LICENSEE EVENT REPORT

Update Report - Previous Report Dates 10/18/82 2/1/83

CONTROL BLOCK: (1)

(PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

01 — LICENSEE CODE: WIKNP1 (2) — LICENSE NUMBER: 00-00000-00 (3) — LICENSE TYPE: 41111 (4) — CAT (5)

CON'T

01 — REPORT SOURCE: L (6) — DOCKET NUMBER: 05000305 (7) — EVENT DATE: 100482 (8) — REPORT DATE: 050683 (9)

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

02 During full power operation, Sensing lines on all six safety related containment pressure
03 transmitters were found capped off inside containment. This rendered the transmitters
04 inoperable and put the plant outside of L.C.O.T.S. 3.5.c in that the minimum channels
05 required for hi-containment pressure safety injection actuation and hi-hi containment
06 pressure for containment spray and steam line isolation were not available. Redundant
07 instrumentation for safety injection and steam line isolation remained operable. There
08 was no impact to public health or safety during the period the transmitters were inoperable. Report attached.

	SYSTEM CODE	CAUSE CODE	CAUSE SUBCODE	COMPONENT CODE	COMP SUBCODE	VALVE SUBCODE
09	IB (11)	A (12)	B (13)	INSTRU (14)	T (15)	Z (16)

(17) LER/RO REPORT NUMBER

EVENT YEAR		SEQUENTIAL REPORT NO.		OCCURRENCE CODE	REPORT TYPE		REVISION NO.
82	—	030	/	01	X	—	2

ACTION TAKEN	FUTURE ACTION	EFFECT ON PLANT	SHUTDOWN METHOD	HOURS (22)	ATTACHMENT SUBMITTED	NPRD-4 FORM SUB.	PRIME COMP. SUPPLIER	COMPONENT MANUFACTURER
X (18)	G (19)	Z (20)	Z (21)	0000	Y (23)	N (24)	N (25)	B080 (26)

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

10 During the performance of local leak rate testing during the 1982 refueling outage caps
11 were inadvertently placed on the ends of the sensing lines. These sensing lines contained
12 3/8 inch Swage-Lok fittings similar to all other vents and drains normally required to
13 be capped subsequent to leak rate testing. Caps were immediately removed. The local
14 leak rate testing procedure will be upgraded and the penetrations tagged to prevent future occurences.

	FACILITY STATUS	% POWER	OTHER STATUS (30)	METHOD OF DISCOVERY	DISCOVERY DESCRIPTION (32)
15	E (28)	100 (29)	NA	A (31)	Containment entry at operations request

	ACTIVITY RELEASED	CONTENT OF RELEASE	AMOUNT OF ACTIVITY (35)	LOCATION OF RELEASE (36)
16	Z (33)	Z (34)	NA	NA

PERSONNEL EXPOSURES

	NUMBER	TYPE	DESCRIPTION (39)
17	000 (37)	(38)	NA

PERSONNEL INJURIES

	NUMBER	DESCRIPTION (41)
18	000 (40)	NA

LOSS OF OR DAMAGE TO FACILITY (43)

	TYPE	DESCRIPTION
19	Z	

8305170271 830506
PDR ADOCK 05000305
S PDR

PUBLICITY

	ISSUED	DESCRIPTION (45)	NRC USE ONLY
20	Y (44)	Press release issued by licensee on 10-6-82	

NAME OF PREPARER C A Schrock

PHONE: 414-433-1352

ENCLOSURE 1

DOCKET 50-305

LER 82-030/01X-2

UPDATE REPORT

Capped Containment Pressure

Instrument Sensing Lines

Submitted May 6, 1983

Enclosure 1

This report formalizes the information presented by WPSC to the NRC during the Enforcement conference of October 22, 1982 in Glen Ellyn, Illinois. Additional information has been submitted to the NRC in the LER Update dated February 1, 1983, from C. W. Giesler to J. G. Keppler; that report is included herein for your convenience (Enclosure 2).

Event Description

On October 4, 1982, WPSC discovered that the instrument sensing lines for the containment pressure transmitters were capped inside the containment. This rendered the containment pressure transmitters inoperable, in violation of KNPP Technical Specification 3.5.c. WPSC immediately removed the caps, restoring the operability of the pressure transmitters. WPSC also immediately notified the NRC Senior Resident Inspector and the NRC Operations Center. A telegram informing NRC Region III of the event was sent within the following 24 hours, and a licensee event follow-up report was submitted on October 18, 1982, in accordance with the reporting requirements of the KNPP Technical Specifications. The cause of the event and corrective action will be described in our response to the Notice of Violation enclosed with the letter from Mr. J. G. Keppler (NRC-Region III) to Mr. P. D. Ziemer (WPSC) dated April 11, 1983. The remainder of this report discusses the consequences and safety significance of this event.

Consequence of Event

A total of ten caps were removed from instrument sensing lines. These caps had rendered inoperable 12 pressure sensing instruments. The affected instruments were:

Instrument No.	Description
P16427	Containment Vacuum Breaker Control
P16428	Containment Vacuum Breaker Control
P21100	Containment Pressure - ESF Actuation
P21101	Containment Pressure - ESF Actuation
P21102	Containment Pressure - ESF Actuation
P21105	Narrow Range Containment Pressure Indication
P21117	Containment Pressure - ESF Actuation
P21118	Containment Pressure - ESF Actuation
P21119	Containment Pressure - ESF Actuation
P21122	Containment - Shield Building Differential Pressure Indication
P21132	Containment Wide Range Pressure
P21133	Containment Wide Range Pressure

As a result of the inoperability of these instruments, there was not a reliable indication of containment pressure or containment-shield building differential pressure in the control room, the containment vacuum breaker function was inoperable, and the Engineered Safety Feature automatic actuation signals derived from Containment pressure were inoperable. These latter are:

Safety Injection Actuation at 4 PSIG

Main Steam Line Isolation at 17 PSIG, and

Containment Spray Actuation at 23 PSIG.

Safety Significance

The safety significance of the loss of reliable containment pressure indication in the control room and loss of containment vacuum breaker function has been discussed previously (reference 2). WPSC has concluded that the loss of these functions, including consideration of the potential for erroneous operator action, did not have any adverse safety significance. The NRC is in general agreement with this conclusion (reference 4, page 5).

The loss of the automatic ESF actuation signals derived from containment pressure has significance only for those accidents which affect containment pressure. Based on a review of the accident analyses performed for KNPP (section 14 of the FSAR) these accidents are:

Rupture of a Steam Pipe	(FSAR Section 14.2.5), and
Loss of Coolant Accident	(FSAR Section 14.3)

It should be noted that a rupture of a Control Rod Drive Mechanism Housing (CRDM) could also affect containment pressure; however, the containment pressure effects are bounded by those caused by a loss of coolant accident. Therefore, the KNPP FSAR, section 14.2.6, discusses only the response of the reactor coolant system and the reactor core for rupture of CRDM housing. Consequently, this postulated accident is not considered germaine to this discussion.

It should also be noted that the automatic ESF actuation signals derived from containment pressure are redundant to other automatic actuation signals, with the exception of containment spray pump actuation at 23 PSIG containment pressure; and that manual actuation of all engineered safeguards was always available. The other ESF actuation signals are:

ESF Function	Actuation Signals
Safety Injection	low steam line pressure low pressurizer pressure manual initiation
Main Steam Line Isolation	hi-hi steam flow coincident with safety injection hi steam flow coincident with low Tavg and safety injection manual initiation
Containment Spray	manual initiation

These signals were operable during the time that the containment pressure signals were inoperable and they would have provided sufficient protection in accordance with the assumptions of the safety analyses.

Rupture of a Steam Pipe

The protective actions relied upon to maintain the health and safety of the public for the postulated rupture of a steam pipe are safety injection (SI) actuation, main steam line isolation, and containment heat removal systems actuation.

The purpose of SI initiation is to supply concentrated boric acid solution to the reactor coolant system to limit the return-to-power or return-to-critical transient (depending on the case analyzed) of the reactor core, and to replace the volume of liquid inventory which is lost due to shrinkage as a result of the reduced temperature in the reactor coolant system. Since SI would have been initiated by low steam line pressure, loss of the SI actuation signal derived from containment pressure had no safety consequence for this postulated accident.

The purpose of main steam line isolation is to prevent the simultaneous blowdown of two steam generators, especially for breaks postulated to occur inside the containment building. For breaks postulated to occur inside the containment building upstream of the flow restricting orifice in the main steam line, main steam isolation would have been accomplished by means of the check valves located in the main steam lines, which are designed for this purpose. If the check valves did not accomplish this function (for whatever reason), and for all other break locations, main steam line isolation would have occurred on either hi-hi steam flow coincident with safety injection or hi steam flow coincident with low Tavg and safety injection. Therefore, loss of the main steam isolation signal derived from containment pressure had no safety significance for this postulated accident.

The purpose of containment cooling is to provide sufficient heat removal to limit postulated pressure transients to less than containment design pressure. The containment pressure transient caused by the postulated rupture of a main steam line has been shown to be bounded by the pressure transient induced by a LOCA (section 14.2.5, page 14.2-41, of the Updated FSAR). Since the analyses performed subsequent to the discovery have shown that there was an acceptable amount of automatic containment cooling capability assuming a LOCA (see discussion under "Loss of Automatic Containment Spray Actuation," below), the loss of automatic containment spray actuation had no safety significance for a postulated rupture of a Steam pipe.

Loss of Coolant Accident - Small Break

The protective action required for a small break loss of coolant accident is the initiation of safety injection. Section 14.3.1 of the KNPP FSAR discusses this accident, noting that the safety injection signal is derived from low pressurizer pressure. Question and Answer 14.8 to the FSAR discusses a small break accident for the specific case of a break located in the steam space of the pressurizer. As noted in this discussion, the results of this accident are acceptable, even though no credit is taken for actuation signals derived from containment pressure. These small break analyses assumed that safety injection occurred on a signal derived from low pressurizer pressure coincident with low pressurizer level. This is conservative since the initiation logic has been changed such that SI now occurs on low pressurizer pressure only. Since consequences of this accident have been shown to be acceptable without consideration of actuation signals derived from containment pressure, loss of those actuation signals have no safety significance for this accident.

Loss of Coolant Accident - Large Break

The protective actions required for a large break loss of coolant accident are initiation of safety injection and containment cooling. Safety injection would be initiated by low pressurizer pressure or high containment pressure, and containment cooling would be initiated by safety injection (containment fan-coil units) and high containment pressure (containment spray pumps).

Since safety injection would have been actuated in accordance with the analyses, and since it has been shown that the fan coil units themselves provide enough containment cooling capability (see discussion under Loss of Automatic Containment Spray Actuation, below), there was no safety significance due to the loss of ESF actuation signals derived from containment pressure for a large break LOCA.

Loss of Automatic Containment Spray Actuation

The updated FSAR, section 6.4.1, page 6.4-1 states that the purposes of internal containment spray are

1. Containment Pressure and Temperature Control (Containment Heat Removal), and

   Injection of Sodium Hydroxide for

2. Stress corrosion control (ph), and
3. Iodine Removal (scrubbing).

Iodine Removal

Section 6.4.3, page 6.4-14 of the Updated FSAR states that no credit is taken for the iodine scrubbing action of sodium hydroxide in the off-site dose calculations following a postulated LOCA. Consequently, loss of this function had no safety significance.

Stress Corrosion Control

Section 6.4.2, page 6.4-10 of the updated FSAR states that studies have shown that ph control of recirculated liquid post LOCA is unnecessary. Furthermore, stress corrosion is a long-term concern, and manual action could be taken by the operator following an accident to provide ph control. Consequently loss of this automatic function had no safety significance.

Containment Pressure and Temperature Control

A LOCA results in the deposition into containment of a large amount of energy in the form of steam. The KNPP design has redundant systems to effect heat removal and thus pressure and temperature control following a LOCA. These systems, as explained in sections 6.3 and 6.4 of the FSAR, are the containment fan coil units (4 in number) and the internal containment spray pumps. The nominal design of the system is such that any of the following combinations provide adequate post LOCA heat removal:

1. 4 containment fan coil units,
2. 2 containment spray pumps, or
3. 1 containment spray pump and two fan coil units.

Under the single failure assumption, the FSAR accident analyses, specifically, the containment capability study, assumes that two fan coil units and one containment spray pump are available to operate post-LOCA.

Following discovery of the capped instrument lines, WPSC contracted with Fluor Engineers, Inc. (the A/E for KNPP) and Westinghouse Electric Corporation (the NSSS supplier) to perform sensitivity studies of the containment pressure response to a LOCA to determine the safety significance of this event. These studies were first performed with initial containment pressure assumed to be 14.7 psia. Subsequent sensitivity studies were performed at an initial containment pressure of 16.85 psia (at the request of the NRC) to conservatively account for the elevated containment pressure which was observed upon removing the caps from the instrument lines.[1] These studies incorporated various assump-

---

[1]The pressure in the containment upon removal of the caps from the instrument lines was observed to be 1.8 psig. Reference 3 discusses the potential that containment pressure may have exceeded the KNPP Technical Specification limit of 2 psig, and explains how WPSC reached the conclusion that 1.8 psig is probably the maximum pressure reached in the containment during the time that the pressure transmitters were inoperable. At the time the containment pressure sensitivity studies were being performed, a value of 2.15 initial containment pressure was assumed to conservatively bound the indicated pressure plus uncertainties in the instrument channel.

tions of fan coil performance and containment spray availability.[2]

The results of these analyses are reported in tables 2,3; the pressure transients calculated by Westinghouse are graphed in figures 2 through 13. These analyses were performed independently by Fluor and Westinghouse, using the CONTEMPT code and COCO code, respectively. The good agreement between the two codes, as well as the good agreement of the base cases to the FSAR analysis, indicates that the analyses are valid. FSAR table 14c-7 is included as Table 1 of this report, and FSAR figure 14c-10 (the base case) is included as Figure 1, for comparison to the recent analyses.

The assumption of the analyses performed by Westinghouse and Fluor are derived from, and identical to, the FSAR analyses. The containment pressure transient was calculated with and without additional heat sinks that have been identified (at the time of licensing) but never assumed in the previous analyses. The results show that the containment design pressure (46 psig) would not have been exceeded in the event of a LOCA, even if only two fan coil units and no containment spray pumps are assumed to operate, initial containment pressure is assumed to be 2.15 psig, and credit is taken for these additional heat sinks.

For the analyses not considering the additional heat sinks, the containment design pressure is exceeded only by a small amount. Additional confidence in the capability of the containment to respond satisfactorily to a LOCA pressure transient even with reduced safeguards heat removal capability is gained in consideration of the conservatism in the analysis, and the fact that the containment has been pressure tested to 51.8 psig during pre-operational testing.

---

[2]During July of 1982, WPSC measured air flow through the fan coil units and found it to be less than nominal design requirements. Subsequent reviews identified the cause of this as being a result of interaction between the fans through common ductwork. These reviews indicate that fan coil availability,

Furthermore, the containment is routinely tested to 46 psig in the performance of integrated leak rate testing.

It can be concluded then, that the reduced automatic containment heat removal capability would not have caused the containment pressure to exceed the containment design pressure in the event of a LOCA. Therefore, loss of automatic containment spray operation had no safety consequences.

Peak Clad Temperature

While the containment pressure transient postulated to occur post LOCA would not have exceeded containment design pressure, the transient would have been slightly different than that predicted in the FSAR, because the containment spray pumps would not have been automatically initiated. Since the containment pressure transient is a consideration in the calculation of peak clad temperature (PCT), the effect of this event on PCT has been evaluated.

The containment pressure assumed in the PCT calculation is not the same as that calculated for containment capability. In fact, lower containment pressures are conservative for PCT calculations, while higher containment pressures are conservative for containment capability calculations. Consequently, this event had no effect on PCT calculations.

---

measured in terms of percent of required air flow, would have been approximately 80 percent (or 3 F/C units) with all four fans operating, and approximately 50 percent (or 2 F/C units) with two fans operating. Therefore, for the purposes of this analysis, it can be assumed that a single failure (eg: loss of one train of safeguards power) would have resulted in the availability of 2 fan coil units, as assumed in the FSAR.

Off-site Dose Consequences

As noted above, the off-site dose calculation took no credit for the iodine scrubbing action of sodium hydroxide. Furthermore, the containment pressure transient is not used to determine containment leakage for this analysis. Instead, a leakage of 2.5 weight percent per day (w/o/day) for the first day, and 1.25 w/o/day for the next 29 days was assumed. Therefore, the slight changes in the pressure transient calculated by Westinghouse and Fluor have no effect on the offsite dose calculation.

Furthermore, the measured leakage rate from the last integrated leak rate test (1980) was 0.037 w/o/day at the 95% confidence level, well below the FSAR assumptions. The integrated leak rate test results in 1973 and 1977 were 0.0484 and 0.0584 w/o/day, respectively. These consistently low leakage measurements provide additional assurance that the off-site dose consequences calculated in the FSAR are conservative even assuming the loss of automatic actuation of containment spray.

Equipment Qualification

The pressure/temperature profiles used for the qualification testing of safety-related equipment in the containment have been reviewed. This review showed that the test profiles, as expected, are much more conservative than the calculated profiles. Figures 14 through 17 provide typical examples of these profiles.

CONCLUSION

This discussion has shown that the results of the FSAR were not affected by the incident in which the containment pressure transmitters were rendered inoperable due to the capping of their instrument lines. This conclusion is based on a review of the safety significance of this event in regards to containment pressure safeguards actuation signals, loss of the high-containment-pressure-main steam line isolation signal, the post-LOCA containment pressure transient, off-site dose calculation, ECCS-PCT calculations, and equipment qualification concerns. The NRC has reviewed this information and has found this evaluation to be correct (reference 4, page 5, item f).

Enclosure 3

List of References

1. Telegram, D. C. Hintz (WPSC) to J. Streeter (NRC - Region III), dated October 5, 1982.

2. LER 82-030/01T-0, submitted by letter from C. W. Giesler (WPSC) to J. G. Keppler (NRC - Region III), dated October 18, 1982.

3. LER 82-030/01X-1 (Update Report), submitted by letter from C. W. Giesler (WPSC) to J. G. Keppler (NRC - Region III), dated February 1, 1983.

4. Inspection Report 50-305/82-19, transmitted by letter from J. G. Keppler (NRC - Region III) to P. D. Ziemer (WPSC). dated April 11, 1983.

5. Notice of Violation and Proposed Imposition of Civil Penalty, transmitted by letter from J. G. Keppler (NRC - Region III) to P. D. Ziemer (WPSC), dated April 11, 1983.

Table 1
(FSAR TABLE 14C-7)

STRUCTURAL HEAT SINKS

Linings	Material	Exposed Area, Ft^2	Thickness (In.)
Containment Cylinder	Carbon Steel	41,300	1.5
Containment Dome	Carbon Steel	17,300	0.75
Reactor Vessel Liner	Carbon Steel	1,260	0.25
	Concrete Backup	1,260	12.00
Refueling Canal	Stainless Steel -	1,100	0.1875
	Concrete Backup	1,100	12.0
	Stainless Steel -	5,500	0.25
	Concrete Backup	5,500	12.0
Steel Structures			
The following items have been grouped according to the indicated thickness:			
Steam Generator Supports) Pressurizer Support) Reactor Coolant Pump Supports) Crane) Crane Rail) Seismic Restraints) Hangers)	Carbon Steel	(4,055 (16,925 (28,500 (2,000 (500	0.336 0.5 0.75 1.5 2.0
Handrails	Carbon Steel	1,695	0.145
Grating	Carbon Steel	12,400	0.09
Exposed Pipe	(None assumed for calculations)		
Exposed Conduit and Cable Trays	Carbon Steel	2,000	0.1
Ductwork	Carbon Steel	18,000	0.07
Accumulators	Carbon Steel	2,200	1.44

| 17

Note: Concrete structures inside containment not used in the calculation include:

Heavy Walls -	40,800 ft^2	12 in. thick
Heavy Floors -	25,070 ft^2	6 in. thick
Light Floors -	7,570 ft^2	3 in. thick

Table 2: KNPP Containment Peak Pressures Following a LOCA
Westinghouse Calculations
(3 ft^2 pump suction break)

CODE USED	COCO Fig 14c-10	COCO			COCO			
PASSIVE HEAT SINKS	DESIGN HEAT SINKS	DESIGN HEAT SINKS			BEST ESTIMATE OR ADDITIONAL HEAT SINKS			
ACTIVE HEAT SINKS	1 SPRAY 2 COOLERS	1 SPRAY 2 COOLERS	NO SPRAY 3 COOLERS	NO SPRAY 2 COOLERS	1 SPRAY 2 COOLERS	NO SPRAY 3 COOLERS	NO SPRAY 2 COOLERS	
FIRST PEAK PRESSURE AT 20 SEC., PSIG	38.1	38.0	38.0	38.0	37.3	37.3	37.3	INITIAL CONTAINMENT PRESSURE AT 14.7 PSIA
SECOND PEAK PRESSURE AT 170.2 SEC., PSIG	43.1 (161 sec)	43.1	43.8	45.34 (888 sec)	40.33	40.8	41.43	
FIRST PEAK PRESSURE AT 20 SEC., PSIG	N/A	40.0	40.0	40.0	39.3	39.3	39.3	INITIAL CONTAINMENT PRESSURE AT 16.85 PSIA
SECOND PEAK PRESSURE AT 170.2 SEC., PSIG	N/A	45.8	46.4 * (881.7spc)	47.7	42.9	43.5	44.0	

Design Pressure = 46 psig

* Froth Peak (Reflood peak 46.9 psig)

TABLE 3: KNPP Containment Peak Pressures Following a LOCA
Fluor Power Services Calculations
(3 ft^2 pump suction break)

CODE USED	COCO Fig 14c-10	CONTEMPT-LT/26			CONTEMPT-LT/26			
PASSIVE HEAT SINKS	DESIGN HEAT SINKS	DESIGN HEAT SINKS			BEST ESTIMATE OR ADDITIONAL HEAT SINKS			
ACTIVE HEAT SINKS	1 SPRAY 2 COOLERS	1 SPRAY 2 COOLERS	NO SPRAY 3 COOLERS	NO SPRAY 2 COOLERS	1 SPRAY 2 COOLERS	NO SPRAY 3 COOLERS	NO SPRAY 2 COOLERS	
FIRST PEAK PRESSURE AT 20 SEC., PSIG	38.1	41.7	41.7	41.7	40.4	40.4	40.4	INITIAL CONTAINMENT PRESSURE AT 14.7 PSIA
SECOND PEAK PRESSURE AT 158 SEC., PSIG	43.1	44.6	45.1	45.5	41.3	41.9	42.3	
FIRST PEAK PRESSURE AT 21 SEC., PSIG	N/A	43.9	43.9	43.9	42.6	42.6	42.6	INITIAL CONTAINMENT PRESSURE AT 16.85 PSIA
SECOND PEAK PRESSURE AT 158 SEC., PSIG	N/A	47.0	47.5	47.9	43.8	44.3	44.7	

Design Pressure = 46 psig

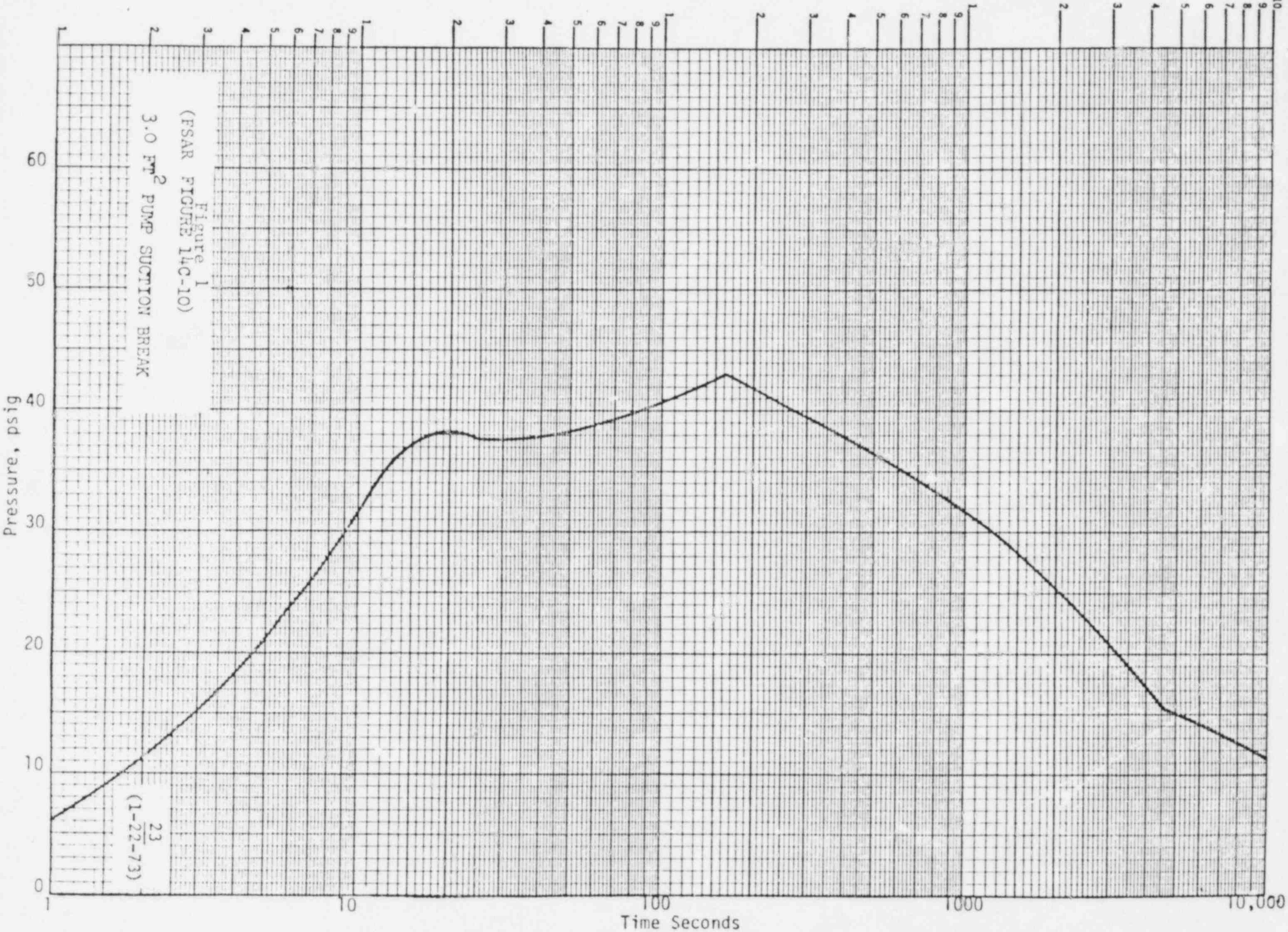
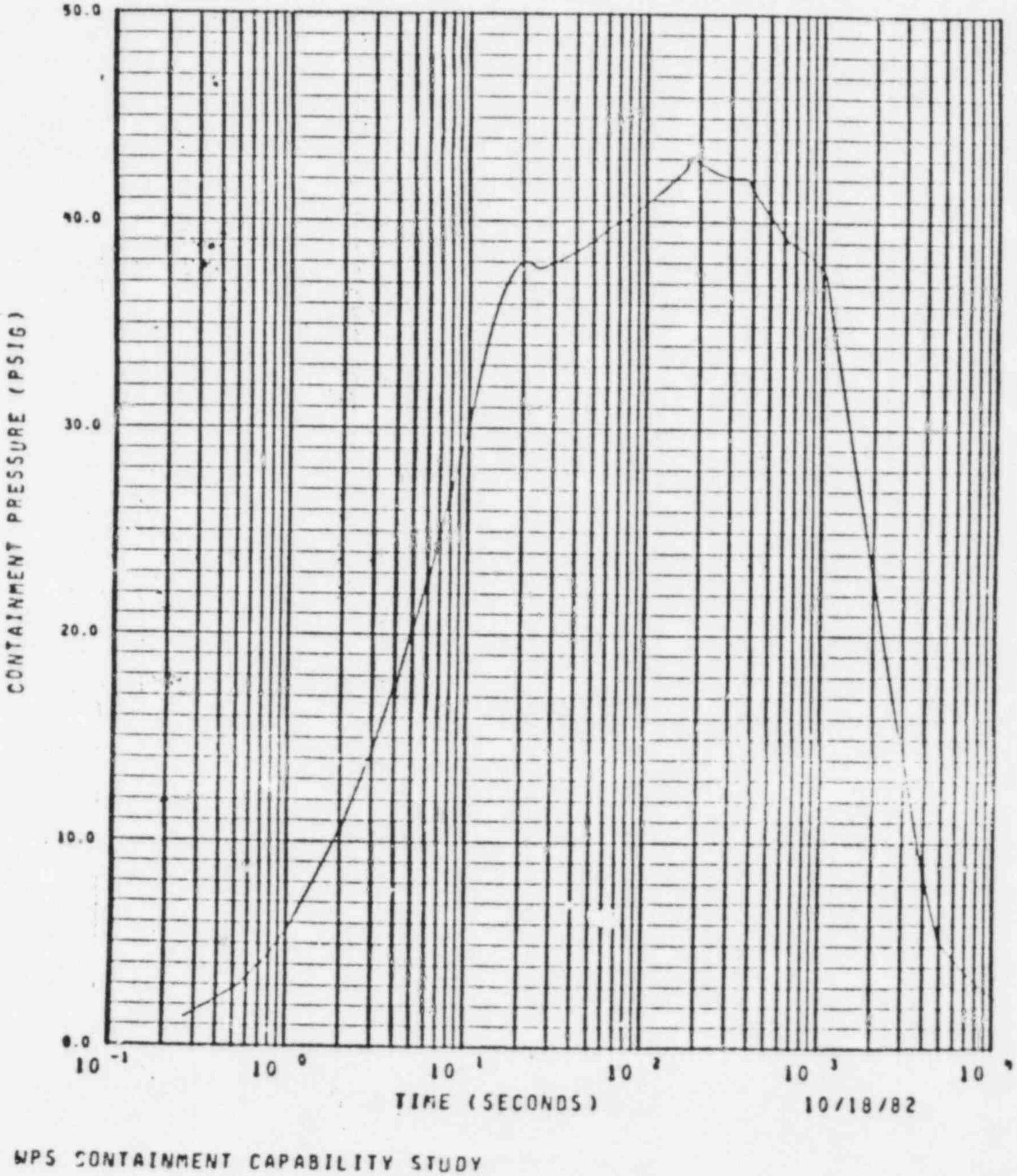


Figure 1
(FSAR FIGURE 14C-10)
3.0 FT^2 PUMP SUCTION BREAK

Docket 50-305
LER 82-030/01X-2 Update Report



2 Fan Coolers

Sprays on

Pressure Peak =
43.13 psig at 170.2 sec.

Initial Containment
Pressure = 14.7 psia

Figure 2

3 Fan Coolers

Sprays Off

Pressure Peak = 43.8 psig
at 170.2 seconds

Initial Containment
Pressure = 14.2 psia

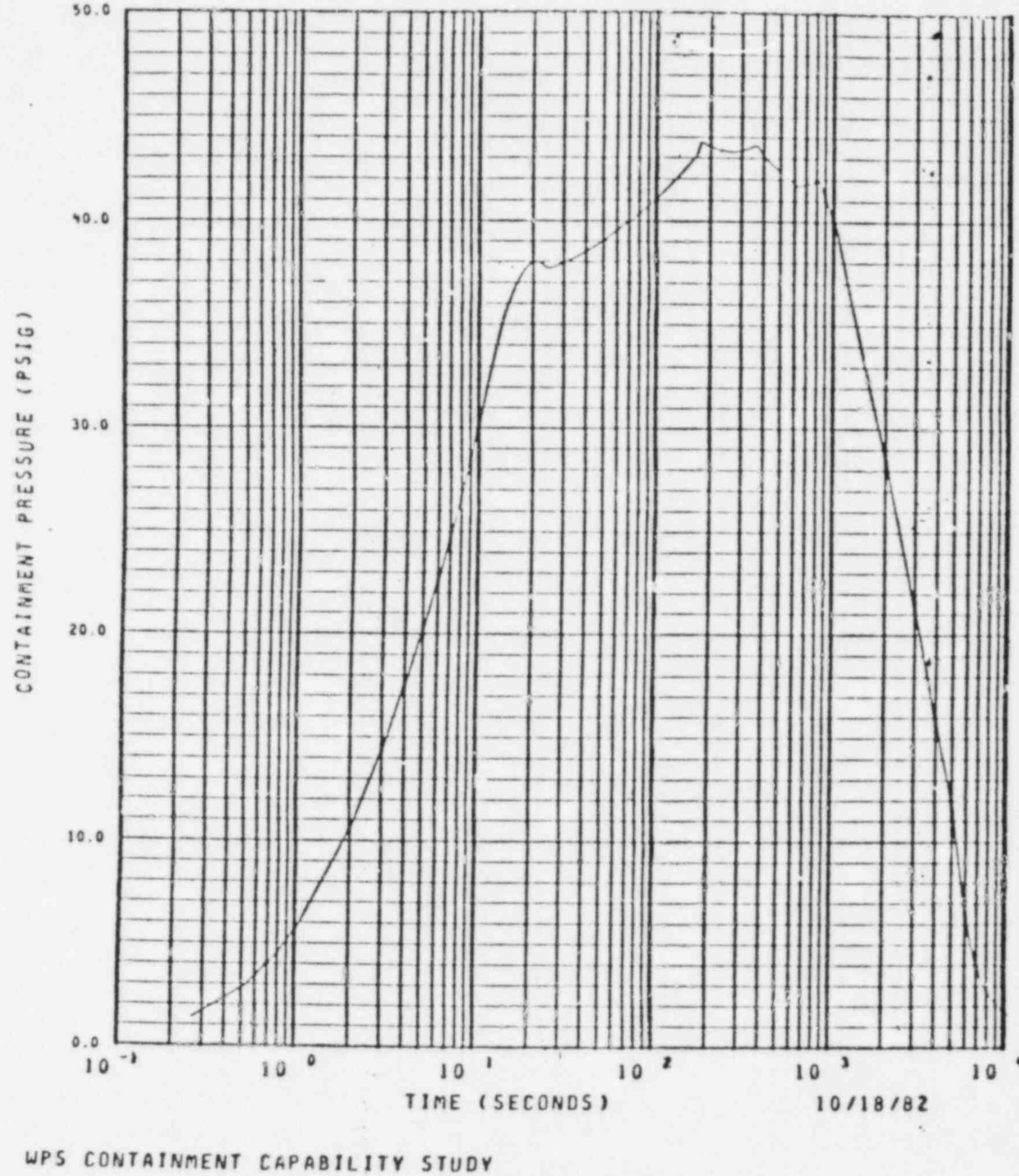
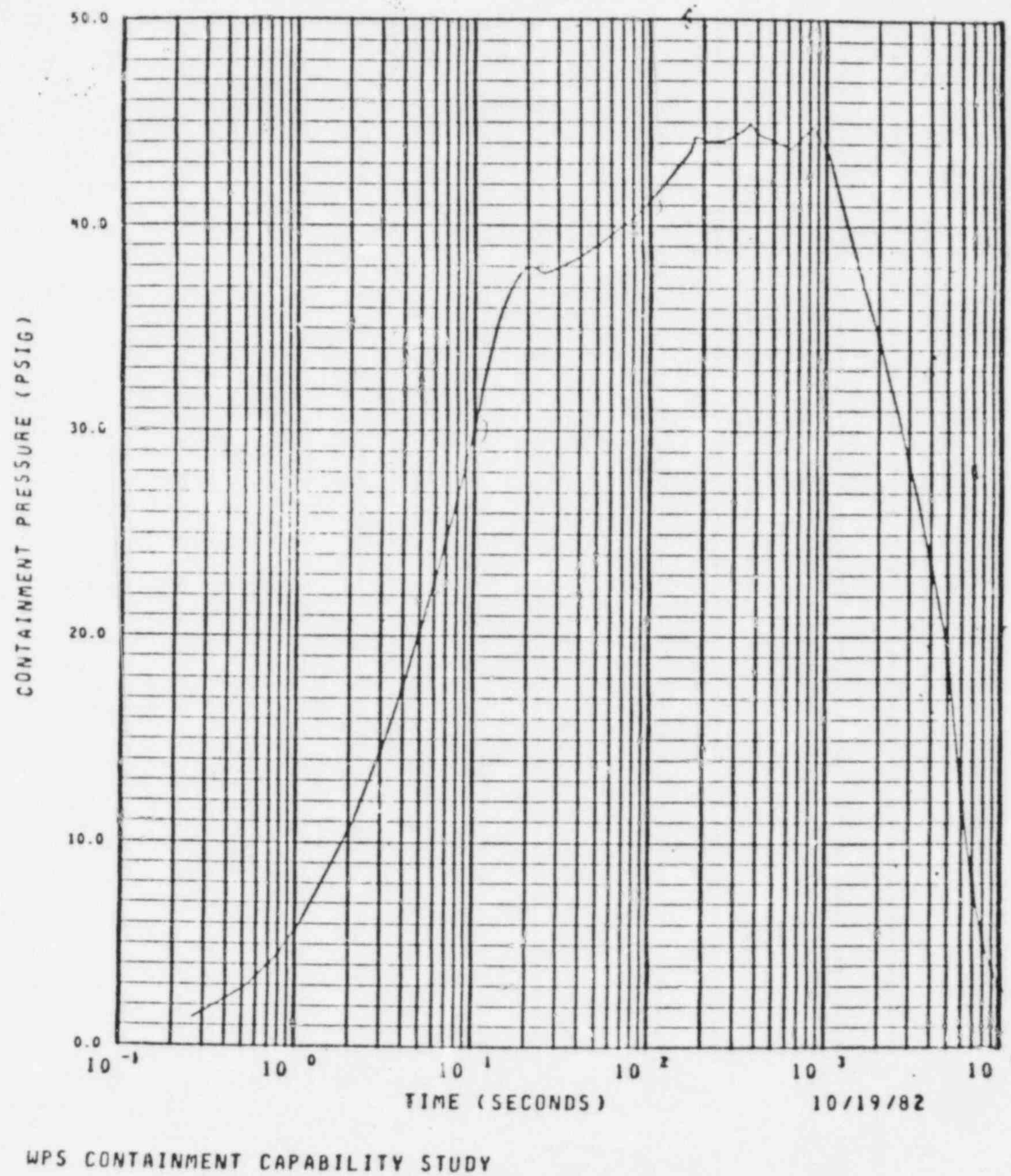


Figure 3



2 Fan Coolers

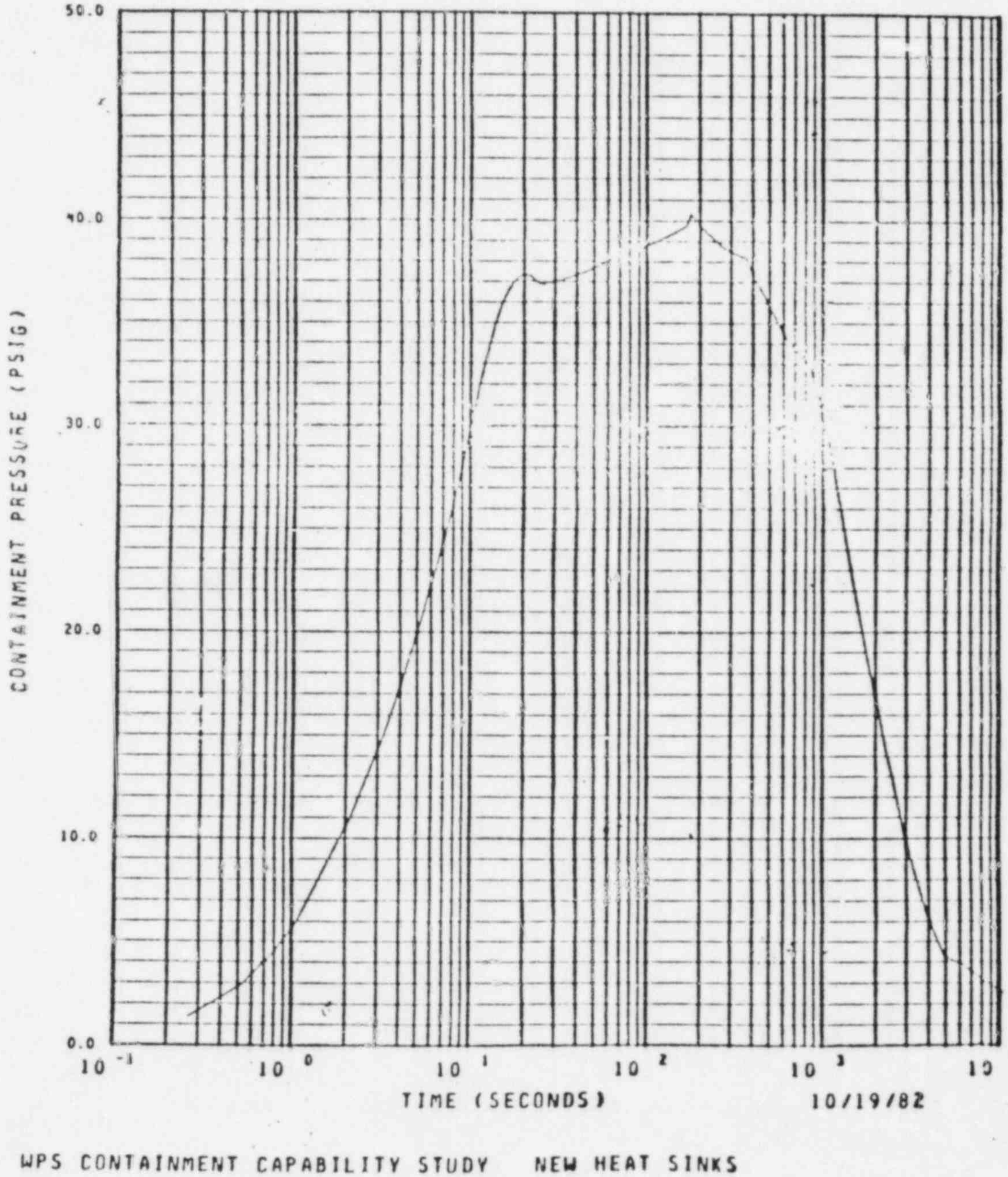
Spray Off

Pressure Peak = 45.34
at 888.0 seconds

Initial Containment
Pressure = 14.7 psia

Docket 50-305
LER 82-030/01X-2 Update Report

Figure 4



2 Fan Coolers

Sprays On

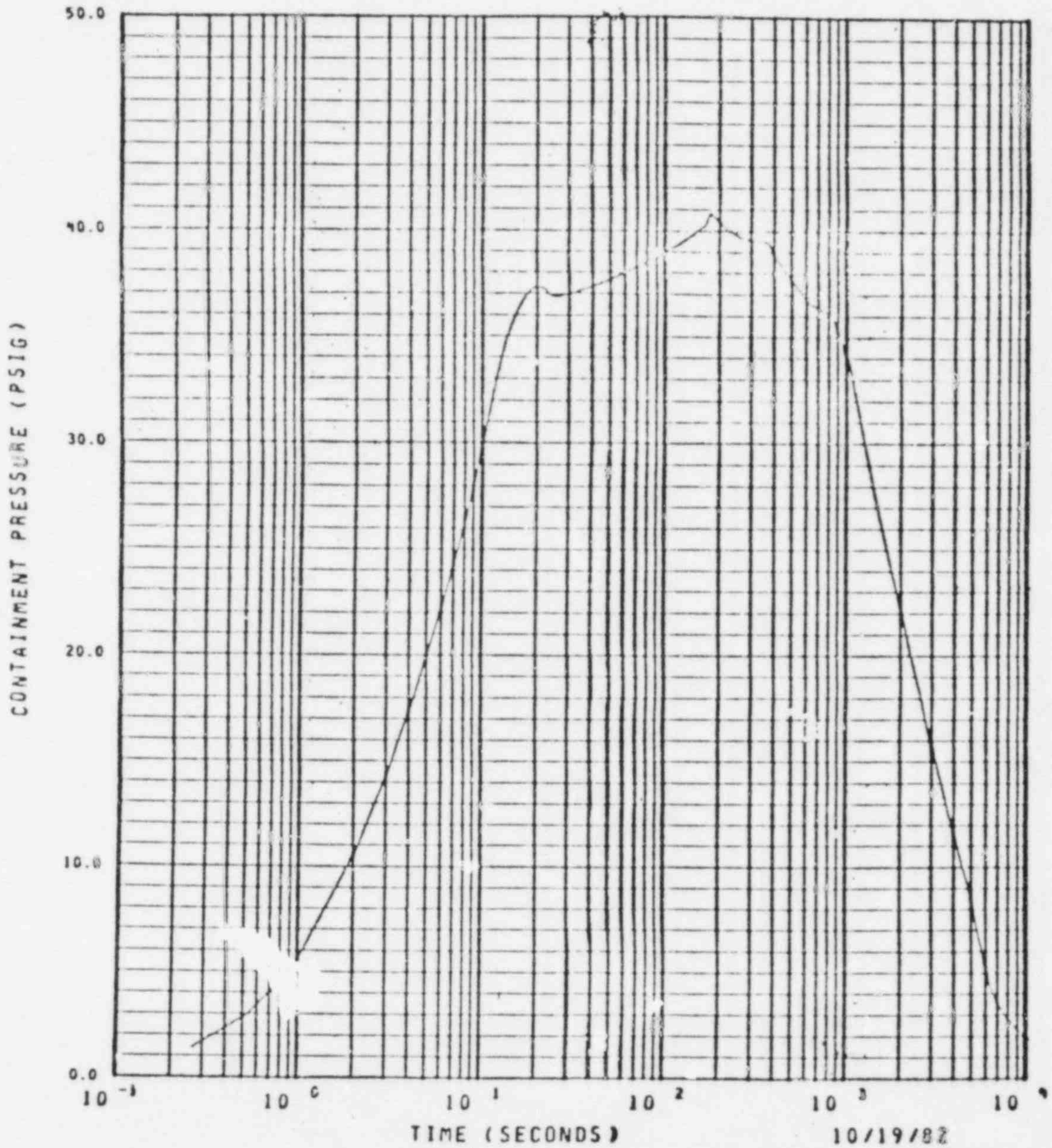
Pressure Peak =
40.33 psig at 170.1 sec.

With Additional Concrete
Heat Sinks

Initial Containment
Pressure = 14.7 psia

Figure 5

Docket 50-305
LER 82-030/01X-2 Update Report



3 Fan Coolers

Spray Off

Pressure Peak = 40.8 psig
at 170.2 seconds

With Additional Concrete
Heat Sinks

Initial Containment
Pressure = 14.7 psia

WPS CONTAINMENT CAPABILITY STUDY NEW HEAT SINKS

Figure 6

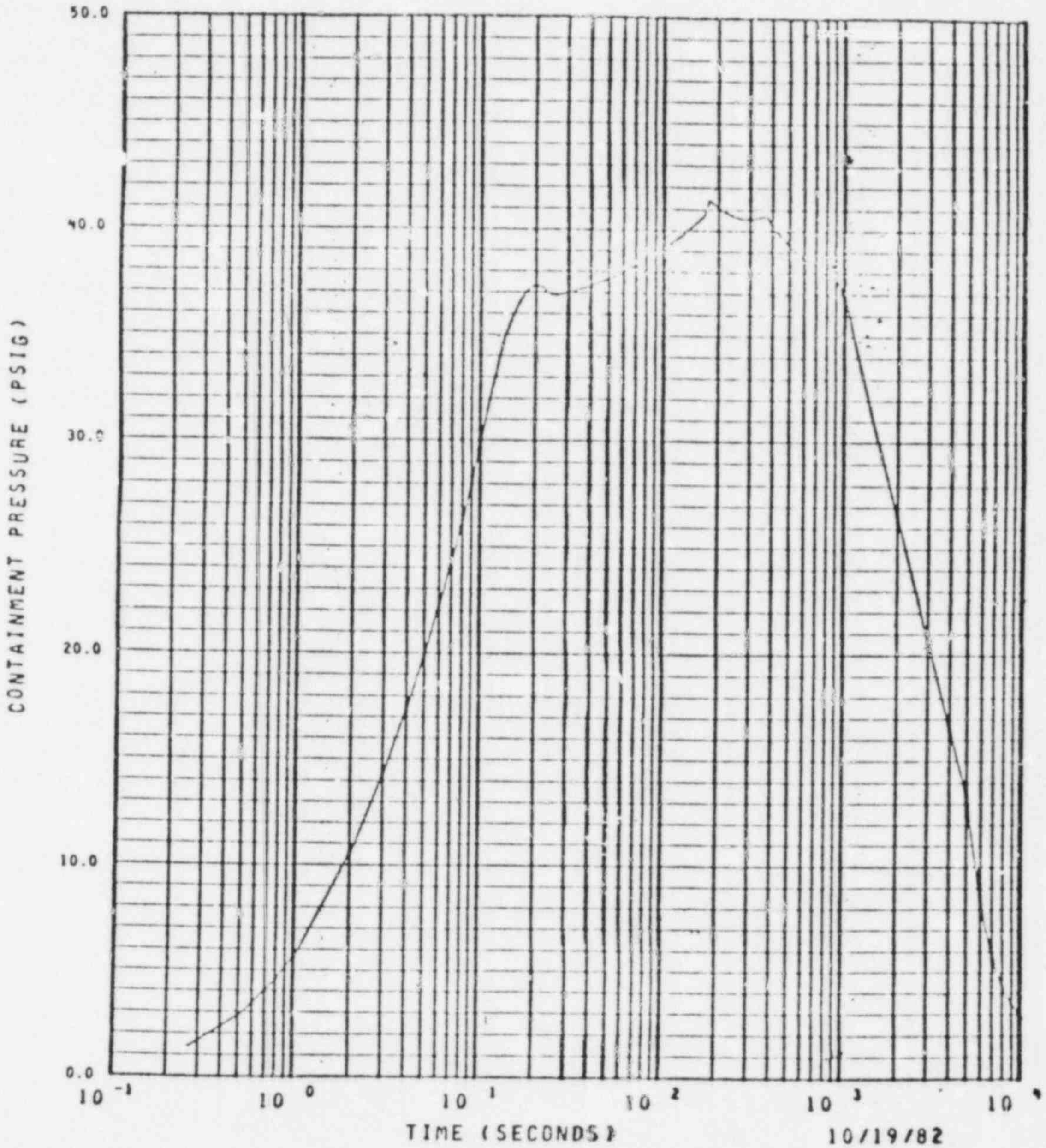
2 Fan Coolers

Spray Off

Pressure Peak =
41.43 psig at 170.1 sec.

With Additional Concrete
Heat Sinks

Initial Containment
Pressure = 14.7 psia



WPS CONTAINMENT CAPABILITY STUDY NEW HEAT SINKS

Figure 7

Docket 50-305
LER 82-030/01X-2 Update Report

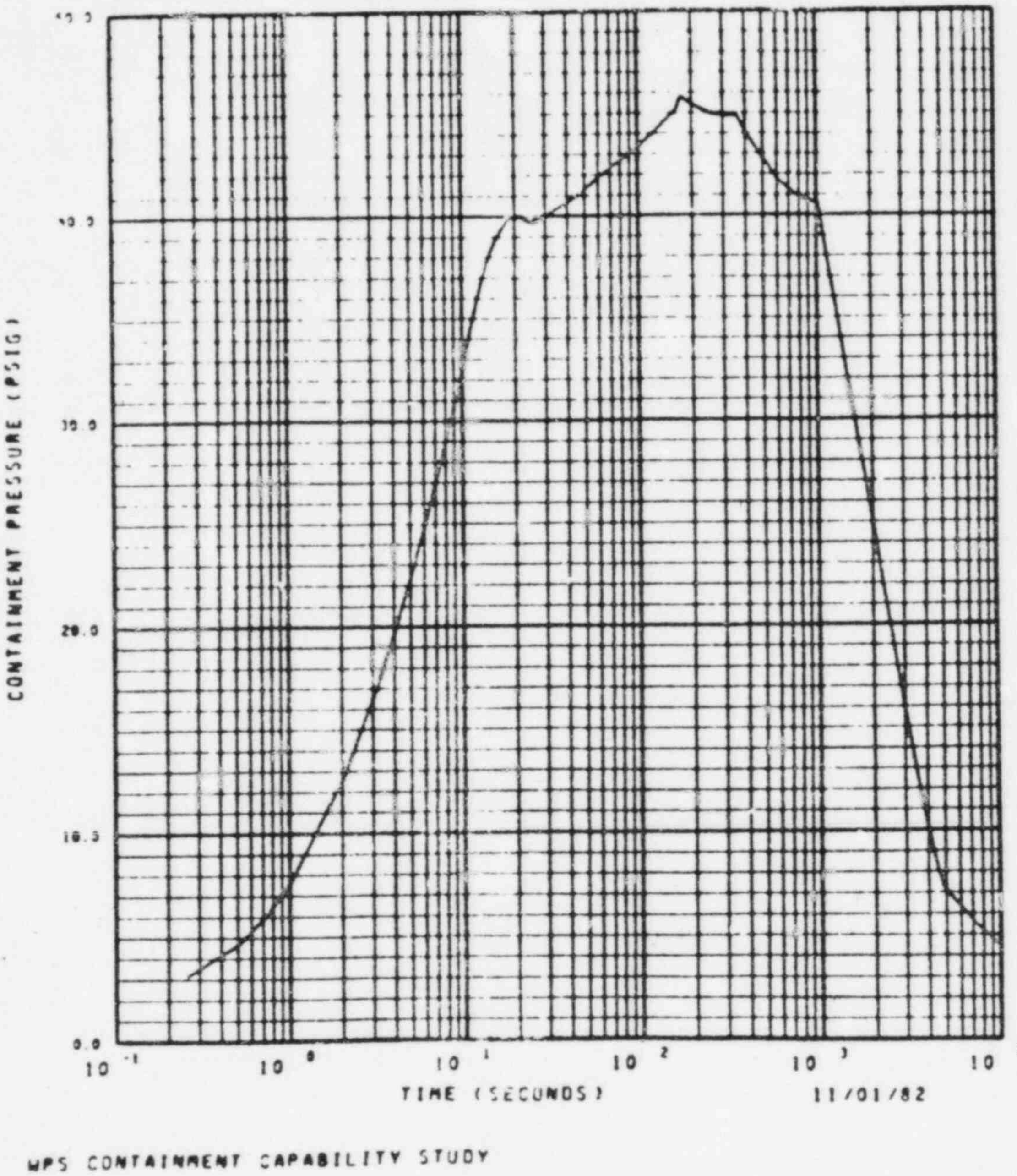


FIGURE 8

2 fan coolers
sprays on
initial containment pressure = 16.85 psia

Pressure peak = 45.8 psig
at 170.2 seconds

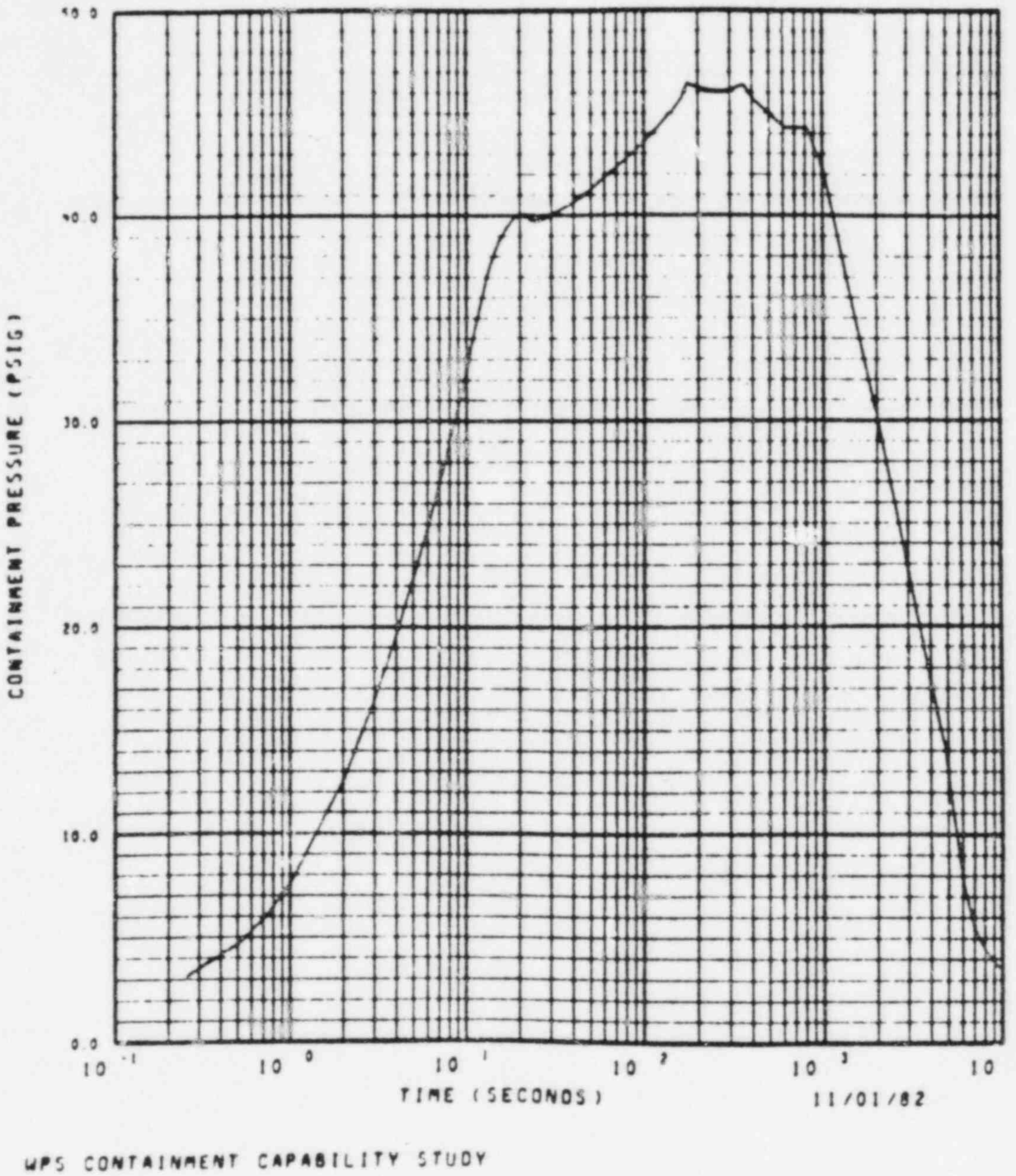


FIGURE 9

3 fan coolers
Sprays off
Initial Containment Pressure = 16.85 psia

Pressure peak = 46.4 psig
at 170.2 seconds

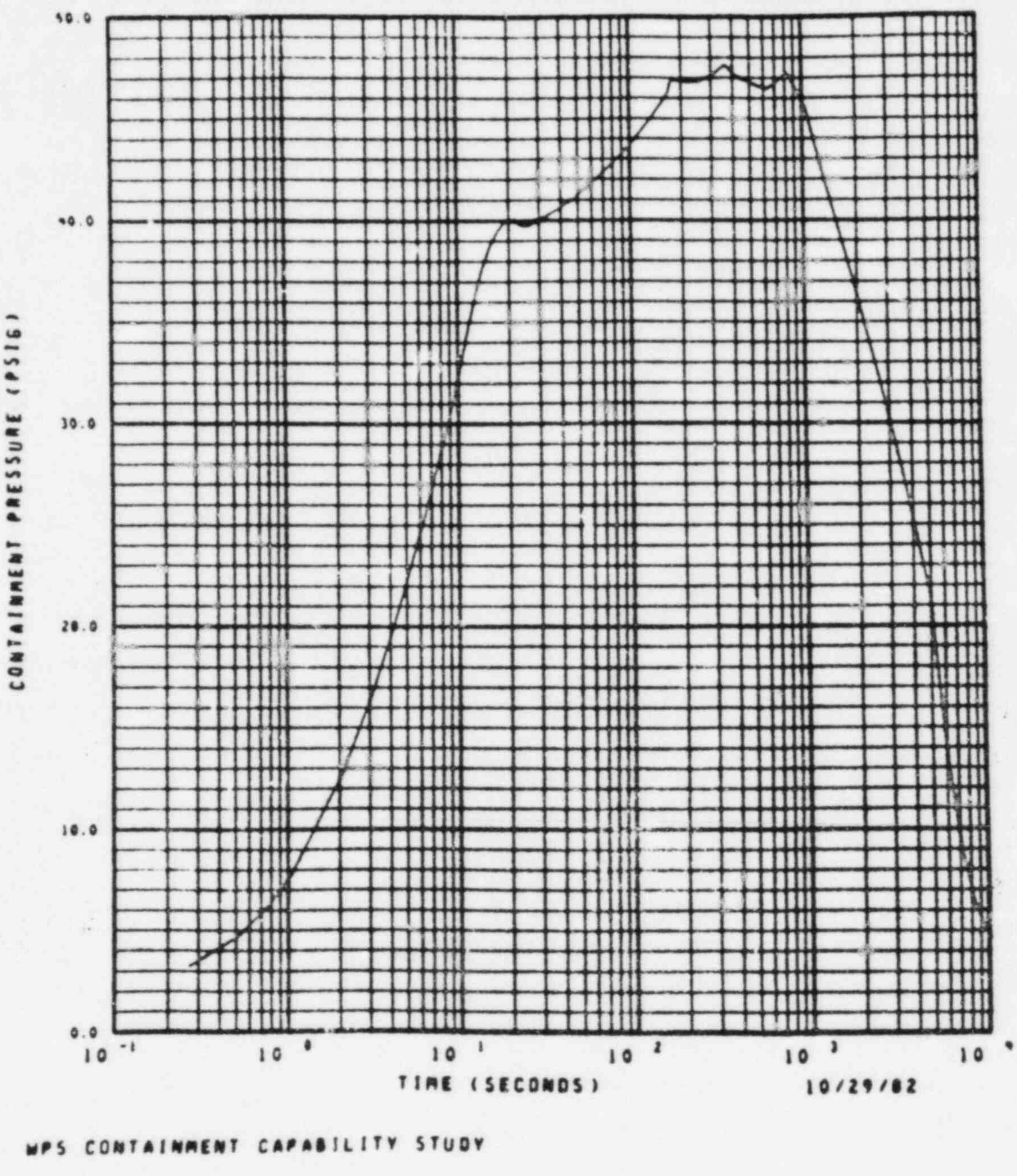
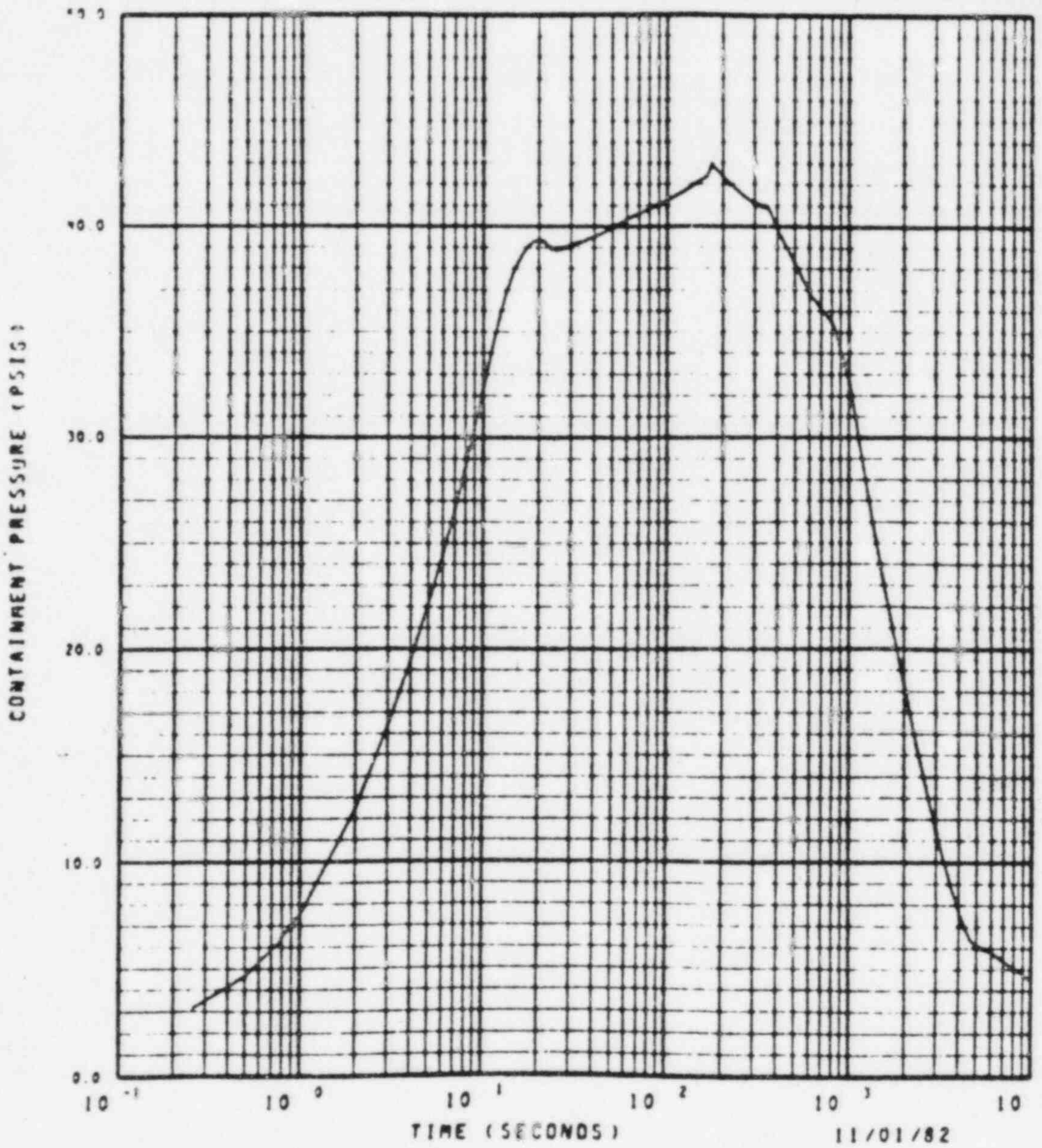


FIGURE 10

2 fan coolers
Sprays off
Initial Containment Pressure = 16.85 psia

Pressure peak = 47.7 psig
at 881.7 seconds

(Froth peak - Reflood peak
of 46.9 psig at 170.2 sec.)

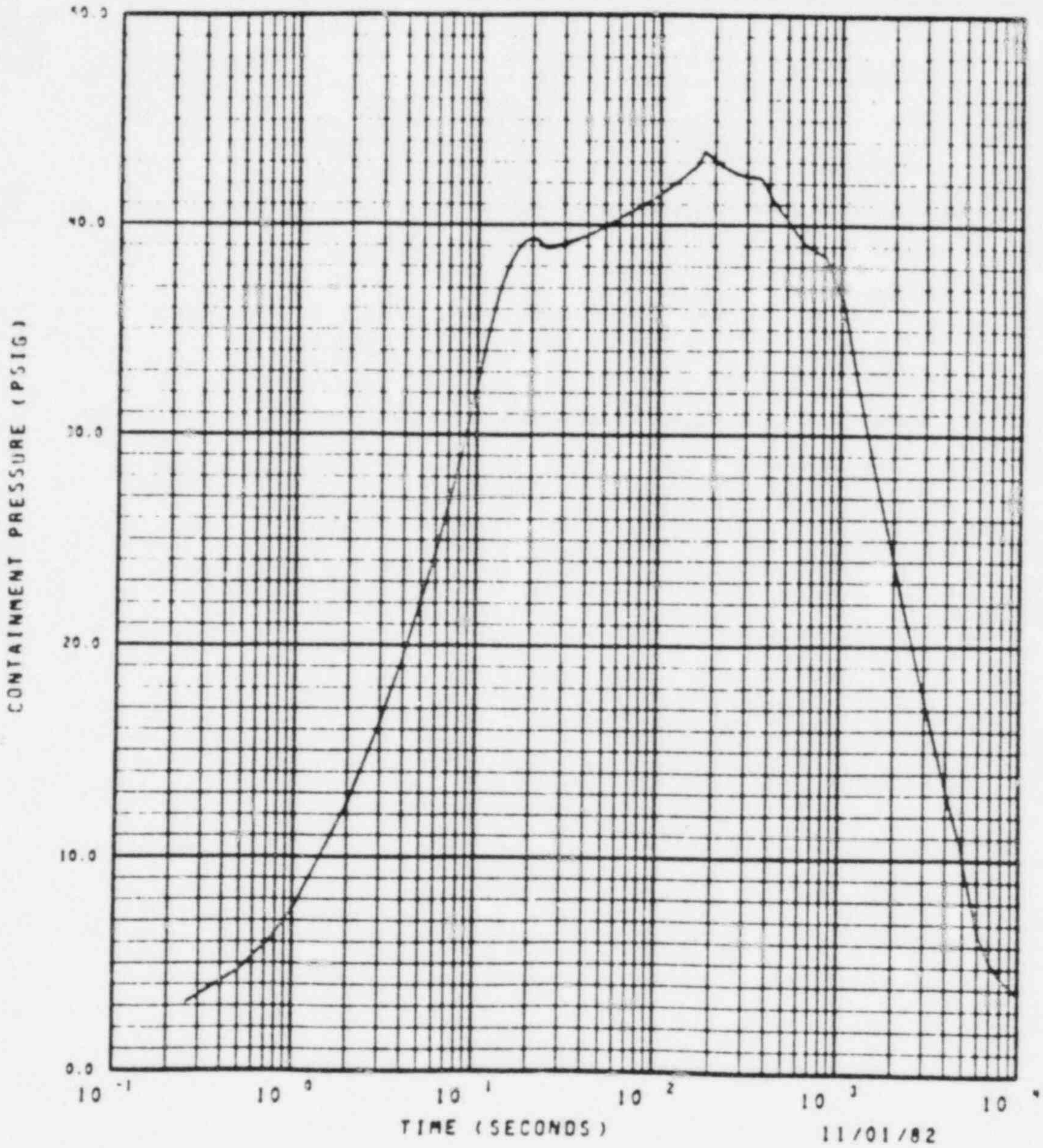


WPS CONTAINMENT CAPABILITY STUDY NEW HEAT SINKS

FIGURE 11

2 fan coolers
Sprays on
Initial Containment Pressure = 16.85 psia
Additional concrete heat sinks assumed

Peak pressure = 42.9 psig
at 170.2 seconds



WPS CONTAINMENT CAPABILITY STUDY NEW HEAT SINKS

FIGURE 12

3 fan coolers
Sprays off
Initial Containment Pressure = 16.85 psia

Additional concrete heat sinks assumed

Peak Containment Pressure = 43.5 psig at 170.2 seconds

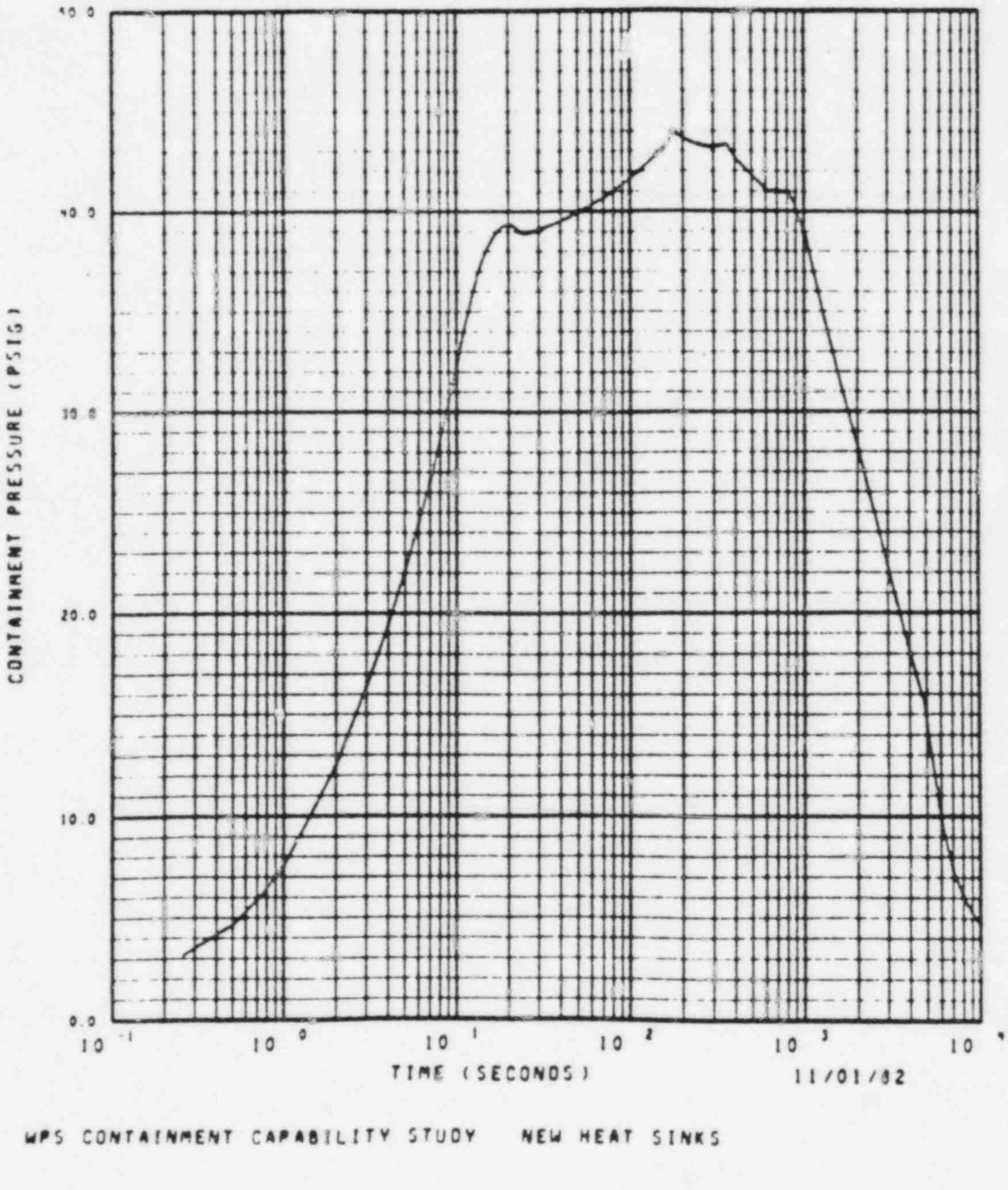


FIGURE 13

2 fan coolers
Sprays off
Initial Containment Pressure = 16.85 psia

Peak pressure = 44.0 psig
at 170.2 seconds
Additional concrete heat
sinks assumed

FOXBORO TRANSMITTERS
N-E10 SERIES

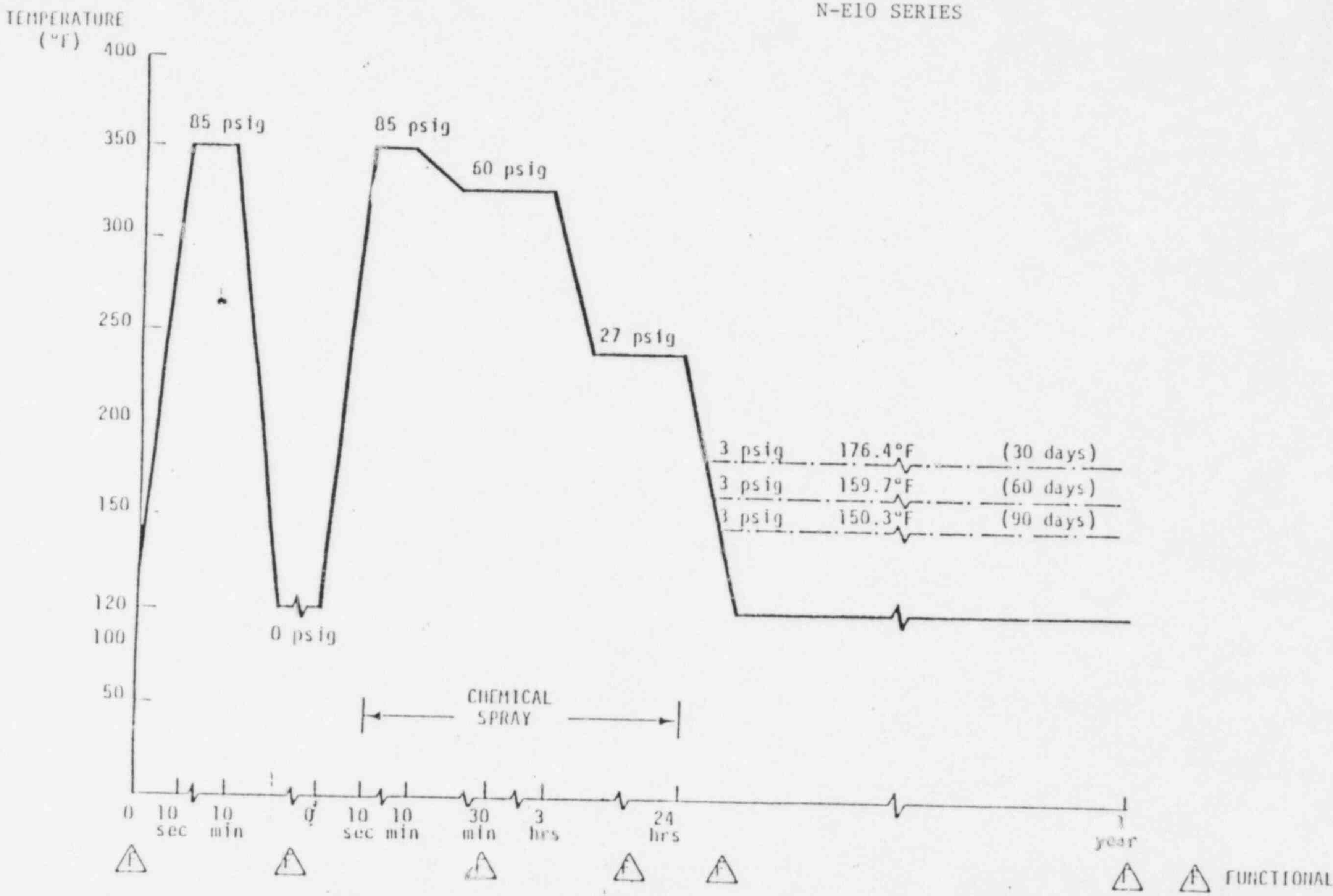


FIGURE 14 LOCA/HELB TIME-TEMPERATURE ENVIRONMENTAL TEST PROFILE - Foxboro Transmitters

LIMITORQUE.

Specified Accident Profile

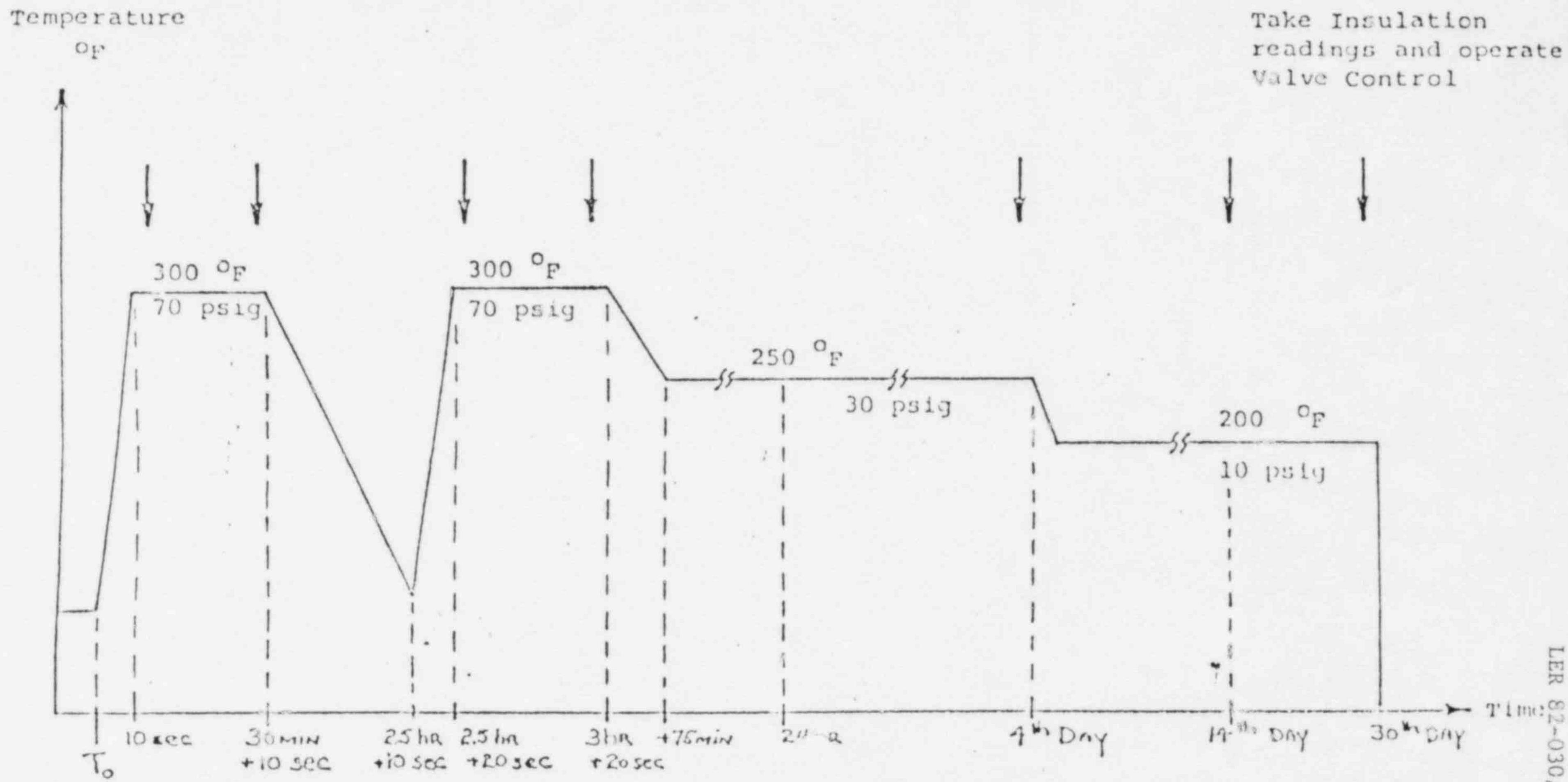


FIGURE 15 - LOCA Pressure/Temperature Environmental Test Profile - Limitorque Valves

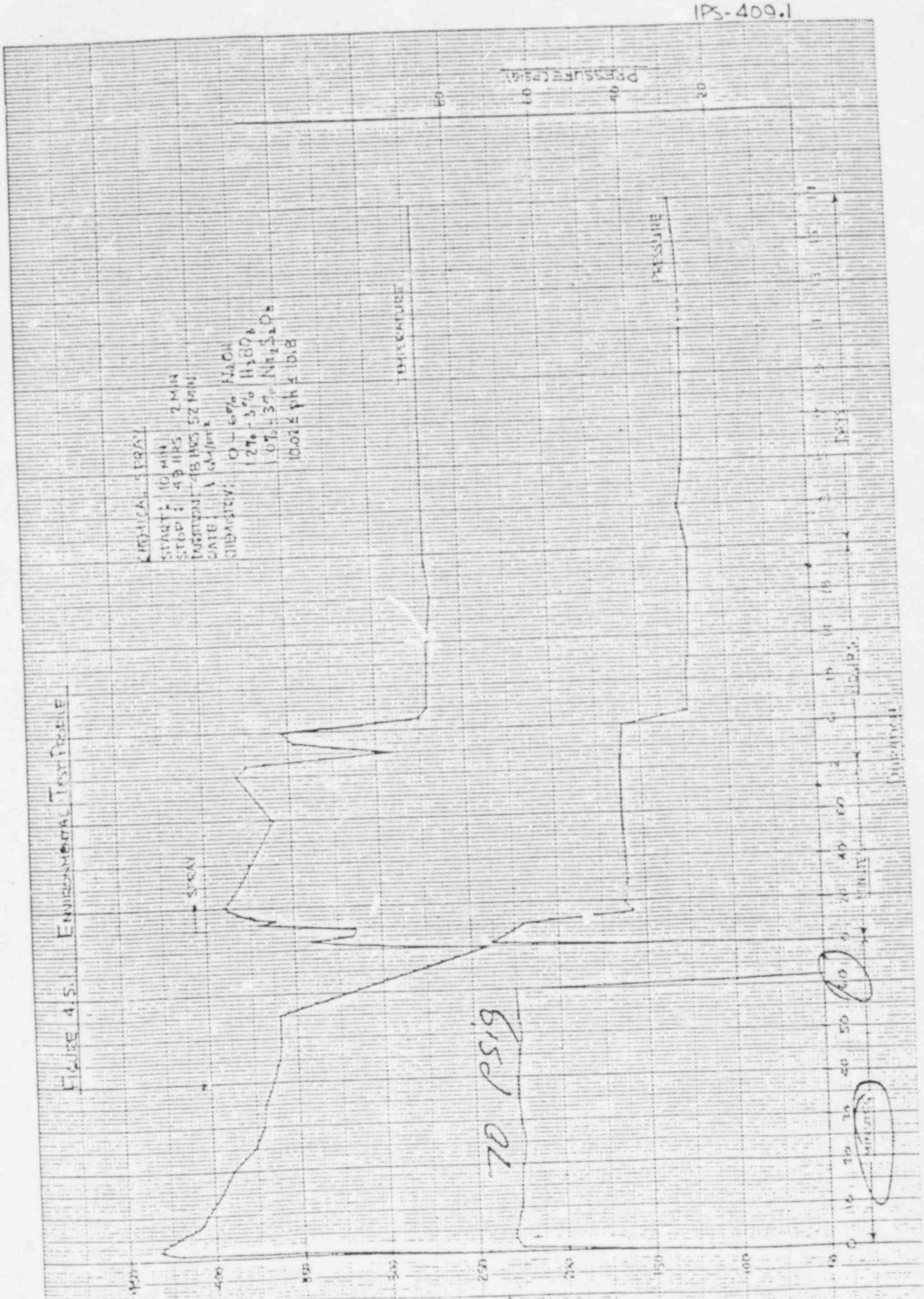
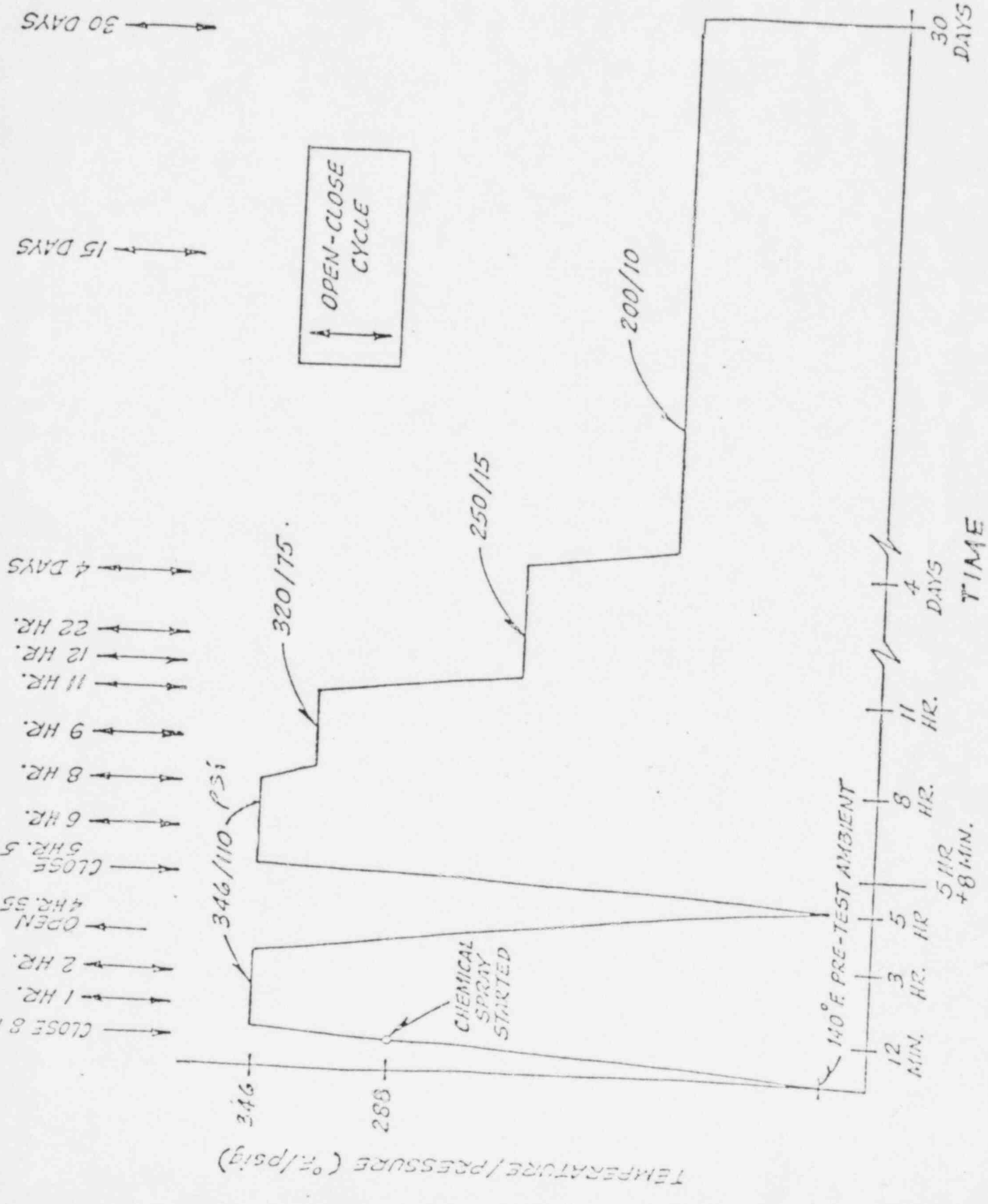


FIGURE 16 LOCA Pressure/Temperature Environmental Test Profile, CONAX
Conax Seals

FIGURE 17
ACTUAL LOCA SIMULATION BY ENVIRONMENTAL EXPOSURE (STEAM/CHEMICAL)



ACTUAL TEMPERATURE/PRESSURE ENVIRONMENTAL TEST PROFILE FOR SIMULATION OF LOSS-OF-COOLANT ACCIDENT (LOCA)

ENCLOSURE 2

DOCKET 50-305

LER 82-030/01X-2

UPDATE REPORT

Capped Containment Pressure

Instrument Sensing Lines

Originally Submitted February 1, 1983

WISCONSIN PUBLIC SERVICE CORPORATION
KEWAUNEE NUCLEAR POWER PLANT

This report supplements the information presented by WPSC to the NRC during the enforcement conference of October 22, 1982 in Glen Ellyn, Illinois. The information presented at the enforcement conference will be summarized in a final LER update report by March 15, 1983.

10 Event Description and Probable Consequences
Several instrumentation lines were found to be capped, rendering the containment pressure transmitters (narrow and wide range) and the containment vacuum breakers inoperable. Refer to telegram dated October 5, 1982, from D. C. Hintz (KNPP plant manager) to J. Streeter (NRC-Region III), and LER 50-305/82-30.

Safety Significance
This event has been carefully evaluated by WPSC to accurately determine its safety significance. The safety significance of inoperability of the Engineered Safety Features Actuation signals which are derived from containment pressure (i.e. safety injection actuation at 4 PSIG, Main Steam Isolation at 17 PSIG and Containment Spray Actuation at 23 PSIG) was discussed at the above mentioned enforcement conference. The effect of this event on peak clad temperature calculations, off-site dose consequences and equipment qualification has also been previously addressed.

This report addresses the following concerns:

a. the possibility that containment pressure exceeded allowable limits during the time that the pressure transmitters were inoperable;
b. the significance of the inoperability of the containment vacuum breakers; and
c. the potential for erroneous operator action during the course of an accident caused by misleading containment pressure transmitter indications.

a. Containment Pressure

The KNPP technical specifications require that containment pressure be maintained at or below 2 psig during operation. This pressure limit is based on the calculated margin to containment design pressure if a LOCA is assumed to occur. WPSC has evaluated the possibility that containment pressure exceeded this limit during the period between the startup of the Kewaunee Plant following the 1982 refueling outage and October 4, 1982 when the caps were removed from the containment pressure transmitter instrumentation lines. We have concluded that it is unlikely that containment pressure exceeded 2 psig.

This evaluation included a review of historical data, which may be relevant to the concern of containment pressure. This data included service water temperature, ambient containment temperature, containment venting history, and (qualitatively) mass input to the containment vessel. Based on this review, three empirical observations were made:

i. Containment pressure shows a possible correlation to service water temperature (service water is used as the cooling fluid in the containment fan coil units) only when service water temperature exceeds 55°F for a prolonged period of time. When this occurs, containment pressure appears to increase slowly until the increase is terminated by venting the containment.

ii. Containment pressure exhibits a very monotonic behavior: in general, containment pressure will remain steady or slowly increase until venting occurs. Containment pressure will not decrease significantly until venting occurs. It should be noted that slight variations in containment pressure (the order of a few tenths of a psi) have been recorded, apparently due to fluctuations in ambient (barometric) pressure or varying meter readings by different operators.

iii. Containment pressure is largely dependent on mass input into the containment, which could come from a variety of sources (RCS or steam leakage, air inleakage from the instrument air system).

We are confident that the mass input from external sources was minimal during the period following the 1982 refueling until October 4, 1982. This is due to an agressive leak repair and minimization effort, which has proven successful as evidenced by the small number of containment vents that have been required since the 1981 refueling, and the low RCS leakage as measured during routine surveillance. Therefore, the third observation is of significance in the negative sense only: rapid increases in containment pressure are not expected when mass input from external sources is minimal.

During the period following the 1982 refueling outage until July 20, 1982, when the containment was vented for personnel access, the service water temperature did not exceed 55°F for prolonged periods. In accordance with the first observation, it is extremely unlikely that containment pressure exceeded 2 psig. In fact, based on our historical observations, it is more likely that containment pressure remained essentially constant, well below the 2 PSIG limit.

During the period between July 22 and October 4, 1982, when the containment was vented following removal of the caps on the containment pressure instrumentation lines, the service water temperature increased to a value above 55°F and remained there for a period of time. Consequently, we would expect an increase in containment pressure in accordance with the first observation. Furthermore, this increase would be expected to continue until terminated manually by venting. Based on these observations it is reasonable to assume that the containment pressure of 1.85 psig observed on October 4, 1982, was the maximum containment pressure reached during the time period between July 22 and October 4, 1982. Therefore, we conclude that the technical specification limit of 2 psig was not exceeded during the time that the instrumentation lines for the containment pressure monitors were capped.

WISCONSIN PUBLIC SERVICE CORPORATION
KEWAUNEE NUCLEAR POWER PLANT

b. Containment Vacuum Breakers

As noted above, the instrumentation lines for the containment vacuum breaker system were also found capped during the period following the 1982 refueling outage and October 4, 1982. Section 5.4.3 of the KNPP FSAR discusses the vacuum breaker system and its design bases. As can be readily seen from this discussion, several conservative, and in some cases unrealistic, assumptions are made in the analysis to show the adequacy of the vacuum breaker system. These conservative assumptions include:

i. no heat energy is being added to the containment atmosphere,
ii. two internal containment spray pumps are operating at full capacity
iii. four containment fan coil units are operating at full capacity, and
iv. initial conditions in the shield building and annulus are 120°F and 14.7 psia

In actuality, during the period of concern the reactor was at or above hot shutdown, providing a significant heat input into the containment, effectively negating the cooling effect (for the purposes of this analysis) of two of the containment fan coil units. Secondly, the initial containment pressure is likely to have been slightly above 14.7 psia (or at a slight positive pressure with respect to the annulus). Finally, the assumption that both trains of containment cooling actuate is extremely conservative in this case, since the only automatic actuation signal for the containment spray pumps is on containment pressure, which was inoperable. It is more realistic to assume a single failure of one of the actuation signals; therefore, either an additional train of fan coil units, or a single containment spray pump, would be the only likely energy removal mechanisms for this event. These more realistic assumptions reduce the energy removal mechanisms to, at most, one-fourth of that assumed in the FSAR analysis. This would significantly increase the time available for operator action. Based on a review of the emergency operating procedures, it is felt that the operator would easily recognize an inadvertent actuation of containment spray and take appropriate action.

It must be recognized, however, that the vacuum breaker system is not an engineered safety feature; and its operation is not essential for protection of the health and safety of the public. This fact is evident in that the vacuum breaker system is not a "technical specification item." While failure of the vacuum breaker system to operate during an overcooling event might result in a differential pressure (dp) between the containment and shield building which exceeds the design dp, it will not have any consequences on the health and safety of the public since no radiation is involved. It should be noted that an inadvertent actuation of the ESF in no way jeopardizes the cooling of the core--in fact, the opposite is true.

We conclude, therefore, that the inoperability of the vacuum breaker system did not have any safety significance, and probably would not have resulted in exceeding the design dp of the containment if an inadvertent ESF actuation had occurred.

c. Operator Action

There is a justifiable concern that due to the caps which were placed on the instrument lines for the containment pressure transmitters, an operator may have taken erroneous, harmful action during the course of an accident.

WPSC has reviewed the emergency operating procedures to determine if, by following the procedures, the operator would take erroneous action that would lead to an inability to maintain core cooling or containment cooling. We have concluded that core cooling and containment integrity would not be jeopardized since SI termination criteria includes parameters in addition to or independent of containment pressure. Consequently, the worst-case action that the operator may take, based on erroneous containment pressure indication would be to stop the containment spray pumps. Since the pumps would not have automatically started anyway, and since it has been shown that the containment pressure would remain within allowable limits, we have concluded that erroneous operator action as a result of this event is not a safety concern.