FNP-0-STP-125
January 6, 1993
Revision 8

FARLEY NUCLEAR PLANT

SURVEILLANCE TEST PROCEDURE

FNP-0-STP-125

SAFETY RELATED

SERVICE WATER POND SEEPAGE TEST

Approved:

R Yance

Manager-Systems Performance

Date Issued: 1-14-93

DEC SP STP-138/2

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FARLEY NUCLEAR PLANT
SURVEILLANCE TEST REVIEW SHEET

SURVEILLANCE TEST NO.	TITLE
FNP-0-STP-125	Service Water Pond Seepage Test

TECHNICAL SPECIFICATION REFERENCE / MODE(S) REQUIRING TEST:
4.7.6.2.4 — 1, 2, 3, 4

TEST RESULTS (To be completed by test supervisor)

SIGNATURE _____ DATE/TIME _____
(Date/Time of Last Procedure Sign-off)

(ENTER SAME DATE/TIME IN SURVEILLANCE SCHEDULE)

COMPONENT OR TRAIN TESTED (if applicable) _____

[ ] ENTIRE STP PERFORMED

[ ] PARTIAL STP PERFORMED: [ ] For Surveillance Credit

[ ] Not for Surveillance Credit

REASON FOR PARTIAL: _____

TEST COMPLETED: [ ] Satisfactory [ ] Unsatisfactory

[ ] The following deficiencies occurred:

_____

_____

[ ] Corrective action taken or initiated:

_____

_____

_____

SYSTEM PERFORMANCE GROUP REVIEW

REVIEWED BY _____ DATE _____

[ ] Procedure properly completed and satisfactory

[ ] Comments: _____

_____

LIST OF EFFECTIVE PAGES

PAGE NO.	REVISION NO.										
	0	1	2	3	4	5	6	7	8	9	10
1				X					X		
2				X					X		
3				X	X			X	X		
4				X	X	X		X	X		
5				X	X	X		X	X		
6				X	X			X	X		
7				X	X			X	X		
8				X	X		X	X	X		
9									X		
DATA SHEET 1											
1				X			X	X	X		
DATA SHEET 2											
1				X			X				
2				X			X				
DATA SHEET 3											
1				X							
2				X							
DATA SHEET 4											
1				X				X	X		

LIST OF EFFECTIVE PAGES

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APPENDIX A											
A-1				X					X		
A-2				X							
A-3				X				X			
FIGURE 1				X							
FIGURE 2				X							
FIGURE 3				X							
FIGURE 4									X		

FARLEY NUCLEAR PLANT
UNITS 1 AND 2
SURVEILLANCE TEST PROCEDURE STP-125

SERVICE WATER POND SEEPAGE TEST

1.0 Purpose

The objective of this test is to demonstrate that seepage from the Service Water Pond does not exceed the rate specified in the Technical Specifications.

2.0 Acceptance Criteria

The maximum, demonstrated seepage rate from the pond shall not exceed 15 cfs under the following prevailing conditions:

2.1 No water is pumped into the pond during the test period.

2.2 The measured rainfall has not exceeded the maximum allowable rate of 0.1 inch per hour at any time during the test nor during the twelve (12) hours immediately preceeding the test.

2.3 In the judgment of the Test Supervisor no significant rainfall event occurred within the entire drainage basin.

3.0 References

3.1 FSAR, Section 2.4.8.1.

3.2 FSAR, Section 2.4.14.2.

3.3 FSAR, Section 2B.6.7.

3.4 FSAR, Section 9.2.

3.5 Section 4.7.6.2.4, Technical Specifications, Appendix A to License # NPF-2.

3.6 A-181001, Service Water System FSD

3.7 D-176980, Storage Pond Dam & Dike General Arrangement

3.8 D-176939, Instrument Installation Data Schedule

3.9 D-170976, Service Water Return to Wet Pit

3.10 D-176982, Storage Pond Dam & Dike Miscellaneous Sections and Details

3.11 Hook Gage, Manufacturers Instruction Manual - Leopold and Stevens Manual, HG-869.

3.12 Rain Gage, Manufacturers Instruction Manual - Belfort Instrument Company, Manuals #8777 and 12049.

3.13 Evaporation Pan Modification and Installation - See Figure 1.

3.14 Liquid Level Recorder, Manuafacturers Instruction Manual - Belfort Instrument Company, Manuals #9909 and 12049.

3.15 Storage Volume Curve - See Figure 3.

3.16 Liquid Level Recorder Installation - See Figure 2.

3.17 FNP-0-SOP-25.0 - River Water System Operating Procedure.

4.0 Test Equipment

4.1 Four (4) Belfort Portable Liquid Level Recorders, Cat. No. 5-FW-1, complete with spring powered chart drive, 4 inch diameter float, counterweight, 30 ft. of perforated tape, ink, pen and one set (100) charts No. 5-1941-AB.

4.2 One (1) Belfort Universal Recording Rain Gage, Cat. No. 5-780 complete with pen, ink, dash pot fluid, 4 day chart drive movement, and one set (100) charts No. 5-4045-B.

4.3 Two (2) Floating Evaporation Pans per Figure 1.

4.4 Two (2) Belfort Hook Gages, Cat. No. 5-743, graduated in inches, or equal.

4.5 Two (2) Belfort Stilling Wells, Cat. No. 5-745 or equal.

4.6 Four (4) Flowmeasuring Systems - One each installed in each of the 42" diameter service water lines.

4.7 Leopold and Stevens - 4 ft. Hook Gage.

5.0 Precautions and Limitations

5.1 It is desirable to perform the test during a period of no rainfall so that the error induced in the estimation of the volume of water entering the pond via rainfall is minimal. However, since it may be difficult to perform the test without any rainfall, an allowable rate not to exceed 0.1 inch per hour is acceptable. Furthermore, if the allowable rate is exceeded, the test must not be restarted for at least 12 hours after the last recorded rate of 0.1 inch per hour.

The Test Supervisor shall monitor the local weather during the test period to visually detect any significant local rainfall event which may occur in the drainage basin but not at the installed rain gage. If, in the opinion of the Test Supervisor, such an event does occur, the significance of the event may be determined by examination of the pond level records. A significant rainfall event will be indicated by a change in the slope of the level vs. time charts, indicating that the rainfall rate was large enough for the surface runoff to flow into the pond. At the discretion of the Test Supervisor, all or any portion of the test results may be invalidated and the test rescheduled.

5.2 Do not allow the pond water level to exceed El. 185.5 feet. This limit is necessary to assure that no water passes over the spillway.

5.3 Do not allow the pond water level to drop below El. 184.7 feet. This limit is necessary to assure that the water level is always kept above the level at which the service water recirculation valves open.

5.4 Sufficient communications equipment must be available for adequate communication between test personnel.

5.5 River Water System

5.5.1 It is required that no water be pumped into the pond during the test. At the same time, the River Water System and the River Water Flume must remain operational. Maintaining the River Water System operational requires that the River Water System Header pressure stay at or above 33 PSIG.

5.5.2 All ten river water pumps must be stopped for the test duration. The normal method is to place all SELECTOR switches to the REMOTE position and place all REMOTE-CONTROL-SWITCHES to the OFF position. Any caution (run) tags must be cleared and any maintenance work coordinated to insure no pumps inadvertantely start. Motor heaters may need to be energized, or other items per FNP-0-SOP-25.0 as deemed necessary. The Lube and Cooling must be transfered from the header to the screen wash supply per FNP-0-SOP-25.2.

5.5.3 If either train header pressure drops to 35 PSIG, one River Water Pump is started of that train and run just long enough to refill the header but not long enough to allow river water to run into the pond. This is accomplished by observing the header pressure immediately after shutting off the River Water Pumps. When a single River Water Pump is started to refill the header, shut the pump off as soon as the pressure reaches the level observed earlier. While the pump is on, observe the River Water Discharge Structure to verify that no water is pumped into the pond. If, in the opinion of the Test Supervisor, a significant amount of water is pumped into the pond, the significance of the event may be determined by the method used in step 5.1.

5.5.4 The Test Supervisor may end the test as of the time of the last reading of the Service Water flow meters and, at his discretion, all or any portion of the test results may be invalidated and, if necessary, the test rescheduled.

5.5.5 If desired, as an extra measure to prevent the header pressure from bleeding off too quickly, if either unit is in cold shutdown or if a pump is out of service for maintenance, put the River Water Pumps that will not be used in LOCAL and close the isolation valve on the discharge lines of those pumps.

5.6 Obtain Shift Supervisor and Security approval prior to making boat entries in the Service Water Pond.

6.0 Prerequisites and Initial Conditions

6.1 The storage volume curve developed for the preoperational test 012-5-006 must be available, Fig. 3.

6.2 Pressure gage NSP25PI583 must be in service on Train A of the River Water Header and pressure gage NSP25PI582 must be in service on Train B of the River Water Header.

NSP25PI583 Cal Due Date _____
NSP25PI582 Cal Due Date _____

_____
Initials / Date

6.3 Verify that the service water flow measuring systems are installed and calibrated.

Unit 1 Train A Pressure transmitters Serial No. _____

Cal Due Date _____
Unit 1 Train B Pressure transmitters Serial No. _____

Cal. Due Date _____
Unit 2 Train A Pressure transmitters Serial No. _____

Cal. Due Date _____
Unit 2 Train B Pressure transmitters Serial No. _____

Cal. Due Date _____

_____
Initials / Date

6.4 One recording rain gage must be checked for accuracy and set up per the instruction manual. Record the starting time on Data Sheet #1.

_____ /
Initials Date

6.5 Two floating evaporation pans, modified and installed per Figure 1, must be in place. Read and record the water level and the time of the reading for each pan on Data Sheet #1.

_____ /
Initials Date

6.6 Four liquid level recorders must be checked for accuracy against an accurate timepiece over a 24-hour period and verified to fall within an allowable error of ±2%; the recorders must then be set up and placed in operation per the instruction manual. Record the starting time and starting elevation for each on Data Sheet #2.

_____/_____
Initials Date

6.7 The five observation wells drilled for Pre-Op Test 012-5-006 must be inspected and determined to be in useable condition. Read and record the water level and time on Data Sheet #3.

_____/_____
Initials Date

6.8 The recording rain gage must be checked at least 12 hours after step 6.5 is completed. The measured rainfall rate must not exceed 0.1 inch per hour at any time during the 12 hours immediately preceeding the start of the test. Record time and the maximum rate of rainfall since the previous reading on Data Sheet #1.

_____/_____
Initials Date

6.9 The pond level indicators must be in service prior to starting the test.

SW Pond Level Indicator NSP25LI4066A
Cal. Due Date _____
SW Pond Level Indicator NSP25LI4066B
Cal. Due Date _____

_____/_____
Initials Date

6.10 Required Data and Documentation: The following data sheets and information are required.

Data Sheet #1 - 1 required.
Data Sheet #2 - 1 required.
Data Sheet #3 - 1 required.
Data Sheet #4 - 1 required.
Appendix A - 1 required.

7.0 Instructions

7.1 A work authorization must be released before implementation of this test.

7.2 Verify the pond water level is between 185.3 and 185.5 feet (preferably at 185.5) for test start and that the level has been maintained between 185.0 and 185.5 for at least 24 hours prior to starting the test.

_____/_____
Initials Date

7.3 Align the screen wash pumps to supply the lube and cooling water for the River Water System, per FNP-0-SOP-25.2.

_____/_____
Initials Date
(Operations)

7.4 Remove the River Water Pumps from service. (Per step 5.5.2). From this point the River Water Pumps shall not be operated until the completion of the test, except as provided in step 8.5.

_____/_____
Initials Date
(Operations)

7.5 Record on Data Sheet #1 the header pressure observed immediately after the River Water Pumps are shut off. Monitor this pressure, if it drops to 35 PSIG, notify the Control Room to start a River Water Pump. When the header pressure reaches the previously recorded pressure, notify the Control Room to stop the pump again. (It is preferable to have Operations personnel monitor header pressure and to communicate with the Control Room on pump operation).

_____/_____
Initials Date

7.6 Mark the test start on the flow measuring system(s), reset the totalizer(s), if available, and assure that all system(s) are in working order. Record this time on Data Sheet #4 as the official starting time of the test.

_____/_____
Initials Date

7.7 Check the liquid level gages for proper operation at least once during and at the conclusion of the test. Report the time of inspection and status of the equipment on Data Sheet #2. Also measure and record the ending elevation at each pier when the recorder is stopped at the conclusion of the test.

_____/_____
Initials Date

7.8 Read and record the water elevation in each of the floating evaporation pans at least once during and at the conclusion of the test. (Data Sheet #1)

_____/_____
Initials Date

7.9 Measure and record the water level in each of the five observation wells at least once during and at the conclusion of the test. Record the time and water level on Data Sheet #3.

_____/_____
Initials Date

7.10 Check the recording rain gages for measurable rainfall periodically during and at the conclusion of the test. (Data Sheet #1)

_____/_____
Initials Date

7.11 Check the flow measuring systems at least once an hour during the test and at the official ending time and record data on Data Sheet #4.

_____/_____
Initials Date

7.12 Continue the test until the pond level reaches approximately 184.7 feet MSL or until water is pumped into the pond (see step 5.5). If at any time the measured rate of rainfall exceeds 0.1 inch per hour, the test must be discontinued and may not be restarted until 12 hours after the last recorded rainfall rate of 0.1 inch per hour or greater.

_____/_____
Initials Date

8.0 System Restoration

8.1 Open any River Water Pump Isolation Valves that were closed per step 5.5.5 (or N/A).

_____/_____
Initials Date
(Operations)

8.2 Restore the River Water System to properly fill and maintain the pond level, per applicable steps in FNP-0-SOP-25.0 and FNP-0-SOP-25.2.

_____/_____
Initials Date
(Operations)

8.3 Remove and recheck the accuracy of the liquid level recorders (see step 6.6). Store after completion of check.

_____/_____
Initials Date

8.4 Remove and store the two floating evaporation pans.

_____/_____
Initials Date

8.5 Remove and recheck the accuracy of the recording rain gage (see step 6.4). Store after completion of check.

_____/_____
Initials Date

DATA SHEET #1

Recording Rain Gage Location: N_____ E_____

Instrument Serial No.: _____

Starting Time: _____ Starting Date: _____

DATE	TIME	INCHES OF RAIN SINCE LAST CHECK	MAX RATE OF RAINFALL SINCE LAST CHECK	BY

EVAPORATION PAN WATER LEVELS

PAN 1				PAN 2			
DATE	TIME	BY	WATER LEVEL	DATE	TIME	BY	WATER LEVEL

Pressure on River Water Header immediately after River Water Pumps are shut off

A _____ PSIG
B _____ PSIG

BY _____/_____
Signature Date

DATA SHEET #2
LIQUID LEVEL RECORDER CHECK SHEET

DATE	TIME	BY	STATUS

Pier #1 Coord. N260986 E724000

Instrument Serial #_____

Bottom of Gage Plate: 186.058' MSL

Starting Elevation _____ MSL

Starting Date/Time _____/_____

Ending Elevation _____ MSL

Ending Date/Time _____/_____

Pier #2 Coord. N259733.57 E724969.1

Instrument Serial #_____

Bottom of Gage Plate: 186.081' MSL

Starting Elevation _____ MSL

Starting Date/Time _____/_____

Ending Elevation _____ MSL

Ending Date/Time _____/_____

Pier #3 Coord. N259000 E723950

Instrument Serial #_____

Bottom of Gage Plate: 186.109' MSL

Starting Elevation _____ MSL

Starting Date/Time _____/_____

Ending Elevation _____ MSL

Ending Date/Time _____/_____

DATA SHEET #2
(Continued)
LIQUID LEVEL RECORDER CHECK SHEET

Pier #4 Coord. N260662 E722650

Instrument Serial #_____

Bottom of Gage Plate: 186.209' MSL

Starting Elevation_____MSL

Starting Date/Time_____/_____

Ending Elevation_____MSL

Ending Date/Time_____/_____

DATE	TIME	BY	STATUS

DATA SHEET #3

OBSERVATION WELLS

		DATE	TIME	BY	WATER LEVEL
Well # 101					
Elevation:	188.96 feet MSL at top of riser				
Well # 102					
Elevation:	205.22 feet MSL at top of riser				
Well # 103					
Elevation:	218.54 feet MSL at top of riser				
Well # 104					
Elevation:	221.38 feet MSL at top of riser				

DATA SHEET #3
(Continued)

OBSERVATION WELLS

Well # 105

Elevation: 198.21 feet MSL
at top of riser

DATE	TIME	BY	WATER LEVEL

DATA SHEET #4

FLOW MEASURING SYSTEM

DATE: _____

OFFICIAL START TIME* OF TEST: _____

OFFICIAL FINISH TIME* OF TEST: _____

DATE	TIME	**TOTALIZER READING IN GALLONS / SYSTEM NO. 1	2	3	4

* Time Recorded to the nearest minute.

Final Total = Last Reading Systems (1 + 2 + 3 + 4) = _____ Gallons

Initial Total = First Reading Systems (1 + 2 + 3 + 4) = _____ Gallons

Total Gallons Pumped = Final Total - Initial Total = _____ Gallons

** If no totalizer is available, determine flow (and subsequent total flow) by reading the strip chart (MA) and applying the appropriate equation below: (attach data sheets as necessary)

$gpm = 7273.23\ [0.9375(MA-4)]^{0.5}$ (for 15" dp and 16 MA range instrument)

$gpm = 7273.23\ [2.8125(MA-4)]^{0.5}$ (for 45" dp and 16 MA range instrument)

gpm = _____ write in the equation used or NA

Signed _____ / _____
Signature Date

APPENDIX A

COMPUTATIONS

1. Official Starting Time

   _____ DATE _____ TIME (nearest minute)

2. Recorded Pond Level at the Official Starting Time (MSL)

   Gage 1 _____ Gage 2 _____ Gage 3 _____ Gage 4 _____ FT.

3. Average Pond Level at the Official Starting Time (calculate using 2) (MSL)

   _____ FT.

4. Average Surface Area and Volume at the Official Starting Time (from area/volume curve at the average pond level - Figure 3)

   A_1 = _____ ACRES

   V_1 = _____ ACRE-FEET

5. Official Stopping Time

   _____ DATE _____ TIME (nearest minute)

6. Recorded Pond Level at the Official Stopping Time (MSL)

   Gage 1 _____ Gage 2 _____ Gage 3 _____ Gage 4 _____ FT.

7. Average Pond Level at the Official Stopping Time (calculate using 6) (MSL)

   _____ FT.

8. Average Surface Area and Volume at the Official Stopping Time (from area/volume curve at the average pond level - Figure 3)

   A_2 = _____ ACRES

   V_2 = _____ ACRE-FEET

9. Average Surface Area during the Test

   A = _____ ACRES

   $$A = \frac{A1 + A2}{2}$$

10. Length of Test, (to the nearest minute, expressed in hours)

    t = _____ HOURS

11. Water Level in the Evaporation Pan:
before starting the test E_{1s} = _____IN. E_{2s} = _____IN.

after ending the test E_{1E} = _____IN. E_{2E} = _____IN.

12. Total Measured Evaporation ($E_1 = E_{1s} - E_{1E}$) ($E_2 = E_{2s} - E_{2E}$) E_1 = _____IN. E_2 = _____IN.

13. Time of Evaporation Measurements t_{1E} = _____HRS. t_{2E} = _____HRS.

14. Evaporation Rate Q_{1E} = _____CFS Q_{2E} = _____CFS

$$Q_{1E} = \frac{43{,}560\ E_1 A}{12 \times 3600\ t_{1E}} = \frac{1.0083\ (E_1)(A)}{t_{1E}}$$

$$Q_{2E} = \frac{1.0083\ (E_2)(A)}{t_{2E}}$$

15. Average Evaporation Rate $Q_e = \frac{Q_{1E} + Q_{2E}}{2}$ = _____CFS

16. Total Rainfall Measured during the Test R = _____ IN.

17. Average Rainfall Rate Q_r = _____ CFS

$$Q_r = \frac{1.0083RA}{t}$$

18. Q_{si} = 0 unless water levels in the observation wells are higher than pond level. If well levels are higher than the pond level, consult SSI-Hydro Projects for computation of Q_{si}.

19. Average Service Water pumping rate during the test period Q_{po} = _____ cfs

$$Q_{po} = \frac{\text{Total volume pumped (from Data Sheet \#4 in gallons)}}{7.4805 \times 3600 \times \text{length of test (from step \#10 in hours)}}$$

20. Apparent Seepage Rate Q_s' = _____ cfs

$$Q_s' = \frac{43560\ (V_1 - V_2)}{3600t} - Q_e - Q_{po} + Q_{me}$$

Where: $Q_{me} = kQ_{po} + \frac{C}{3600t} + 0.1\ Q_r + 0.3\ Q_e + 0.5\ Q_{si}$ = _____CFS

and

$C = 435.6\ (A_1 + A_2) + 0.875\ DP_2$ = _____ FT^3

P_2 = pond perimeter (ft.) at the official stopping time (to be measured from contour maps) = _____ FT.

D = difference in the average water levels at the start and the end of the test (ft.) = _____ FT.

k = Accuracy of the flow measuring system used to measure Q_{Po} - (decimal fraction) = _____

21. List of Definitions

a. Official Starting Time - Time designated by the Test Supervisor as the starting time.

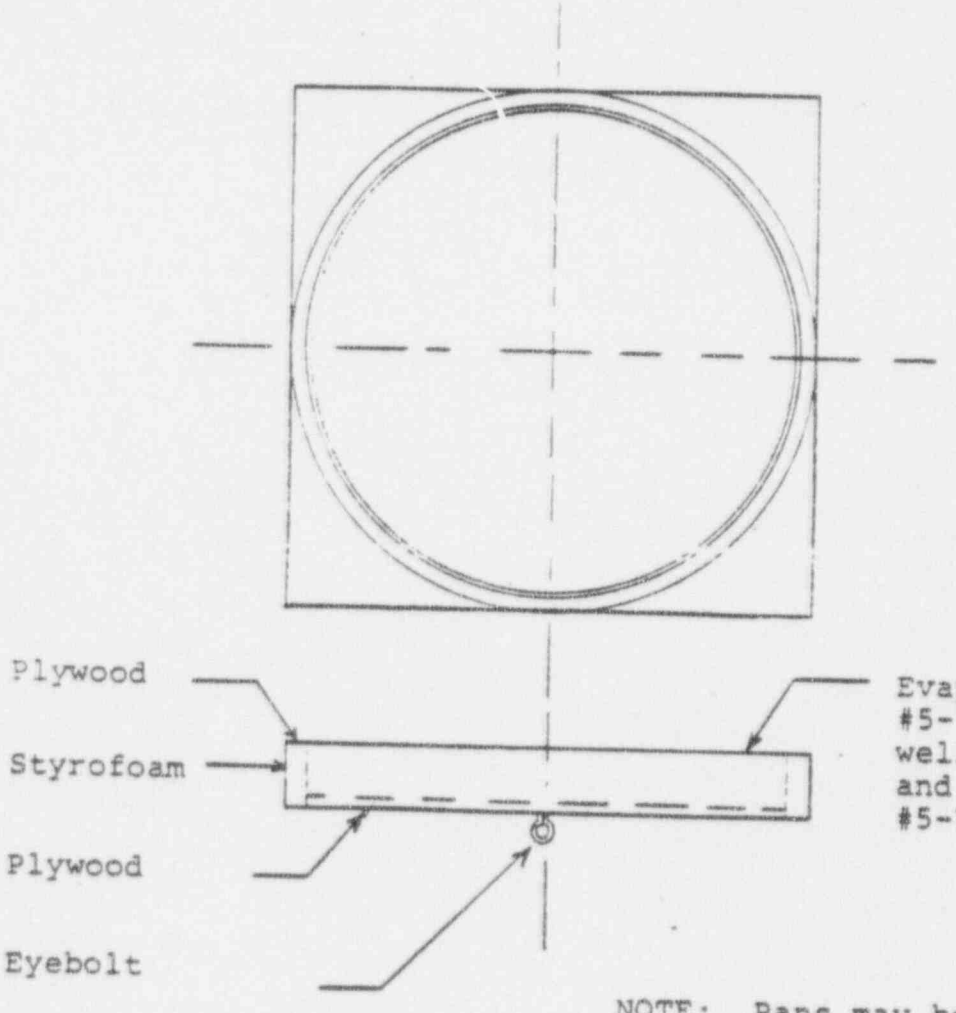
b. Official Stopping Time - Time designated by the Test Supervisor as the stopping time.

c. MSL - Elevation Mean Sea Level.

d. Q_{Po} - Average rate at which water was pumped from the pond during the test period.

By: _____ / _____
Signature Date

FLOATING EVAPORATION PAN



NOTE: Pans may be floated in any convenient location on the pond at the descretion of the Test Supervisor.

Figure 1

TYPICAL LEVEL GAGE INSTALLATION

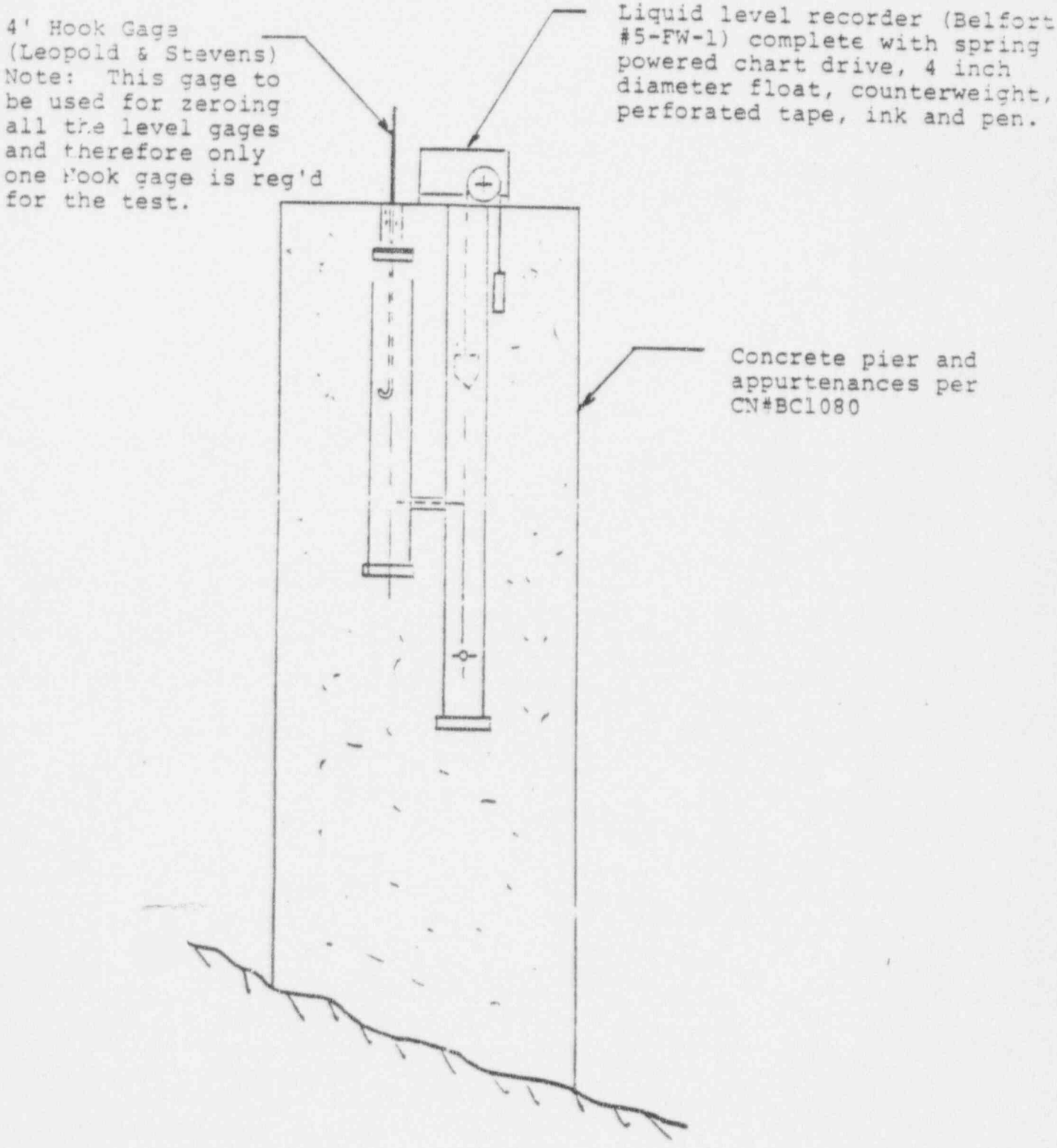


Figure 2

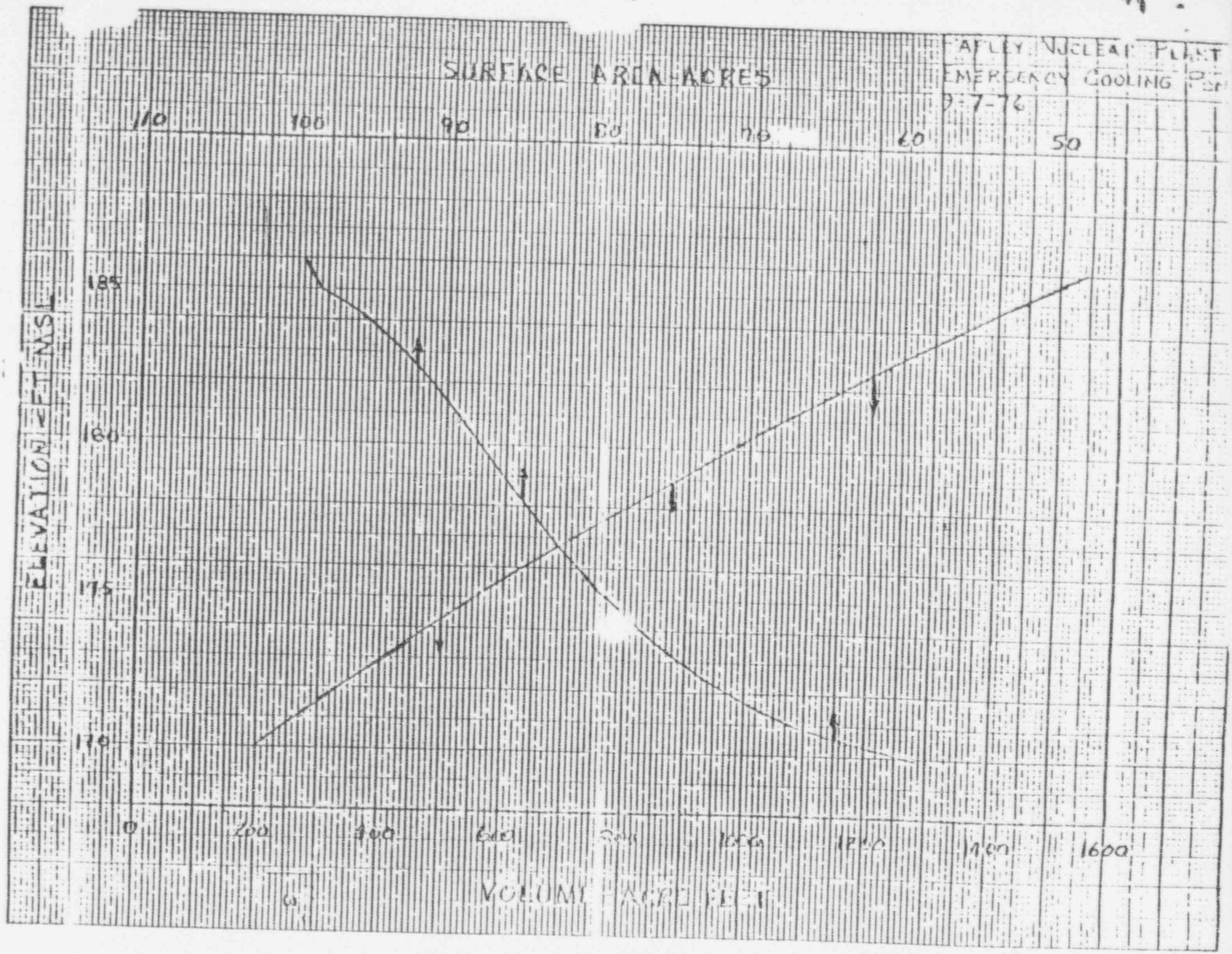


Figure 2

Gen. Rev. 3

Approximate locations of Observation Wells 101-105 and Piers 1-4

Well 101 is 50 ft due south of the Service Water Return to Wet Pit Vent and has no permanent barrier.

Wells 102-105 have permanent barriers.

Pier locations are approximated.

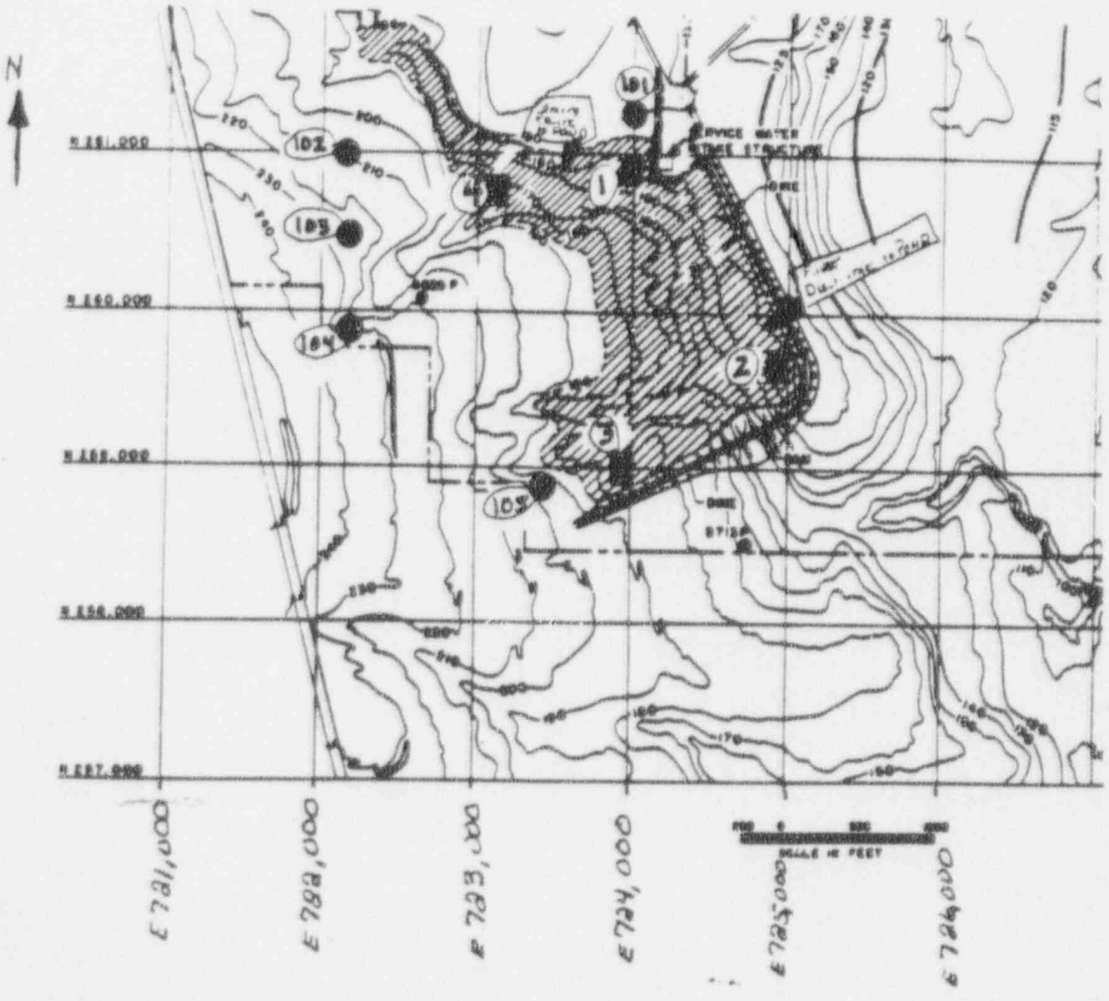


Figure 4

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