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R. J. Kelly
Vice President and General Manager
Power Generation



August 14, 1979

Director of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

NRC DOCKET 50-366
OPERATING LICENSE NPF-5
EDWIN I. HATCH NUCLEAR PLANT UNIT 2
ADDITIONAL INFORMATION - DIFFERENTIAL BUILDING SETTLEMENT

Gentlemen:

In response to your letter of March 30, 1979, which requested additional information regarding our December 1, 1978, submittal on differential building settlement, Georgia Power Company hereby submits the following information:

1. Attachment 1 contains revised FSAR figure 2A-16A. The revision provides for a correlation between benchmark numbers used in the proposed Technical Specifications and the FSAR figure.
2. Table 6 of Attachment 2, titled "Summary of Reference Dates and Elevation Across Structures", provides the surveyed elevation for each benchmark and the reference date used for the beginning of differential settlement calculations. Also contained in Attachment 2 is a "Summary of Differential Settlements Across Structures" which provides the results of the comparison of measured to allowable differential settlement. As can be seen from the table, none of the structures are exhibiting any significant differential settlement.

Attachment 3 provides the calculations used to establish the allowable differential settlement valves between benchmarks 1 & 2 and benchmarks 1 & 3 for the Reactor Building.

3. Item 3 of your request for additional information suggests that the proposed Technical Specifications be revised to incorporate a note which specifies when an allowable differential settlement across a structure has been superseded by a more limiting settlement criterion. It is our view that there is no conflict between the various tables submitted. Table 3.7.8.2-1 establishes limiting valves for differential settlement across a single structure, based on that structure's relationship to adjacent structures. Table 3.7.8.3-1 establishes limiting values for differential settlement between a building penetration and the soil, based on stress calculations for the limiting penetration. Table 3.7.8.4-1 establishes limiting values

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Page Two

for penetration differential settlement between structures, based on stress calculations for the limiting penetration. Each specification contributes without overlap to the total program monitoring differential settlement.

Your March 30, 1979, letter also requested Georgia Power Company to address the staff's position that a shutdown of the unit is required should an allowable differential settlement value be exceeded. We are in general agreement with Item 1 of the discussion in Enclosure 2 of your March 30, 1979, letter. However, it is our view that the maximum settlement limit, beyond which physical inspection would be required, is well beyond the conservative values specified in our submittal. We also agree with discussion Item 2. Should the special report, which would be required 60 days after reaching the 75% level, not provide an acceptable explanation for the continuing differential settlement, we believe ample time would exist due to the slow pace of settlement activity for other measures, one of which might be a unit shutdown. However, we believe a shutdown requirement should not be called out in the Technical Specifications, because the special report called for might suggest alternative solutions which could proceed while the unit was in operation. In our view, such a requirement would unnecessarily restrict the options available to manage the unit. We believe the existence of a specification which calls for a special report when certain conditions are attained calls sufficient attention by plant management to a potential problem, and that corrective action generally is feasible without requiring a unit shutdown.

Very truly yours,

R. J. Kelly

RDB/mb

Attachments

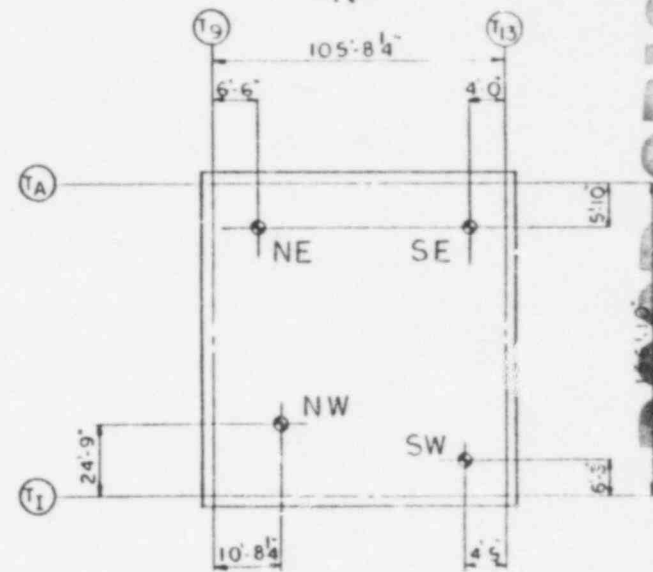
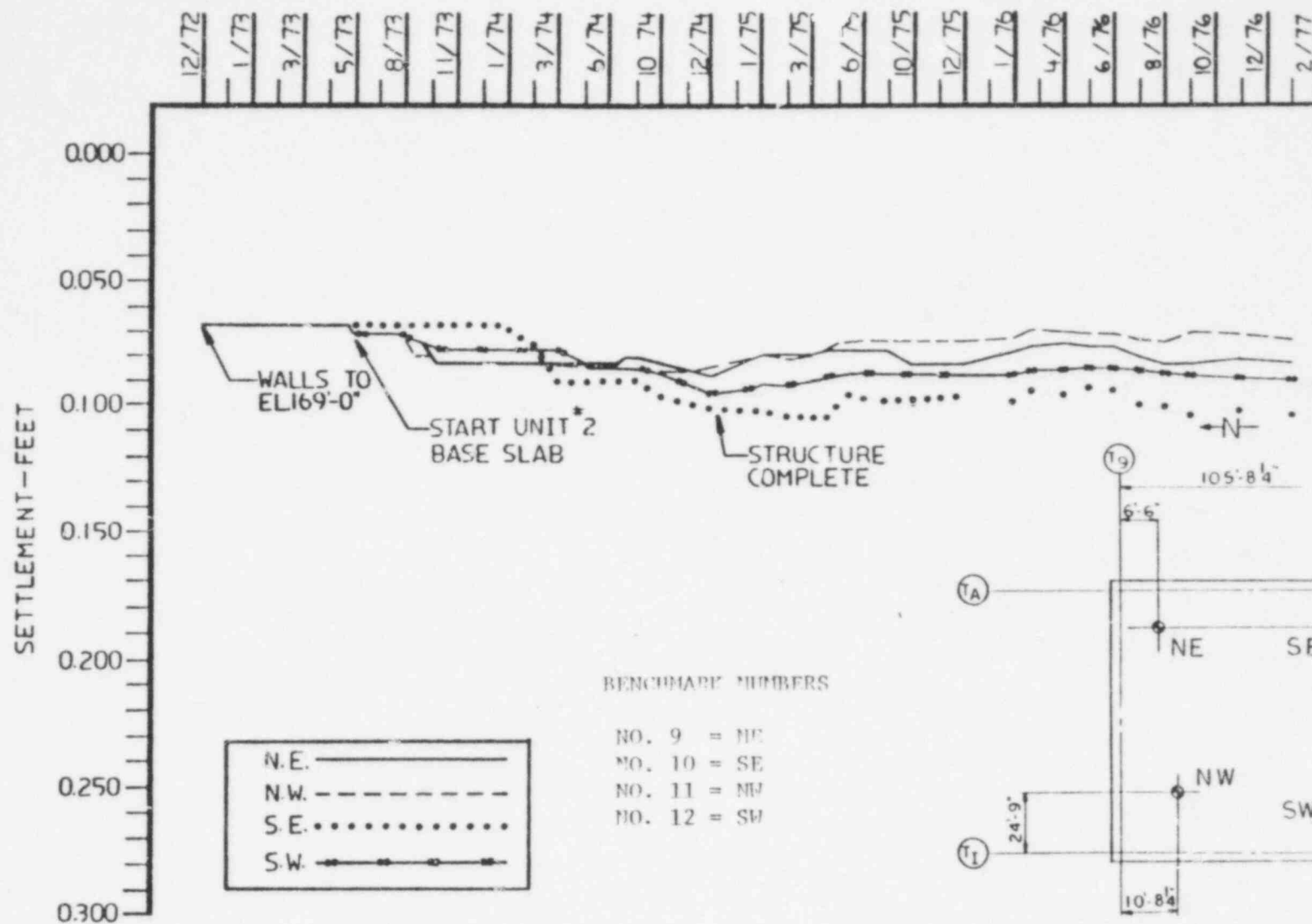
xc: Ruble A. Thomas
George F. Trowbridge

ATTACHMENT 1

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CONTROL BUILDING

AMEND. 25 7/77

GEORGIA POWER COMPANY
EDWIN I. HATCH NUCLEAR PLANT UNIT 2
FINAL SAFETY ANALYSIS REPORT

SETTLEMENT
CONTROL BUILDING

FIGURE 2A-16A

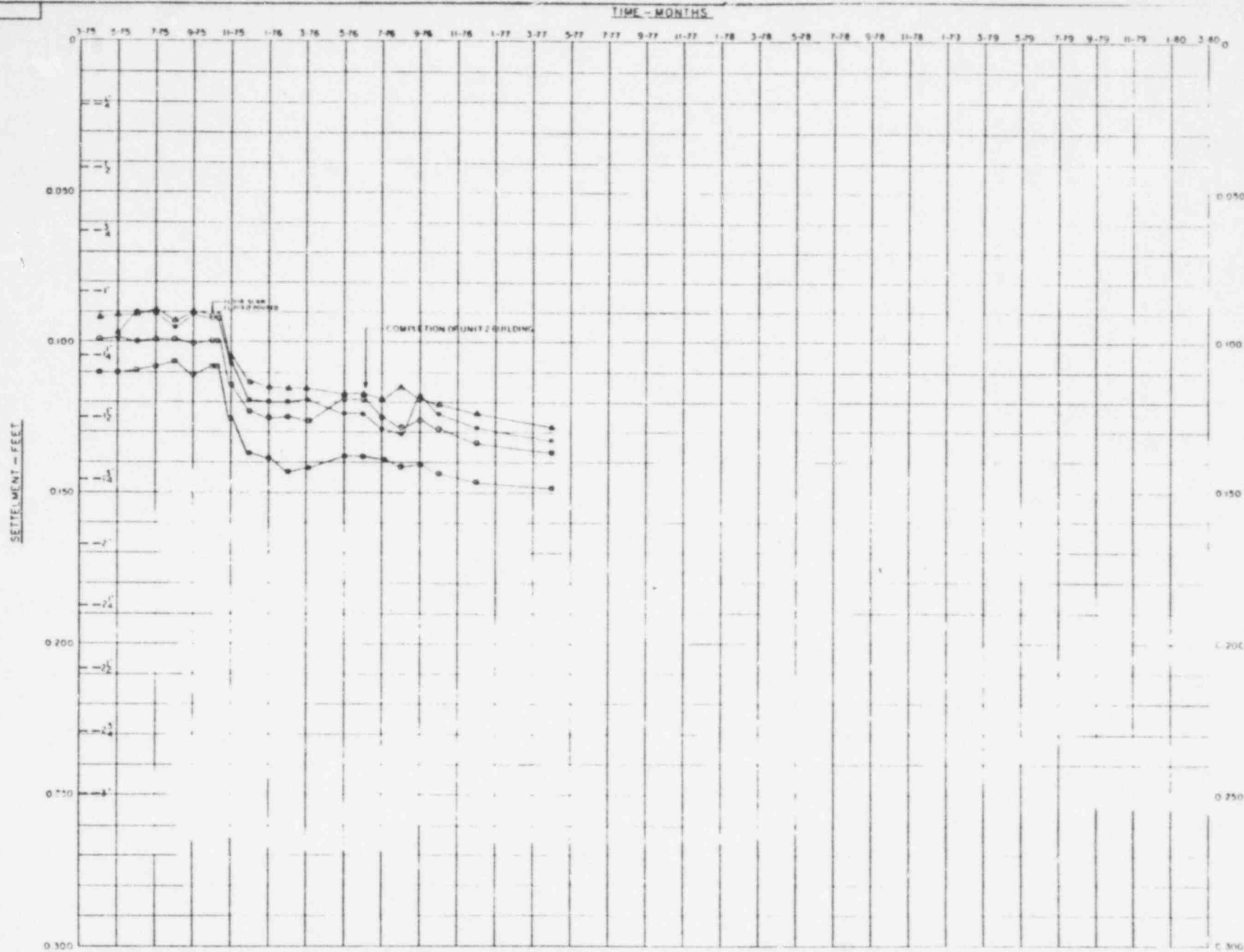
SHEET 1

POOR ORIGINAL

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ONE INCH EQUALS TWO MONTHS
HORIZONTAL SCALE
FOUR INCHES EQUALS FIVE HUNDRETHS OF
ONE FOOT VERTICAL SCALE

AMEND. 35 7/77

GEORGIA POWER COMPANY
EDWIN I. HATCH NUCLEAR PLANT UNIT 2
FINAL SAFETY ANALYSIS REPORT

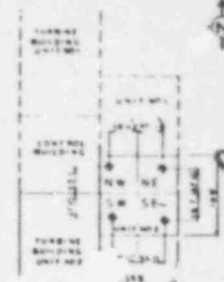
SETTLEMENT
REACTOR BUILDING

FIGURE 2A-16A

LEGEND
 ○ NW BENCH MARK
 △ NE BENCH MARK
 □ SE BENCH MARK
 ■ SW BENCH MARK

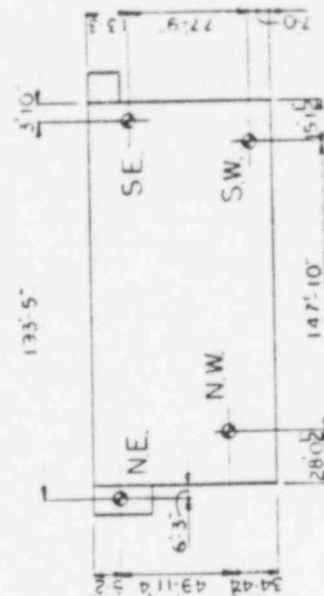
REA. BLDG. BUILDING
BENCH MARK

NO. 1 = NE
 NO. 2 = SE
 NO. 3 = NW
 NO. 4 = SW



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POOR ORIGINAL



DIESEL GENERATOR BUILDING

AMEND. 35 7/77

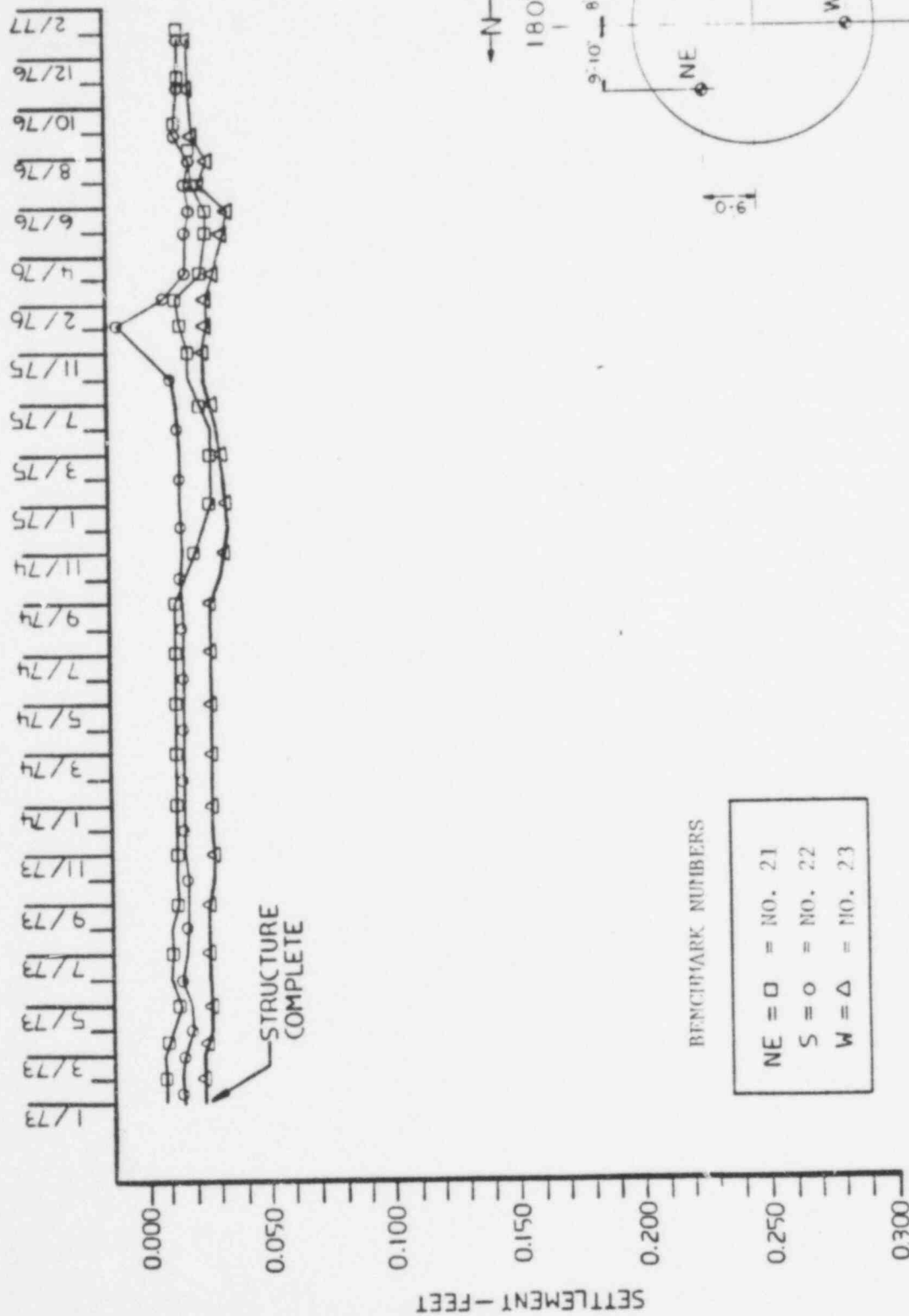
GEORGIA POWER COMPANY
EDWIN I. HATCH NUCLEAR PLANT UNIT 2
FINAL SAFETY ANALYSIS REPORT

SETTLEMENT
DIESEL GENERATOR BUILDING

FIGURE 2A-16A SHEET 3

800 334 POOR ORIGINAL

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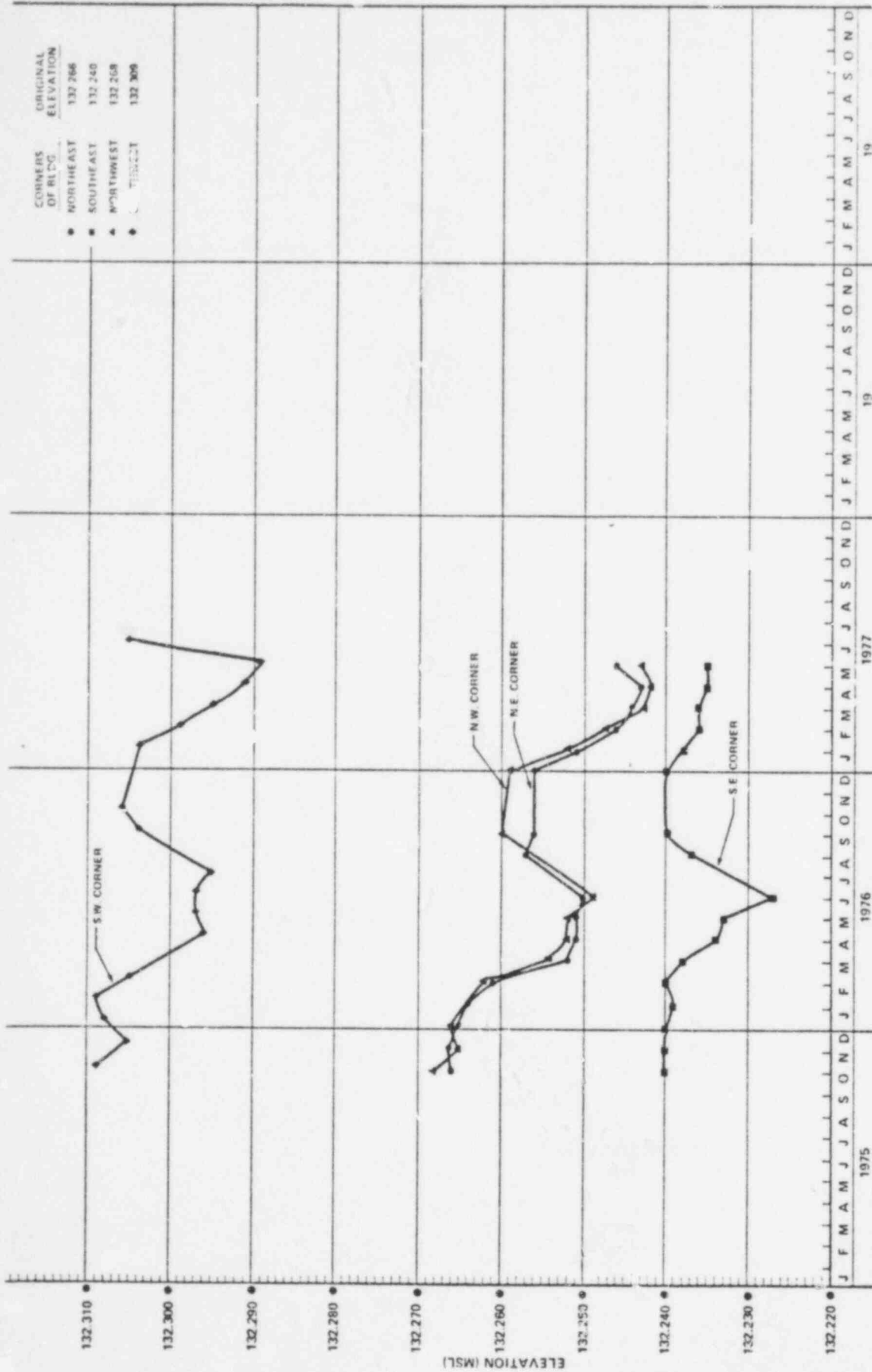
MAIN STACK

AMEND. 35 7/77

GEORGIA POWER COMPANY
EDWIN I. HATCH NUCLEAR PLANT UNIT 2
FINAL SAFETY ANALYSIS REPORT

SETTLEMENT
MAIN STACK

FIGURE 2A *6A SHEET 4



AMEND. 35.7/77

GEORGIA POWER COMPANY
EDWIN I. HATCH NUCLEAR PLANT UNIT 2
FINAL SAFETY ANALYSIS REPORT

SETTLEMENT
RADWASTE BUILDING

FIGURE 2A.16A SHEET 5

ATTACHMENT 2

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STRUCTURE	BETWEEN BENCHMARK NOS.	DIFFERENTIAL SETTLEMENT IN FEET		RATIO OF MEASURED TO ALLOWABLE, %
		ALLOWABLE	MEASURED	
Reactor	1 and 2	0.033	0.000	0
Building	3 and 4	0.034	0.006	18
Unit No. 2	1 and 3	0.139	0.006	4
	2 and 4	0.134	0.000	0
Radwaste	5 and 6	0.154	0.019	12
Building	7 and 8	0.160	0.017	11
Unit No. 2	5 and 7	0.132	0.007	2
	6 and 8	0.080	0.000	0
Control	9 and 10	0.083	0.005	6
Building	11 and 12	0.079	0.012	15
	9 and 11	0.251	0.015	6
	10 and 12	0.288	0.008	3
Turbine	13 and 14	0.224	0.004	2
Building	15 and 16	0.205	0.005	2
Unit No. 2	13 and 15	0.247	0.005	2
	14 and 16	0.281	0.006	2
Diesel	17 and 18	0.424	0.009	2
Generator	19 and 20	0.394	0.022	6
	17 and 19	0.206	0.017	8
	18 and 20	0.206	0.004	2
Main Stack	21 and 22	0.037	0.007	19
	21 and 23	0.046	0.002	4
	22 and 23	0.042	0.005	12
Intake	24 and 25	0.208	0.001	0
Structure	26 and 27	0.208	0.002	1
	24 and 26	0.054	0.000	0
	25 and 27	0.104	0.003	3

SUMMARY OF DIFFERENTIAL SETTLEMENTS ACROSS STRUCTURES

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<u>STRUCTURE</u>	<u>DATE</u>	<u>BENCH MARK</u>	<u>ELEVATION, FEET</u>	<u>STRUCTURE</u>	<u>DATE</u>	<u>BENCH MARK</u>	<u>ELEVATION, FEET</u>
Reactor	5-76	1	129.814	Diesel	1-75	17	131.933 ⁽¹⁾
Building	5-76	2	129.877 ⁽¹⁾	Generator	1-75	18	131.643 ⁽¹⁾
Unit No. 2	5-76	3	129.918 ⁽¹⁾	Building	1-75	19	131.017 ⁽¹⁾
	5-76	4	129.864		1-75	20	131.328 ⁽¹⁾
Radwaste	10-75	5	132.266	Main Stack	10-74	21	119.978
Building	10-75	6	132.240		10-74	22	119.972
Unit No. 2	10-75	7	132.268		10-74	23	119.986
	10-75	8	132.309	Intake	10-74	24	note (2)
Control	1-75	9	111.886	Structure	10-74	25	
Building	1-75	10	111.842		10-74	26	
	1-75	11	111.923		10-74	27	
	1-75	12	111.920	Reactor	5-76	28	129.772
Turbine	5-76	13	129.926 ⁽¹⁾	Building	5-76	29	129.718
Building	5-76	14	129.950 ⁽¹⁾	Unit No. 1	5-76	30	129.884 ⁽¹⁾
Unit No. 2	5-76	15	129.960 ⁽¹⁾		5-76	31	129.744
	5-76	16	129.911 ⁽¹⁾	Turbine	1-75	NE	111.837
				Building	1-75	SE	111.842
				Unit No. 1	1-75	NW	111.913
					1-75	SW	111.922

Notes: (1) Reference elevations adjusted to account for benchmark alterations

(2) Elevations on Intake Structure not recorded at end of construction

TABLE 6: SUMMARY OF REFERENCE DATES AND ELEVATIONS ACROSS STRUCTURES

ATTACHMENT 3

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COMPUTATIONS FOR ALLOWABLE DIFFERENTIAL SETTLEMENT IN TABLE 3.7.8.2-1

The computational method used for determining the allowable settlement profile slope across structures is illustrated in Figures 2 and 3. The Reactor Building Unit 2 and the Radwaste Building Unit 2 are used for illustration purposes, but the procedure applies to any two adjacent buildings in the powerblock. Once the allowable slope is determined, the allowable differential settlement may be determined using the known distance between benchmarks inside the building. The benchmark locations for the buildings which comprise the powerblock are shown in Figure 1.

Example 1 - Reactor Building Unit 2 with Reactor Building Unit 1 as the adjacent building.

$$h = 205.33 \text{ ft. (Reactor Building height)}$$

$$S_1 + S_2 = 1.44 \text{ in. (absolute sum of max. seismic movements / O.B.E. / at the top of the buildings)}$$

$$d = \frac{3 - (S_1 + S_2)}{2} = \frac{3 - 1.44}{2} = 0.78 \text{ in.}$$

$$\Theta = \frac{d}{h} = \frac{0.78}{205.33 \times 12} = 0.00032 \text{ radians}$$

$$L_{12} = \text{distance between benchmarks 1 and 2} = 104.45 \text{ ft.}$$

$$\begin{aligned} \text{allowable differential settlement} &= (\Theta) L_{12} \\ &= 0.00032 (104.45) \\ &= 0.033 \text{ ft.} \end{aligned}$$

This is the value which appears in Table 3.7.8.2-1 between benchmarks 1 and 2.

Example 2 - Reactor Building Unit 2 with the Control Building as the adjacent building.

$$h = 90.33 \text{ ft. (bottom of Reactor Building to highest elevation where the 3" gap remains)}$$

$$S_1 + S_2 = 0.18 \text{ in. (absolute sum of max. seismic movements / O.B.E. / at the highest elevation where the 3" gap remains)}$$

$$d = \frac{3 - (S_1 + S_2)}{2} = \frac{3 - 0.18}{2} = 1.41 \text{ in.}$$

$$\Theta = \frac{d}{h} = \frac{1.41}{90.33 \times 12} = 0.0013 \text{ radians}$$

$$L_{13} = \text{distance between benchmarks 1 and 3} = 106.76 \text{ ft.}$$

Computations for Allowable Differential Settlement, Cont.

$$\begin{aligned}\text{allowable differential settlement} &= (\ominus) L_{13} \\ &= 0.0013 (106.76) \\ &= 0.139 \text{ ft.}\end{aligned}$$

This is the value which appears in Table 3.7.8.2-1 between benchmarks 1 and 3.

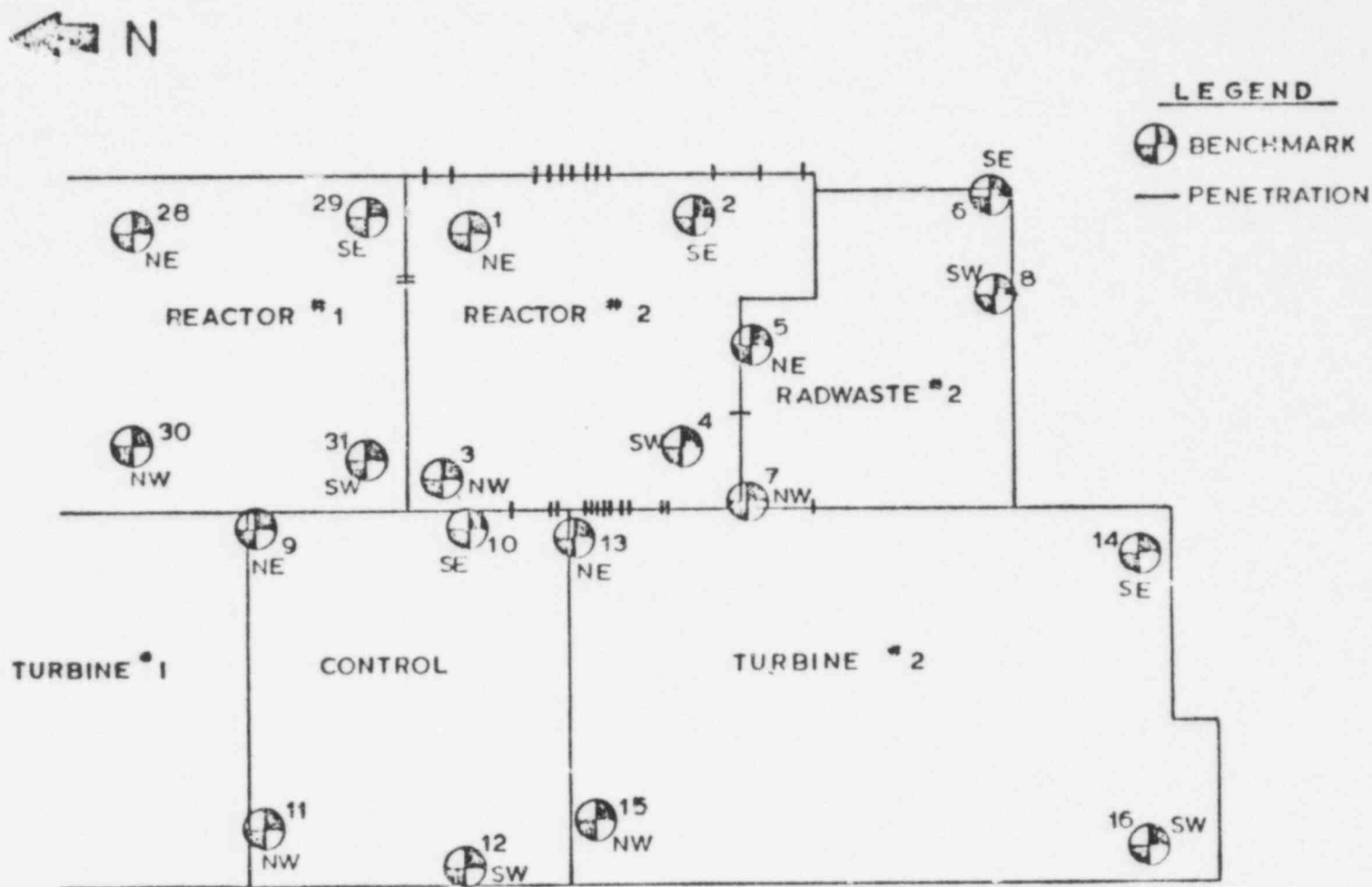
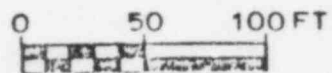


FIGURE 1: LAYOUT OF UNIT NO.2 POWERBLOCK



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SOUTHERN SERVICES, INC.

EDWIN I. HATCH NUCLEAR PLANT - UNIT NO. 2

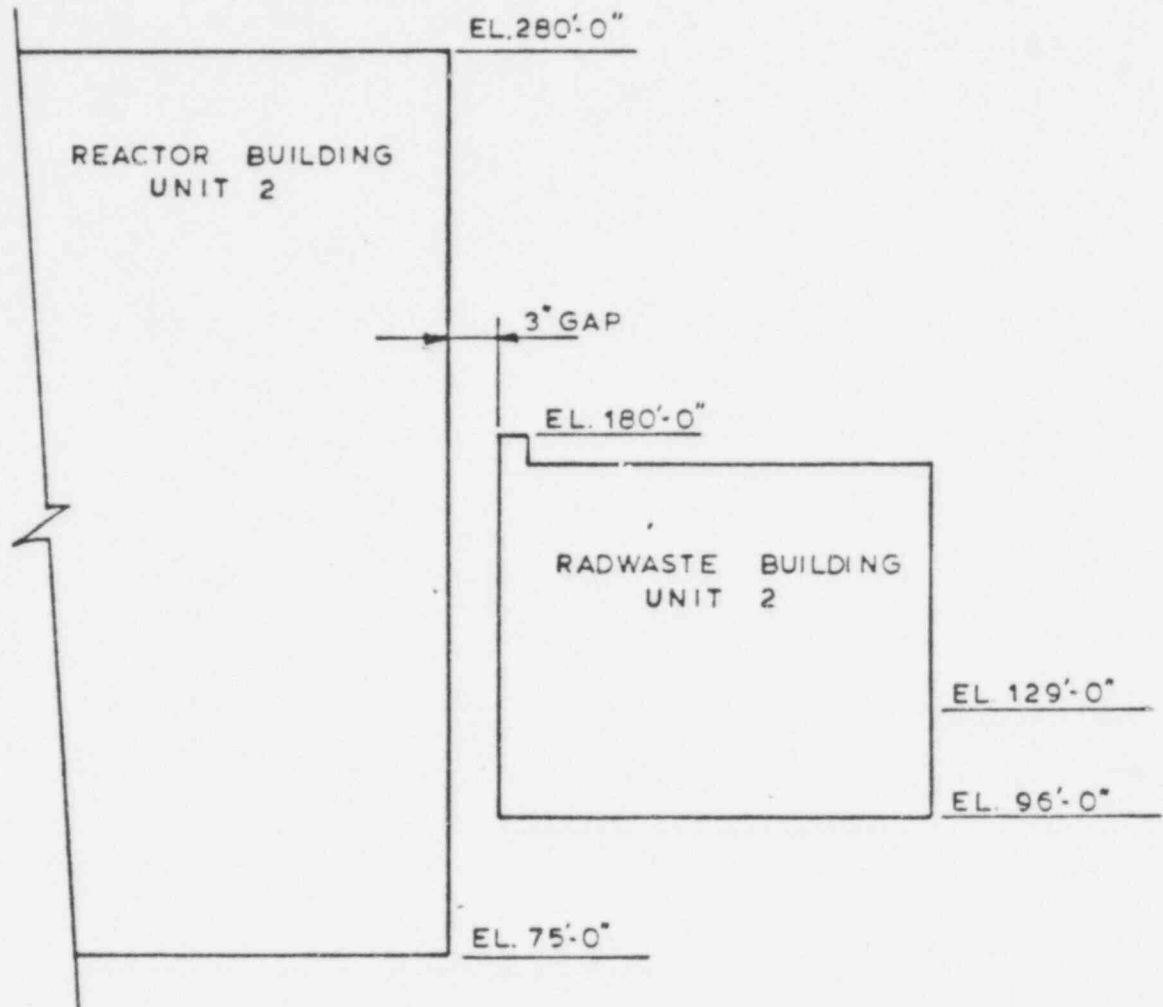


FIGURE 2: UNIT 2 REACTOR AND RADWASTE
BUILDINGS

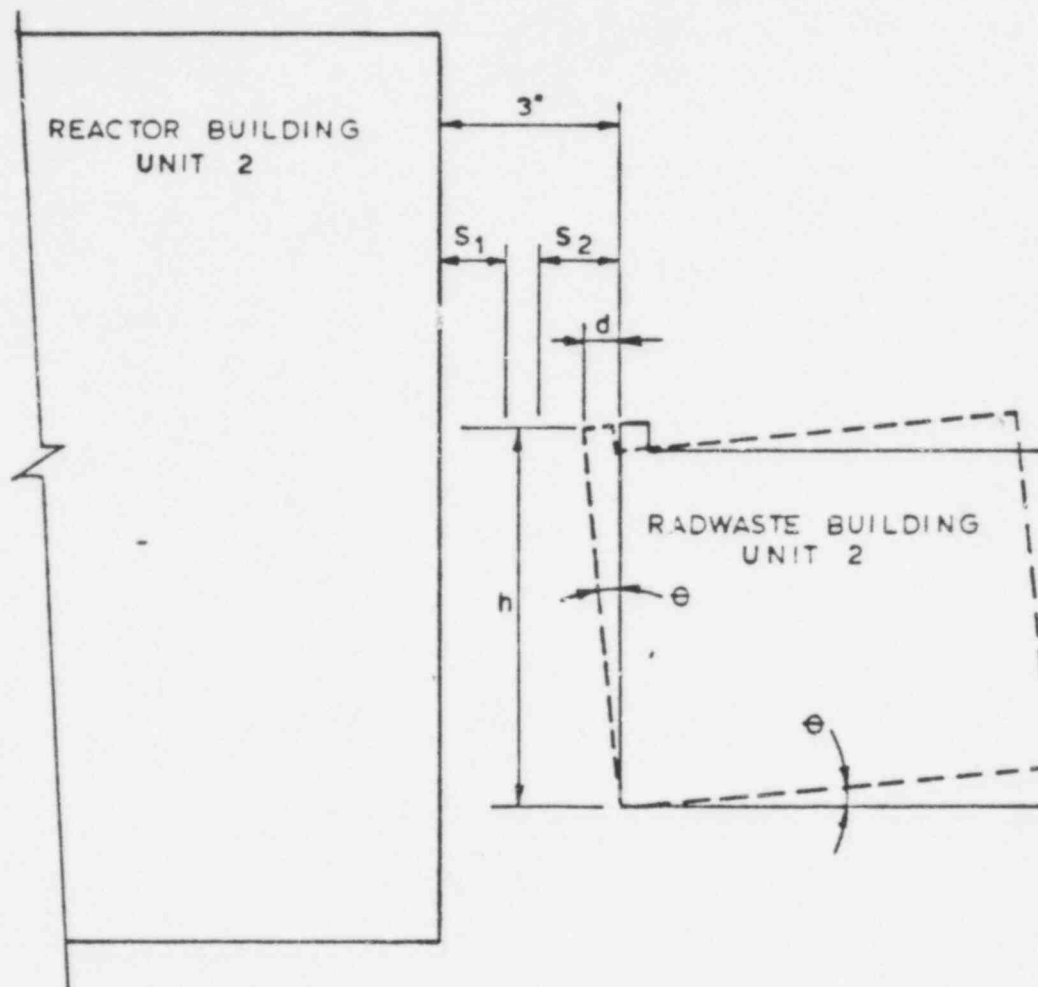
PARTIAL ELEVATION LOOKING WEST

BECHTEL ASSOCIATES JOB 6511

EDWIN I. HATCH NUCLEAR PLANT - UNIT No. 2

SOUTHERN SERVICES, INC.

GEORGIA POWER COMPANY ATLANTA, GEORGIA
GENERAL ENGINEERING DEPARTMENT



ALLOWABLE SLOPE $\theta = \frac{d}{h}$ (FOR SMALL ANGLES)

AND $d = \frac{3'' - (S_1 + S_2)}{2}$

WHERE: θ = ALLOWABLE SLOPE OF THE BUILDING
 d = ALLOWABLE HORIZONTAL COMPONENT OF TILT TOWARDS AN ADJACENT BUILDING
 h = HEIGHT OF BUILDING
 S_1 = OBE DEFLECTION OF BUILDING AT TOP
 S_2 = OBE DEFLECTION OF ADJACENT BUILDING AT SAME ELEVATION

FIGURE 3: ALLOWABLE SETTLEMENT PROFILE SLOPE
CALCULATION PROCEDURE

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EDWIN I. HATCH NUCLEAR PLANT - UNIT No. 2

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