1

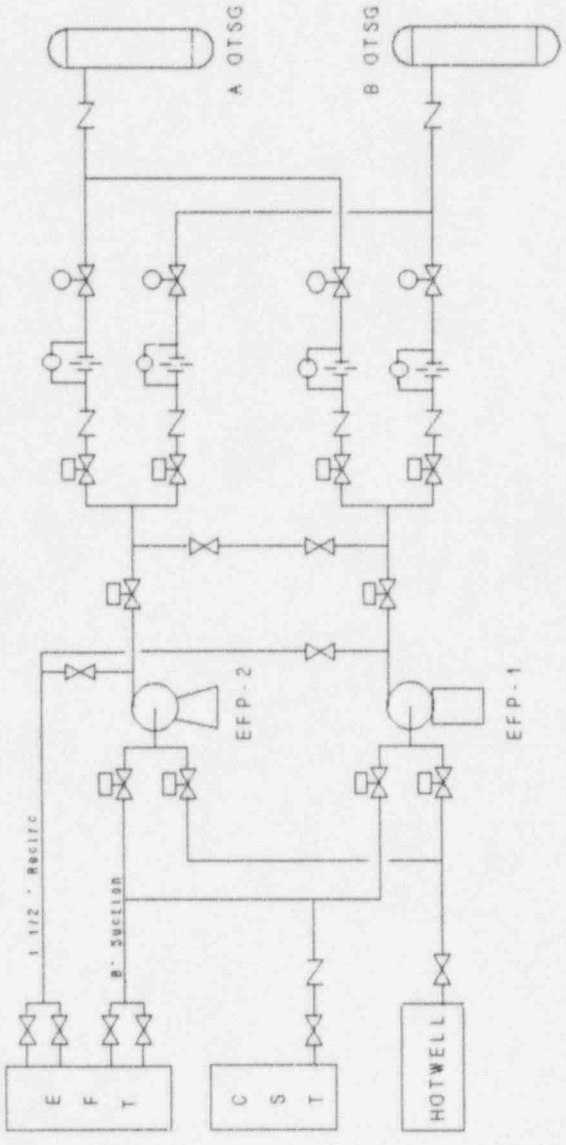

Figure 2