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RECIP.NAME RECIPIENT AFFILIATION
DENTON,H.R. Office of Nuclear Reactor Regulation, Director

SUBJECT: Forwards responses to environ rept review Questions 240.4-9, Ltr supplements 820603 & 0714 responses. Responses to Questions 240.3,291.13 & 291.15 will be submitted in near future.

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CP&L
Carolina Power & Light Company

August 17, 1982

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
United States Nuclear Regulatory Commission
Washington, DC 20555

SHEARON HARRIS NUCLEAR POWER PLANT
UNIT NOS. 1 AND 2
DOCKET NOS. 50-400 AND 50-401
ENVIRONMENTAL REPORT REVIEW QUESTION RESPONSES

Dear Mr. Denton:

Carolina Power & Light Company's responses to the Shearon Harris Nuclear Power Plant (SHNPP) Environmental Report (ER) review questions numbered 240.4, 240.5, 240.6, 240.7, 240.8 and 240.9 are attached. This letter supplements our responses of June 3, 1982 and July 14, 1982.

Responses to question 240.3 (Hydrologic Engineering) and questions 291.13 and 291.15 (Terrestrial and Aquatic Resources) are being completed and will be submitted in the near future.

Yours very truly,

M. A. McDuffie
Senior Vice President
Engineering & Construction

LJW/lr (1060R6T3)
Attachments

cc: Mr. E. A. Licitra (NRC)
Mr. G. F. Maxwell (NRC-SHNPP)
Mr. J. P. O'Reilly (NRC-RII)

C001

411 Fayetteville Street • P. O. Box 1551 • Raleigh, N. C. 27602

240.4 (2.4.3) Provide a discussion of the effect of the reservoir on offsite groundwater levels. In your discussion include a piezometric level map showing preconstruction groundwater level and expected increases relative to ground surface elevation for affected offsite areas. Also describe how the water level increases were determined including assumed permeabilities, flow net and etc.

Response: The reservoirs at the Shearon Harris Nuclear Power Plant site comprise a total of approximately 4,417 acres in surface area and contain approximately 77,500 acre-feet of water at the normal pool elevations. The normal pool elevation is 220 feet, msl, for the main reservoir and 252 feet, msl, for the auxiliary reservoir.

Water is supplied to the reservoirs by stream flow, direct precipitation and runoff and an insignificant quantity of ground-water influent from springs of intercepted permeable zones associated with intrusive rocks where they are in hydraulic contact with the reservoirs.

Because of the impervious nature of the soils and country rock, there is only insignificant interchange of water between the reservoirs and the aquifier. This condition is verified as shown in Figure 240.4-1. Note that the water levels in piezometers 8A and LP13 are at elevations 102.5 ft. (affected by pumping) and 189.3 ft., respectively, while the water level in the emergency intake canal, approximately 50 feet from both wells, is at elevation 245 ft.

In Table 2.4.13-7 of the FSAR (attached), the results of permeability determinations from down-hole pressure tests show that permeability values for the country rock range from 0.0096 to 0.265 gallons per day per square foot (gpd/ft^2) within the plant site. According to the USDA Soil Conservation Service soil survey of Wake County, 1970, the permeability values of the upper 96 inches of soil range from 29.9 gpd/ft^2 to 94.2 gpd/ft^2 in the uppermost 12 inches of sandy loam, from 9.4 to 29.9 gpd/ft^2 in the next 17 inches of clay loam, and 3 gpd/ft^2 in the next 79 inches of clay. The saprolite zones below the surficial clay have much lower permeability values, as mentioned above, and prevent ready movement of water from the surface to the deeper soils.

The lack of data points outside the immediate vicinity of the plant island makes it impossible to prepare an accurate map of the piezometric surface in the offsite areas. However, in Figures 240.4-2 and 240.4-3, the pre-construction, current, and post-construction water-level conditions in the plant island area are illustrated. The post construction water levels are anticipated to closely duplicate the preconstruction conditions except where altered by the plant structure and, to some extent, in the immediate proximity of the reservoir and canals.

240.4
(2.4.3)

Response: (Cont'd)

The permeability values of the soils and saprolite that underlie the reservoir are so low as to require near vertical gradients to drive even a small amount of water from the reservoir bottom to the water table. In areas where there may be a flow of water from the reservoir to the water table, the steep hydraulic gradient will confine the flow path to within approximately 100 feet of the shoreline. Where fracture systems of intrusive dikes may be in hydraulic contact with the reservoir and the head relationships are such as to allow flow from the reservoir into the acquifier, the gradients will be less than in the country rock, but the flow path will be narrow and confined very closely to the fractured zones in the dikes. According to the observed behavior of water in the fracture system during the pumping test on wells 13 and 15, it is possible that measurable changes in the water level may occur a few hundreds of feet from the reservoir in such fracture systems. The reservoirs will produce no observable effects on the ground-water levels outside the Shearon Harris Nuclear Power Plant site.

Subject: The Corresponding Author

TABLE 2.4.13-7

PERMEABILITY OF PLANT SITE MATERIALS BASED ON DOWN-HOLE PRESSURE TESTS*

Material	No. Of Tests	Permeability Range Ft./yr.	Permeability Range gpd/ft^2
Fine sandstone	8	0.47-2.54**	.0096 - .052
Shaley siltstone	3	6.71-12.93+	.137 - .265
Siltstone	5	1.31-2.91	.027 - .0596

* Down-hole pressure tests may yield high permeabilities.
** One test produced results of 237 ft./yr.
\+ One test produced results greater than 520 ft. yr.
Tests performed in borings BP-62, BP-68, and BP-70.

240.5
(2.4.3.3) Provide a discussion of the potential for degradation of the quality of offsite groundwaters or surface water due to seepage from the main or auxiliary reservoirs. Provide a map showing the locations of offsite wells, springs or streams that could be affected.

Response: As was discussed in the response to review question 240.4, there will be so little seepage into the aquifier that the effects on water quality will be undetectable outside the CP&L property boundaries.

The closest privately-owned well to the reservoir is on N. C. State Road 1128 at approximately 600 feet from the shoreline (Figure 240.5-1). The ground surface elevation at this well is greater than 30 feet above the normal pool level. The direction of ground-water flow would be from the well to the reservoir, in this case. Inspection of the topographic maps of the area indicates the expected direction of ground-water flow all around the reservoir to be towards the reservoir. Possible exceptions may be in the stream valley immediately downstream from the main dam where there might be some ground-water flow under and around the dam, and within a few feet of the general shoreline as the gradients adjust to the water levels in the reservoir.

The chemical and biological requirements for the plant make-up water are quite stringent and dictate that the high quality of the reservoir water must be maintained. Should any reservoir water seep into the surrounding streams, it would be filtered within the aquifier and would be of better quality than the water in the receiving streams.

240.6 (3.4.2.2) Provide a listing, by month, of the expected average and maximum consumptive water use for one unit generation.

Response: Table 240.6-1 provides the requested information. This information will be incorporated in a future revision to the SHNPP ER.

Provide a [illegible] by which of the exported purpose and must
(5.11.3.3) organize [illegible] type the one unit company on.

Tab = 2B7(...) [illegible] + a [illegible] by or al'one. This [illegible]
Relation (1)

TABLE 240.6-1

AVERAGE AND MAXIMUM CONSUMPTIVE WATER USE - ONE UNIT

	AVERAGE (cfs)	MAXIMUM (cfs)
January	22.0	26.3
February	22.2	26.5
March	23.1	27.4
April	24.4	28.1
May	25.4	29.8
June	26.2	30.5
July	26.5	30.8
August	26.3	30.6
September	25.7	30.1
October	24.3	29.1
November	23.1	27.8
December	21.9	26.4

240.7 & 240.8 (2.4.2)

1. Descriptions of floodplains, as required by Executive Order 11988, Floodplain Management, have not been provided. The definition used in the Executive Order is:

   Floodplain: The low land and relatively flat areas adjoining inland and coastal waters including floodprone areas of offshore islands, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year.

   (a) Provide descriptions of the floodplains adjoining the Cape Fear River, Buckhorn Creek and the makeup reservoir adjacent to the site and site facilities. On a suitable scale map(s) provide delineations of those areas that will be flooded during the one percent (100 year) and .2 percent (500 year) chance floods both before and after plant construction.

   (b) Provide details of the methods used to determine the floodplains in response to (a) above. Include your assumptions of and bases for the pertinent parameters used in the computation of the one percent flood flow and water elevation. If studies approved by the Federal Insurance Administration (FIA) are available for the site and adjoining area, the details of the analysis used in the reports need not be supplied. You can instead provide the reports from which you obtained the floodpath information.

   (c) Identify, locate on a map and describe all structures and topographic alterations in the floodplains.

2. (a) Discuss the hydrologic effects of all items identified in response to question 240.7c. Discuss the alteration in flood flows in Buckhorn Creek below the main dam. Determine the effect of the reservoir on the 50, 10, and .2 percent chance floods (2 year, 10 year, 100 year and 500 year floods in Buckhorn Creek below the reservoir). Expected reservoir water level and storage at the time of the storm may be taken into account.

   (b) Provide details of your analysis used in responses to (a) above.

Response: Executive Order 11998, Floodplain Management, requires the description of flood plains associated with projects which involve a federal authorization to proceed (license). The following discussion fulfills this requirement.

Since the drainage area of the Buckhorn Creek is small in comparison with that of the Cape Fear River at Buckhorn Dam, the construction of the Main Dam and the Auxiliary Dam of the project will have no significant effect on the 100-yr. and

240.7 & 240.8 (2.4.2) (Cont'd)

500-yr. flood levels in the Cape Fear River. Consequently, the flood level shown on Figure 240.7-1 represents both the pre-construction and post-construction conditions.

The 100-yr. and 500-yr. floodplains adjoining the Cape Fear River in the vicinity of the Buckhorn Creek are shown in Figure 240.7-1. The corresponding plains for the Buckhorn Creek and the makeup reservoirs adjacent to the plant island are shown in Figure 240.7-2.

The flood profiles in the Cape Fear River are based on the following data provided by the U. S. Army Corps of Engineers (Reference 240.7-1):

Location	100-yr. Flood Water Level (Ft. above MSL)	Standard Project (approx. 500 yr) Flood Water Level (Ft. above MSL)
10,000 ft. Upstream of Buckhorn Dam	168.5	186.5
Upstream Side of Buckhorn Dam	165.5	182.0
Downstream Side of Buckhorn Dam	159.5	182.0
4 miles Downstream of Buckhorn Dam	147.0	172.0

The flood water level profile slopes uniformly between the two locations upstream of the Buckhorn Dam as well as between the two locations downstream of the Buckhorn Dam.

The pre-construction flood profiles of Buckhorn Creek for the 100-yr. and 500-yr. floods were calculated using the HEC-2 computer program (Ref. 240.7-2). The 100-yr. and 500-yr. flood flows in the Buckhorn Creek before plant construction were obtained from SHNPP ER Figure 2.4.2-28 as 9,900 cfs and 16,000 cfs, respectively, at its confluence with the Cape Fear River. Based on these flows, the corresponding flows in the tributaries of the Buckhorn Creek were estimated according to their drainage area ratios. Since the normal creek channel is rather shallow, the creek cross-sections for the flood flows were principally scaled from a 1/12000 scale map at 1000 to 2000 feet intervals. In addition, available project construction maps for the area below the Main Dam and the USGS 1/24000 map of the area adjacent to the Cape fear River were also used. Manning's n-values of 0.4 and 0.45 were selected for the main and flood channels, respectively, in the flood profiles computation.

The flood plains adjoining the Buckhorn Creek and its tributaries were delineated from the 1/12000 contour map as shown in Figure 240.7-2.

500 yr [illegible] level [illegible] River. Consequently the [illegible]

The [illegible] and 500-yr [illegible] in Figure 280.7-1. The corresponding [illegible] for the Buckhorn [illegible] in Figure 280.7-2.

[illegible] (See Figure 280.7-1)

[illegible]	168.5	56.
[illegible]	[illegible]	52.
[illegible]	70.5	182.
[illegible]	[illegible]	122.0

The [illegible] of the Buckhorn Dam [illegible]

The [illegible] flood [illegible] 100-yr and 500-yr [illegible]

[illegible] Based on [illegible]

[illegible] 1000 [illegible]

The [illegible] Buckhorn [illegible] Figure 280.7-2

240.7 &. 240.8 (2.4.2) (Cont'd)

The construction of the Main Dam and Auxiliary Dam of the plant will reduce the magnitude of the flood flows downstream of the plant because of the storage capacity of the two reservoirs created by the dams. Again, based on the drainage area ratio between that at each dam location and that of the entire Buckhorn Creek, the 100-yr. and 500-yr. floods adopted for the floodplain delineation are:

Flood	At Main Dam	At Auxiliary Dam
100-yr	8850 cfs	215 cfs
500-yr	14300 cfs	350 cfs

Both the Main Dam and Auxiliary Dam have uncontrolled spillways to release floods. The spillway rating curves for these dams are shown in SHNPP ER Figures 2.4.2-31 and 2.4.2-32. The corresponding flood level in each reservoir was determined by applying the flood flows to the appropriate rating curve. Since the reservoirs are rather small, no backwater effect in the reservoirs was taken into consideration when the floodplains adjoining the reservoirs were delineated.

The floodplains adjoining the reach of the Buckhorn Creek between the Main Dam and Cape Fear River after the construction of the Main Dam were not studied since the flood levels will be less than before construction.

The construction of the plant will increase the extent of the floodplains above the Main and Auxiliary Dams in Buckhorn Creek and reduce the flood magnitude below the Main Dam. The water level (WL) and storage capacity (SC) of both reservoirs at 100-yr and 500-yr flood are:

	Main Reservoir		Auxiliary Reservoir	
Flood	WL (ft) MSL	SC (Ac ft)	WL (ft) MSL	SC (Ac ft)
100-yr.	234.0	142×10^3	252.5	5.25×10^3
500-yr.	239.0	174×10^3	252.8	5.35×10^3

The storage capacities are obtained from SHNPP ER Figures 2.4.2-7 and 2.4.2-8, the reservoir area and capacity curves, using the calculated water levels.

The pre-construction and post-construction floodplains for that portion of Buckhorn Creek that is influenced by the plant construction are entirely within the site boundary. There are no existing structures within these floodplains other than those constructed for plant use. These structures were designed to preclude adverse effects due to the probable maximum flood. Additional structures may be constructed to support the recreational use of the main reservoir. It is expected that the effect of floods will be considered in the design of these structures based on a cost/risk assessment.

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

[illegible]

240.7 & 240.8 (2.4.2) (Cont'd)

Since the Cape Fear River floodplains are not increased due to plant construction, any pre-existing structures in these areas are not subject to increased risk of flood damage due to plant construction.

References:

240.7-1

Letter, K. B. Old, Jr., Wilmington District, Corps of Engineers to C. H. Zee of Ebasco, dated June 2, 1982 and Telephone call between K. B. Old, Jr. and D. Hunter of Ebasco, dated June 4, 1982.

240.7-2

HEC-2, Water Surface Profiles, Hydrologic Engineering Center, U. S. Army Corps of Engineers.

240.9 Question 240.9 was revised by the NRC via telephone to request the following information:

(a) Provide estimates of the potential harvests (in kilograms per year) via recreational and commercial fisheries in Harris Reservoir and in the Cape Fear River downstream to the river mouth.

(b) Provide an estimate of drinking water consumption from the Cape Fear River within 200 miles downstream of the site.

(c) Provide an estimate of the use of the Cape Fear River for swimming.

Note that this response provides additional information related to our responses to NRC review questions 291.16 and 470.11 (8) and (9) submitted in CP&L's June 3, 1982 letter to NRC/ONRR.

Response: (a) Virtually no commercial fishery exists in the vicinity of the SHNPP, and none is expected to develop at Harris Reservoir. A small number of anadromous species is harvested from the Cape Fear River below Lillington, North Carolina, but this catch is insignificant when compared to the overall North Carolina commercial harvest (SHNPP OL-ER Amendment No. 2, p. 2.1.3-2). Access to the Cape Fear River is limited within the 176 km (110 river miles) distance downstream of SHNPP and fishing pressure is limited to accessible reaches.

The sport fishing in the Harris Reservoir should be similar to other piedmont North Carolina and southeastern United States reservoirs. Creel data for sport fishing are available from a variety of sources, including Jenkins and Morais (1971) and others summarized in Attachment 240.9-1. Based on these data, the Harris Reservoir should yield about 13.7 kg/ha/yr or a total of 22,200 kg/yr for the entire 1620 ha (4000 ac) reservoir. Also from Attachment 240.9-1, the sport fish harvest from the Cape Fear River to a distance of 176 kilometers (110 river miles) downstream of SHNPP is estimated to be 7500 kg/year.

Commercial fishing in the Cape Fear River is generally restricted to the area from Lock No. 1 to the river mouth. The N. C. Division of Marine Fisheries has made available preliminary estimates of commercial fish and shellfish catches in the Cape Fear for 1980 and 1981. The commercial catch for these years was 604,900 kg in 1980 and 592,800 kg in 1981. The commercial catch includes sedentary shellfish (oysters, clams), resident fishes

Telephone

Response: (Cont'd)

(catfish, bullheads), and migratory species (shrimp, shad, trout, spot, croaker, bluefish, mullet, striped bass). The presence, and thus the catch, of the latter group of species varies according to their movement patterns in and out of the river system.

The overall potential harvest in the Harris Reservoir and Cape Fear River is approximately 622,500 kg, of which about 95% is the commercial catch in the lower river (over 175 km downstream).

(b) Information on the municipal water users of the Cape Fear River Water is provided in Attachments 240.9-2, 240.9-3, 240.9-4, 240.9-5 and 240.9-6.

(c) There are no public access areas for swimming on the Cape Fear River downstream of SHNPP. Some swimming occurs incidental to boating activities but in general, the Cape Fear River is not used for swimming.

ATTACHMENT 240.9-1

Estimated Potential Sport Fish Harvests from the Harris Reservoir and for the Cape Fear River to a Distance of 176 Kilometers Downstream of SHNPP.

(Revised August 6, 1982)

Source	Harvest (Kg/ha/yr)	Comments
Jenkins and Morais 1971	16.4	Mean of 103 U.S. reservoirs
Degan, Harrell, and Johnson (in prep.)	35.4	L. Wylie, NC/SC
	5.3	L. Norman, NC
	10.2	L. Badin, NC
	8.2	L. Hartwell, SC
	1.5	L. Keowee, SC
	18.7	L. Murray, SC
Mean of above	13.7	Harris Reservoir: Based on mean harvest at 13.7 kg/ha/yr and a reservoir area of 1620 ha (4000 ac), the estimated total harvest will be about 22,200 kg/yr.
Fish 1968; Jenkins & Morais 1971	0.9	Cape Fear River (SHNPP to US-301 bridge): Based on 225 g/fish average weight for sunfish and crappie, 5.4 fish/hour (from Fish 1968), 76.1 hours/ha (from Jenkins and Morais 1971 for reservoirs), 541 ha area of Cape Fear River (from Fish 1968), and 1% of this stretch of river being accessible to anglers, the estimated harvest will be 500 kg/year.
	9.2	Cape Fear River (US-301 bridge to Corps of Engineers Lock #1): Based on the same assumptions as stated for the Cape Fear River above, except 757 ha and 10% accessibility, the estimated harvest will be 7000 kg/year.

ATTACHMENT 240.9-2

LILLINGTON, HARNETT COUNTY

OWNERSHIP:

Municipal. Also supplies Shawtown. Total population supplied, about 2,150 in 1972 (610 metered customers).

SOURCE:

Cape Fear River: The intakes are on the south bank of the river at the eastern city limits, 250 yards north of the treatment plant at lat 35°24'39", long 78°49'16". The drainage area at the intake is 3,440 square miles, approximately.

RAW-WATER STORAGE:

None.

ALLOWABLE DRAFT:

Estimated allowable draft is 19 mgd without storage.

TOTAL USE:

Average 1971, 0.22 mgd, metered; maximum daily (7-3-67) 0.357 million gallons.

INDUSTRIAL USE:

None in industrial processes.

TREATMENT:

Prechlorination, coagulation with alum and soda ash, sedimentation, addition of carbon for control of taste and odor, rapid sand filtration, addition of phosphate compounds for corrosion control, adjustment of pH with soda ash, postchlorination, and fluoridation.

RATED CAPACITY OF TREATMENT PLANT:

0.5 mgd.

PUMPING CAPACITY:

Raw water. 1.15 mgd; finished water, 1.8 mgd.

FINISHED-WATER STORAGE:

One clear well, 200,000 gallons; one standpipe 880,000 gallons.

FUTURE PLANS:

None

WATER-RESOURCES APPRAISAL:

Surface water: Lillington is on the south bank of the Cape Fear River in central Harnett County. There is ample water in the Cape Fear River to meet the needs of Lillington for the foreseeable future. Streamflow records have been collected near the intake since 1923. The minimum flow recorded was 7.1 mgd in 1954 and this is more than 30 times present use. When the New Hope Dam is completed, minimum releases from the reservoir will probably greatly exceed the flow recorded in 1954.

Ground water: Rocks of the volcanic slate series underlie Lillington. Coastal Plain sediments of the Tuscaloosa Formation overlie the slate. The Cape Fear River has cut through the sediments and bedrock crops out in places in the river channel and flood plain. On the south side of the city, the depth of material overlying the slate ranges from about 30 feet to more than 100 feet in places. Wells in Lillington are usually finished in the slate. Reported well depths range from 75 to 465 feet and reported well yields range from 3 to 90 gpm.

One analysis of water from a well in Lillington showed the water to be slightly acidic, moderately hard, and to contain 5.5 mg/l of iron.

Reference: Public Water Supplies of North Carolina - Part 2 - Southern Piedmont, State of North Carolina, Department of Natural and Economic Resources, July, 1973.

ATTACHMENT 240.9-3

DUNN, HARNETT COUNTY

OWNERSHIP:

Municipal. Also supplies the City of Erwin. Total population supplied, about 13,500 in 1972 (3,900 metered customers, 200 of which are in surburban areas).

SOURCE:

Cape Fear River: The intake is on the east bank of the river, just above Stuart Creek, 1-1/4 miles west of Erwin at lat 35°20'00", long 78°42'00". The drainage area at the intake is 3,790 square miles, approximately.

RAW-WATER STORAGE:

Pond at treatment plant, 4-5 million gallons.

ALLOWABLE DRAFT:

Estimated allowable draft is 20 mgd without storage.

TOTAL USE:

Average 1972, 1.05 mgd, metered; maximum daily (6-12-66), 2.58 million gallons.

INDUSTRIAL USE:

0.30 mgd, estimated. Principal users include Burlington Industries, Lundy Packing Company, and H. P. Cannon & Son. Burlington Industries obtain process water from a company-owned treatment plant in Erwin.

TREATMENT:

Prechlorination, coagulation with alum and occasionally caustic soda, sedimentation, addition of carbon for control of taste and odor, rapid-anthracite filtration, addition of phosphate compounds for corrosion control, adjustment of pH with caustic soda, postchlorination, and fluoridation.

RATED CAPACITY OF TREATMENT PLANT:

4.0 mgd.

PUMPING CAPACITY:

Raw water, 2 mgd; finished water 10.4 mgd.

FINISHED-WATER STORAGE:

One clear well, 1,500,000 gallons; one elevated tank, 1,000,000 gallons; one standpipe, 500,000 gallons.

FUTURE PLANS:

Treatment plant constructed in 1969 is readily expandable to 8 mgd capacity when needed.

WATER-RESOURCES APPRAISAL:

Surface water: Dunn obtains its water supply from the Cape Fear River. This is the most dependable source available. Records of flow of the river have been collected at Lillington since 1923. The minimum flow of record, 7.1 mgd, occurred during the drought of 1954. Minimum releases from the New Hope Dam will probably greatly exceed the flow experienced in 1954. If the quality of water in the Cape Fear River is protected, there will be ample water to supply future demand.

Ground water: Dunn is in the southeastern corner of Harnett County. The basement rocks are of the volcanic slate series. Coastal Plain sediments of the Tuscaloosa Formation overlie the slate and the Black Creek Formation overlies the Tuscaloosa. Available records do not show the thickness of the Coastal Plain deposits in the Dunn area but it is probably in the range of 150 to 200 feet. Some wells are screened in the sand layers and some are drilled into the basement rocks. For screened wells, reported depths range from 40 to 150 feet and reported yields range from 10 to 45 gpm. One well 434 feet deep finished in the slate was reported to yield 200 gpm.

Reference: Public Water Supplies of North Carolina - Part 2 - Southern Piedmont, State of North Carolina, Department of Natural and Economic Resources, July, 1973.

ATTACHMENT 240.9-4

FAYETTEVILLE; CUMBERLAND COUNTY

OWNERSHIP:

Municipal. Also supplies Hope Mills. Total population supplied, about 70,000 in 1976 (20,446 metered customers, 3,281 of whom are in surburban areas, including Hope Mills, which has 1,070 metered customers).

SOURCE:

Cape Fear River: the intake is on the west bank of the Cape Fear River about 1,000 feet southeast of the Hoffer treatment plant at lat 35°04'58", long 78°51'52". The drainage area at the intake is 4,330 square miles, approximately.

Little Cross Creek impounded in Bonnie Doone Lake, Kornbow Lake, Mintz Pond, and Glenville Lake: the intake is at the Glenville Lake Dam about 400 feet west of the Glenville treatment plant at lat 35°04'09", long 78°53'50". The drainage area at the intake is 9.71 square miles.

Cross Creek (emergency supply): The intake is about 200 feet upstream from Langdon Street at lat 35°04'48" long 78°53'19". The drainage area at the intake is 14.7 square miles.

RAW-WATER STORAGE:

Bonnie Doone Lake, 75 million gallons; Kornbow Lake, 150 million gallons; Mintz Pond, 25 million gallons, Glenville Lake, 125 million gallons.

ALLOWABLE DRAFT:

Estimated allowable draft of Cape Fear River is 96 Mgal/d with no storage. Estimated allowable draft of Little Cross Creek is 5.6 Mgal/d with an adjusted (for sedimentation, etc.) storage of 361 million gallons. Estimated allowable draft of Cross Creek is 3.1 Mgal/d with no storage.

TOTAL USE:

Average (Apr. 1975 - March 1976), 10.76 Mgal/d, metered; maximum daily (April 29, 1976), 14.90 million gallons, metered.

Average daily water use (Mgal/d), Apr. 1975 - Mar. 1976

Apr. 1975--10.22	Aug. 1975--12.12	Dec. 1975-- 9.99
May 1975--10.53	Sept. 1975--11.12	Jan. 1976-- 9.80
June 1975--12.14	Oct. 1975--10.62	Feb. 1976--10.40
July 1975--11.10	Nov. 1975--10.48	Mar. 1976--10.58

INDUSTRIAL USE:

2.5 Mgal/d, estimated. Principal users included Fayetteville Finishing, Borden Chemicals, Cargill Corp., Black and Decker, Purolator Corp., and Kelly-Springfield Corp.

TREATMENT:

Glenville plant - prechlorination, coagulation, with alum and lime, sedimentation, addition of carbon for control of taste and odor, rapid sand filtration, addition of phosphate compounds for corrosion control, adjustment of pH with lime, postchlorination, and fluoridation.

Hoeffer plant - prechlorination, coagulation with alum and caustic soda, sedimentation, addition of carbon for control of taste and odor, rapid mixed-media filtration, addition of phosphate compounds for corrosion control, adjustment of pH with caustic soda, postchlorination and fluoridation.

RATED CAPACITY OF TREATMENT PLANT:

Glenville plant, 12 Mgal/d; Hoeffer plant, 8 Mgal/d.

PUMPING CAPACITY:

Glenville plant: raw water 22.0 Mgal/d; finished water, 18.0 Mgal/d.
Hoeffer plant: raw water 18.0 Mgal/d; finished water, 20.0 Mgal/d.

FINISHED-WATER STORAGE:

Three clear wells, 5,000,000, 2,000,000, and 1,000,000 gallons; three elevated tanks of 1,000,000 gallons each.

FUTURE PLANS:

The capacity of the Hoeffer plant will be increased. The clear-well capacity at this plant will be increased to 12 million gallons. Water lines will be extended.

WATER-RESOURCES APPRAISAL:

Surface water: Fayetteville is on the Cape Fear River, which can provide enough water for any foreseeable need of the city.

Ground water: Fayetteville is underlain by the upper sandy aquifer, which is generallly less than 40 feet thick. The lower sandy aquifer underlies the upper sandy aquifer and is about 150 feet thick. Considering its thickness, the lower sandy aquifer should be capable of yielding about 200 gal/min to wells, but the meager data available indicate that well yields from this aquifer would be much smaller here.

Most wells in the city obtain their water from the crystalline rock which underlies the lower sandy aquifer. A few tens of gallons per minute can be obtained from these wells. One well in the crystalline rock yielded water that was soft, had a high dissovled-solids concentration, and had a high alkalinity.

Reference: Public Water Supplies of North Carolina - Part 5 - Southern Costal Plain, State of North Carolina, Department of Natural and Economic Resources, July, 1977.

ATTACHMENT 240.9-5

ELIZABETHTOWN, BLADEN COUNTY

OWNERSHIP:

Municipal. Total population supplied, about 3,800 in 1975. (1,089 metered customers, about 500 of whom live in surburban areas).

SOURCE:

Two wells (Nos. 1 and 2)

Well No. 1 (Swanzy St., between Hill and Hall Sts.), B1-74, located at lat 34°37'26", long 78°36'03". Driller: Carolina Drilling and Equipment Co. Date Drilled: 1960. Total depth: about 500 ft. Diam: ____. Cased to: ____. Type of finish: screened (gravel-packed). Screened intervals: ____. Topography: flat. Aquifier: lower sandy. Altitude of land surface: 125 ft. Static water level: ____. Pump capacity: 320 gal/min. Type pump: turbine.

Well No. 2 (Swanzy St., near fire station), B1-73, located at lat 34°37'39", long 78°36'46". Driller: Charles R. Underwood. Date Drilled: ____. Total depth: 514 ft. Diam: ____. Cased to: 180 ft. Type of finish: screened (gravel-packed). Screened intervals: ____. Topography: flat. Aquifier: lower sandy. Altitude of land surface: 120 ft. Static water level: 60 ft. below land surface. Pump setting: 140 ft. Pump capacity: 600 gal/min. Type pump: turbine.

TOTAL USE:

0.41 Mgal/d, estimated; maximum daily not determined.

INDUSTRIAL USE:

0.15 Mgal/d, estimated. Principal users include Veeder-Root, Inc., Singletary Construction Co., D and H Manufacturers, Cape Craftsmen, Inc., Elizabethtown Lingerie Co., and Bladen Sportswear.

TREATMENT:

Aeration, chlorination, and carbon filtration for removal of iron, taste, and odor. Each well has treatment plant.

RATED CAPACITY OF TREATMENT PLANTS:

Not determined, but considered adequate for any anticipated need.

PUMPING CAPACITY:

Raw water, 1.16 Mgal/d; finished water, 1.16 Mgal/d.

RAW-WATER STORAGE:

None.

FINISHED-WATER STORAGE:

Two clear wells of about 38,000 gallons each; one elevated tank, 300,000 gallons.

FUTURE PLANS:

Will expand system to include an area to be annexed.

WATER-RESOURCES APPRAISAL:

Surface water: Elizabethtown is in central Bladen county on the west side of the Cape Fear River. The river could readily provide more than enough water for any foreseeable need of the town.

Ground water: Elizabethtown is underlain at a shallow depth by the lower sandy aquifer, which has a thickness of about 500 feet here. This aquifer can yield up to 1,000 gal/min to wells. Water from deep wells in the lower sandy aquifer tends to be soft, with a moderate dissolved-solids concentration, and may have high alkalinity.

Reference: Public Water Supplies of North Carolina - Part 5 - Southern Coastal Plain, State of North Carolina, Department of Natural and Economic Resources, July, 1977.

ATTACHMENT 240.9-6

WILMINGTON, NEW HANOVER COUNTY

OWNERSHIP:

Municipal. Total population supplied, about 47,000 in 1975 (13,500 metered customers, 5 of whom are in surburban areas).

SOURCES:

Cape Fear River. The intakes for the Kings Bluff pumping station are a canal diversion from the south bank of the river above Lock No. 1, about 28 miles northwest of Wilmington at lat 34°24'08", long 78°17'17". The storage provided by the lock is considered to be negligible compared to the flow of the river. The drainage area at the intake is 5,220 square miles, approximately.

Northeast Cape Fear River (emergency only). The intakes for the Hilton pumping station are at the filtration plant at lat 34°15'29", long 77°56'52". The drainage area at the intake is 1,738 square miles, approximately.

Cape Fear River (emergency only). The intakes for the Toomers Creek pumping station are about 600 feet from the north bank of the river and about 2 miles west of the filtration plant at lat 34°15'43", long 77°59'02". The drainage area at the intake is 7,060 square miles, approximately.

RAW-WATER STORAGE:

Negligible.

ALLOWABLE DRAFT:

Estimated allowable draft is 180 Mgal/d with no storage.

TOTAL USE:

Average (1975), 8.5 Mgal/d, metered; maximum daily (8-22-71), 12.7 million gallons, metered.

INDUSTRIAL USE:

2.0 Mgal/d, estimated. Principal users include Timme Corp. Babcock and Wilson, Inc., and Seaboard Coastline Railroad.

TREATMENT:

Prechlorination, coagulation with alum and lime, sedimentation, addition of carbon for control of taste and odor when needed, rapid sand filtration addition of phosphate compounds for corrosion control, adjust of pH with caustic soda, postchlorination and fluoridation.

RATED CAPACITY OF TREATMENT PLANT:

12.0 Mgal/d.

PUMPING CAPACITY:

Raw water, 12.0 Mgal/d; finished water, 21.0 Mgal/d.

FINISHED-WATER STORAGE:

Three clear wells, 12.0 million, 4.0 million, and 1.0 million gallons; three elevated tanks, 1.5 million, and 500,000 gallons.

FUTURE PLANS:

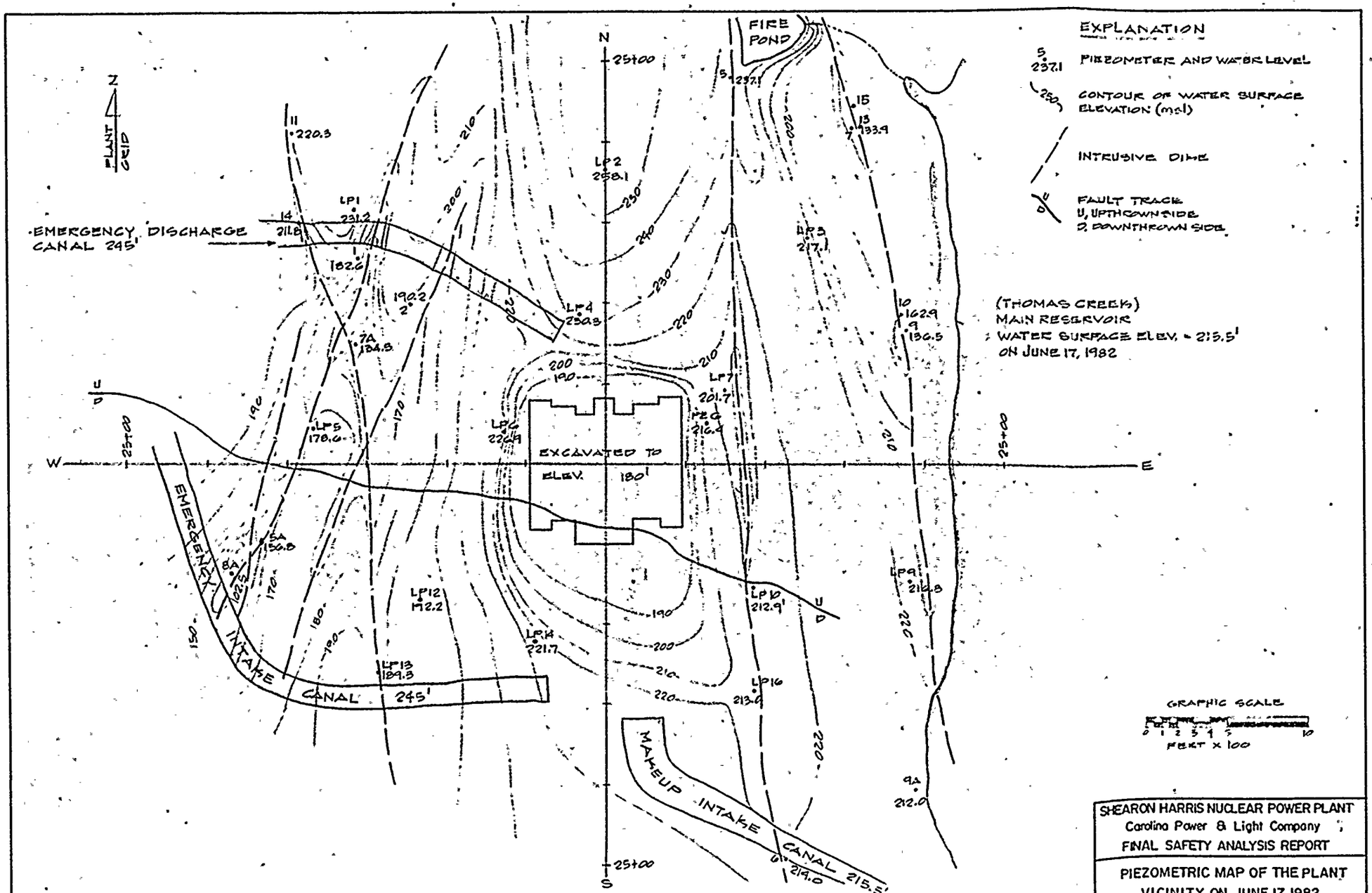
Master-plan study of county-wide system to be made. Will double the capacity of the filter beds and will increase plant capacity to 18.0 Mgal/d.

WATER-RESOURCES APPRAISAL:

Surface water: Wilmington is in northern New Hanover County on the estuary of the Cape Fear River. The topography is flat. The allowable draft at the city's intake is more than 20 times present usage and is more than ample for any forseeable need.

Ground water: Wilmington is underlain by the upper sandy aquifer, which has a thickness of 20 to 40 feet. This aquifer is underlain by the limestone aquifer in the southeastern part of the city. The limestone aquifer may reach a thickness of a few tens of feet. Even though thin, the high permeability of this aquifer might afford well yields of up to a few hundred gallons per minute. To the south and to the east of the city, the limestone aquifer thickens and higher yields can be obtained. Where the limestone aquifer is missing, the upper sandy aquifer is directly underlain by the lower sandy aquifer. Otherwise, the lower sandy aquifer underlies the limestone aquifer. The lower sandy aquifer is over 1,300 feet thick beneath the city, but only the upper two hundred feet or so of the aquifer contain fresh water. Well yields of several hundred gallons per minute can be obtained from this aquifer. The ground water at Wilmington is hard and may contain excessive iron or manganese.

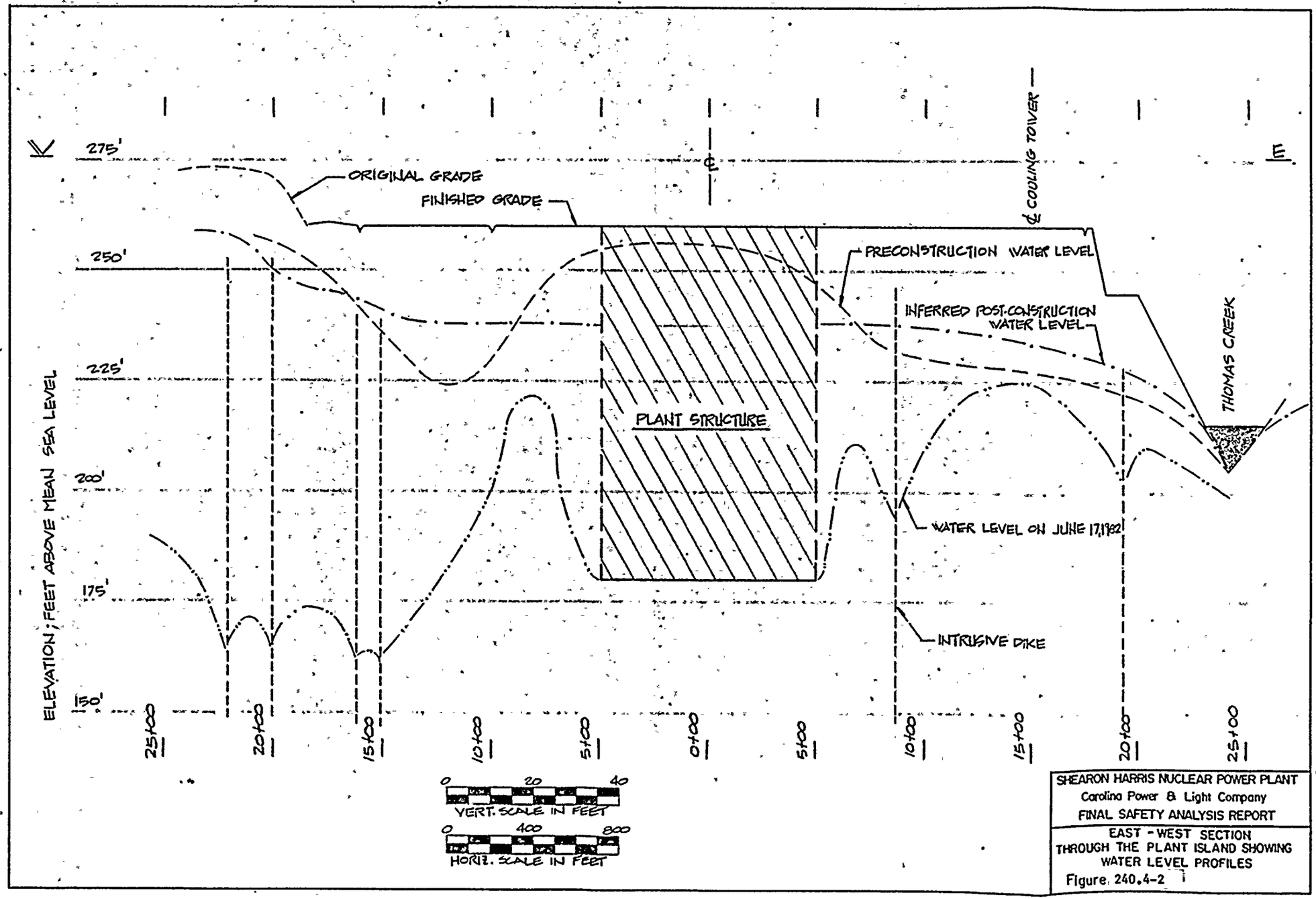
Reference: Public Water Supplies of North Carolina - Part 5 - Southern Coastal Plain, State of North Carolina, Department of Natural and Economic Resources, July, 1977.



PIEZOMETRIC MAP OF THE PLANT ISLAND VICINITY ON JUNE 17, 1982

SHEARON HARRIS NUCLEAR POWER PLANT
Carolina Power & Light Company
FINAL SAFETY ANALYSIS REPORT

PIEZOMETRIC MAP OF THE PLANT VICINITY ON JUNE 17, 1982
FIGURE 240.4-1



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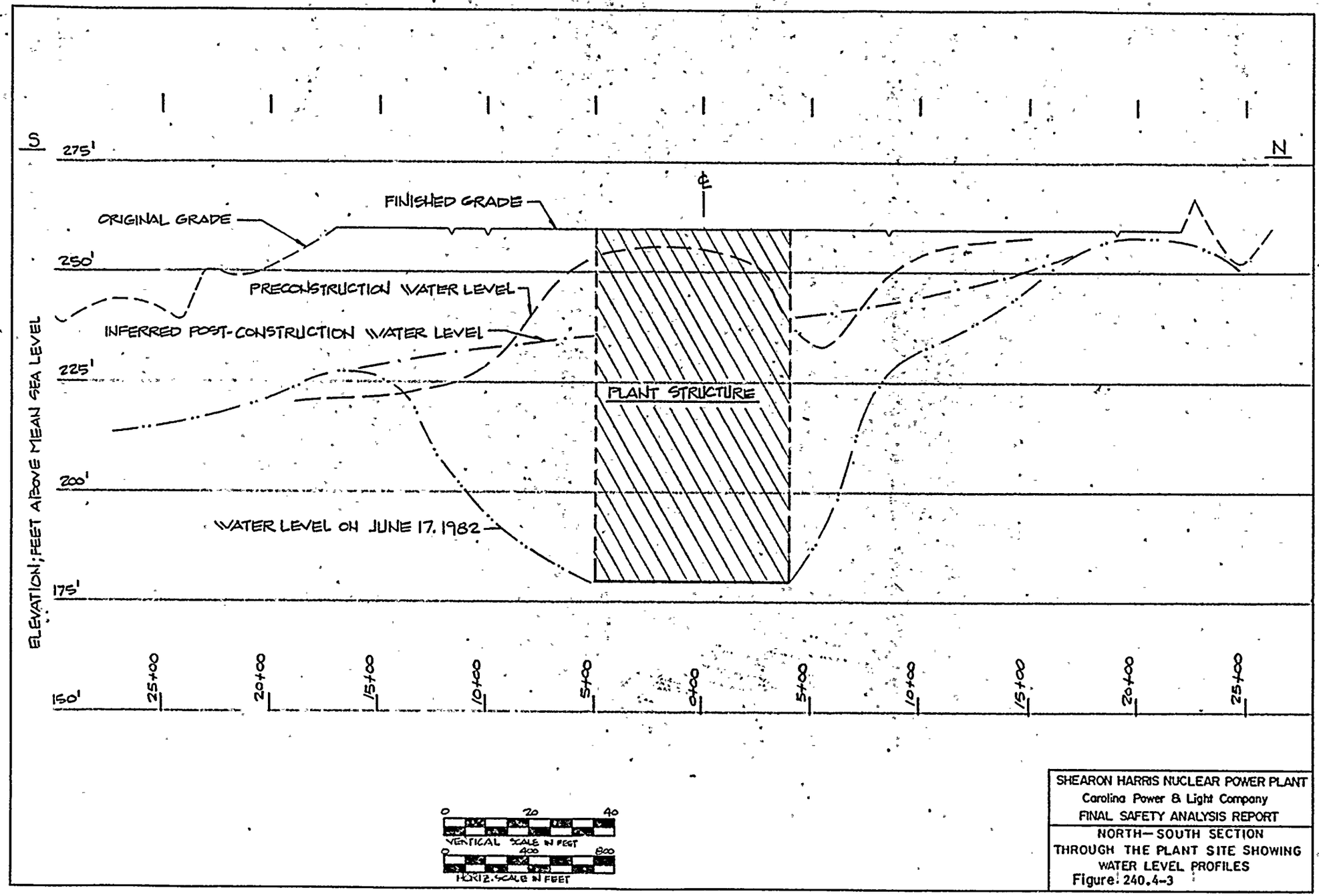
EAST - WEST SECTION
THROUGH THE PLANT ISLAND SHOWING
WATER LEVEL PROFILES

Figure 240.4-2



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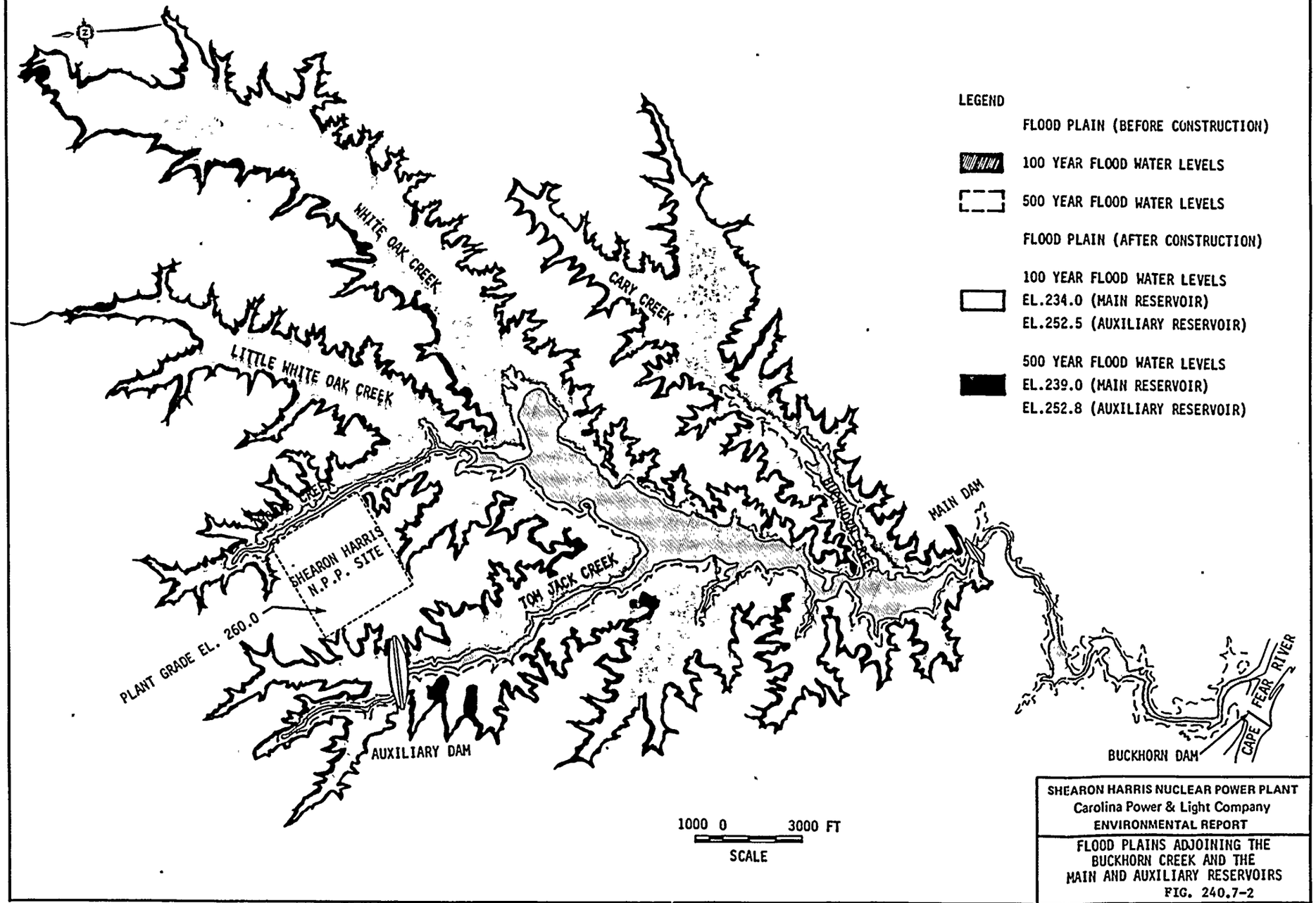
NORTH–SOUTH SECTION
THROUGH THE PLANT SITE SHOWING
WATER LEVEL PROFILES
Figure 2.4.4-3



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FLOOD PLAINS ADJOINING THE BUCKHORN CREEK AND THE MAIN AND AUXILIARY RESERVOIRS
FIG. 240.7-2

PRELIMINARY

PRELIMINARY