APPENDIX 2K

SEISMIC SURVEY

(THIS APPENDIX HAS BEEN EXTRACTED IN ITS ENTIRETY FROM THE SEABROOK STATION PSAR, WHERE IT IS REFERRED TO AS APPENDIX 2E)

The information contained in this appendix was not revised, but has been extracted from the original FSAR and is provided for historical information.

. A

APPENDIX 2E

SEISMIC SURVEYS

Seismic refraction surveys were conducted in the following areas: the plant site; tidal marsh; Hampton Harbor; Hampton State Park-State Beach; and offshore (to the east of Hampton State Beach). The purpose of these reconnaissance, seismic surveys was to determine depths to bedrock and depths of major seismic overburden discontinuities. The results of these surveys are summarized as follows:

1. Plant Site Area

The plan of the seismic lines of investigation, in the plant site area is shown on Figure 2E-1. In addition to the previously stated purpose, Line 20,000N was extended west to provide supplimentary data for the groundwater hydrology study. Other lines were extended north for the purpose of exploring the contact zone between the Newburyport quartz diorite in the site area and the Merrimack Formation to the north of the site.

The results of refraction surveys in the plant site area are shown on Figure 2E-2 (Sheets 1, 2, and 3). In general, the seismic survey showed that hard rock was shallow in the vicinity of the selected plant location, with dense till along the north side of the site and less dense till and possible other overburden materials west of the plant location. There is good correlation between seismic and boring data.

The bedrock velocities measured by surface refraction techniques ranged between 13,000 and 16,000 ft/sec; this is indicative of sound bedrock conditions.

Overburden materials can be tentatively identified by their respective seismic velocities. Velocities for the overburden materials ranged from 2,000 ft/sec for loose, unconsolidated overburden materials to 6,500 to 6,800 ft/sec for dense glacial till. In general, overburden materials with velocities in excess of 5,500 ft/sec and in excess of 3,000 ft/sec for unsaturated materials are indicative of glacial till. Velocities below 5,500 ft/sec for saturated overburden usually indicate a fluvial or marine deposition.

The extension of Line 20,000N west to 76,900E indicates bedrock in the order of 200 feet deep and the absence of any potentially important aquifers.

A number of lines were extended northward to investigate a contact zone; however, Line 78,750E was the only one over which a velocity change from 15,000 ft/sec (Newburyport) to 13,000 ft/sec (Merrimack) was noted. This change was noted near Station 21,400N. The velocity change was subsequently confirmed by crosslines, and the contact location confirmed by borings. Line 80,500E had a velocity change between 20,900N and 21,100N, but it was not as evident as Line 78,750E. Other lines were either not extended sufficiently to the north or overburden velocity or depth variations were such that any

velocity change could not be definitely ascribed to the bedrock type.

2. Tidal Marsh Area

The plan map of the seismic lines in the tidal marsh area is shown on Figure 2E-3. The basic program of investigation consisted of Line A and Lines 2A, 2B, and 2C across the tidal marsh area with a number of crosslines between. The location and orientation of the crosslines were determined by depths to bedrock and the numerous small streams and man-made canals which crisscrossed the area. Detailed investigations were made along Browns River (600 series of seismic lines) and then westward to the site passing north of Hunts Island (Line NS-2 and the 700 and 800 series). A detailed plan map of the seismic lines in this area is shown on Figure 2E-3. The 600 series of seismic lines were operated as a marine refraction survey. Elevations of the bottom of Browns River were provided by McKenna Associates.

The results of the seismic survey in the tidal marsh area are shown on Figure 2E-4 (Sheets 1 through 10). In general, the bedrock surface in the tidal marsh is more than 50 feet below ground surface although a few sharp rises in the bedrock surface were noted in the vicinity of Browns River, where some outcrops were noted. Although Boring C-68 encountered refusal at an elevation of -28 feet, the bedrock surface rises to an

elevation of -10 feet along Lines 805 and NS-24, about SO to 70 feet northeast of the boring. Another example of the sharp changes in bedrock depths occurs in the vicinity of Line A where Boring C-52, 25 feet right of Line A, encountered refusal at the elevation of -33 feet, while the seismic data along Lines A and NS-6 indicate that a ridge of shallow rock (approximately Elevation -18 feet) occurs along or just to the north of Line A.

The borings showed that the glacial till found along the north of the site extends into the tidal marsh south of Line A and as far east as Line A-12. The till is only a few feet in thickness and, therefore, could not be detected seismically.

Boring data subsequently showed that in some areas the depths to bedrock were too shallow by as much as S feet. This was due'to a surface layer of organic material (peat) of about the same thickness. Organic materials, because of air entrapped and the overall nature of the material, are not conducive to good generation or transmission of seismic energy. In a few areas of the tidal marsh, organic materials were so thick as to prevent the generation of a recordable seismic signal.

3. Hampton Harbor Area

The results of the fathometer survey which took place during March and April 1973 are shown in the form of a bottom contour

map (Figure 2E-5). The results of the seismic investigations are shown in the form of a bedrock contour map (Figure 2E-6). The contours are based on seismic reflection and seismic refraction surveys conducted during March and April 1973 and augmented by the data obtained from a seismic refraction survey conducted in the fall of 1968. The 1968 data were obtained in the northern half of the area shown on Figure 2E-6 and mainly consisted of information on the minimum depths to a bedrock with only a few computed bedrock depths. The track maps for the 1973 reflection and refraction surveys are shown on Figures 2E-7 and 2E-8, respectively.

In the southern half of the area the bedrock was found to be generally shallow and somewhat irregular. The bedrock contour map in this area was based principally on seismic reflection data, the interpretation of which was confirmed by Boring F1A. Organic materials which prevented the generation of a good seismic signal were noted in a few small areas and at the southern edge of the area of investigation.

The bedrock contour map in the northern half of the area of investigation is based on a combination of seismic reflection and refraction data. Glacial till was detected against the north side of the shallow rock area by the seismic reflection.

The till appeared to thin towards the north so that the till and bedrock could not be distinguished on the seismic reflection records. Based on Boring F-2 which encountered 14 feet of till above bedrock, the seismic reflection data were reevaluated and the contours, as shown on Figure 2E-6, were constructed from the reevaluated reflection data and the seismic refraction data.

4. State Park - State Beach Area

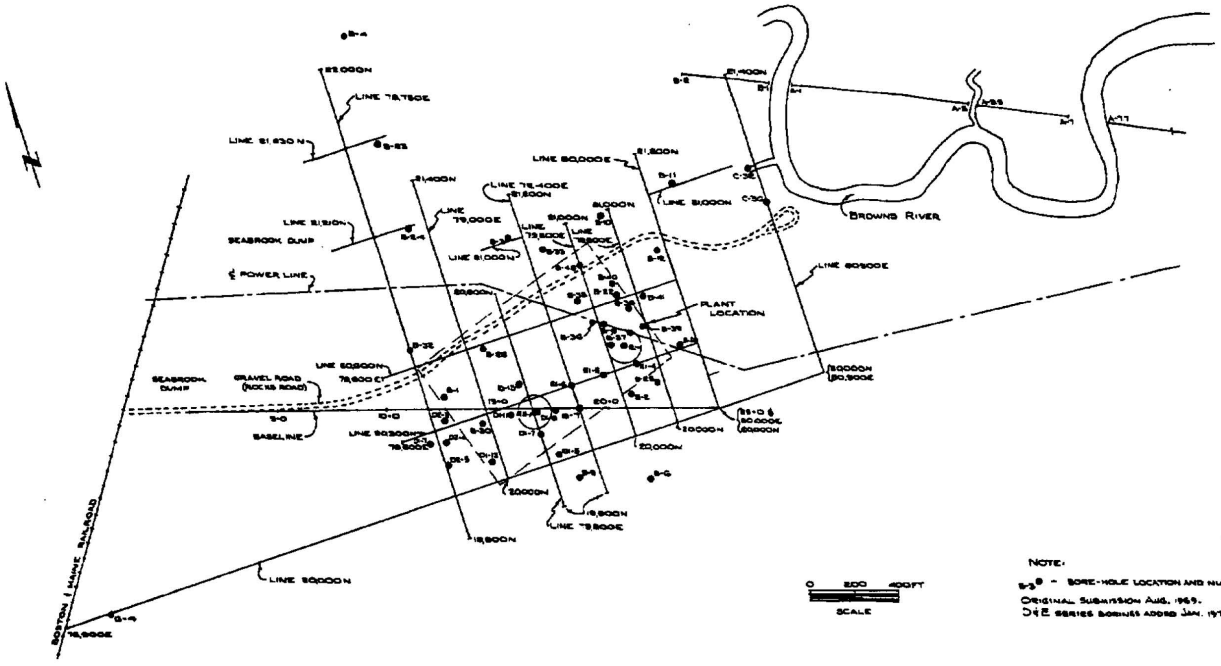
The location plan of the seismic lines in this area is shown on Figure 2E-9 and the seismic results are shown on Figure 2E-10 (Sheets 1, 2, and 3). Two relatively shallow areas in the bedrock surface were detected in the State Park: one in the vicinity of Lines SPS and SPB, just north of Boring C-56; the second, in the vicinity of Lines SP3, SP4, and SPE, just north of Boring C-66. Boring C-24 confirmed the fact that a depression in the bedrock surface exists between the two high areas of rock.

In the State' Beach area, a thin layer of glacial till was encountered by Boring P-1, but was not detected seismically. The seismic overburden velocity of 5,500 ft/sec, as detected on the more easterly lines of the State *Beach* area, may be indicative of a dense sand.

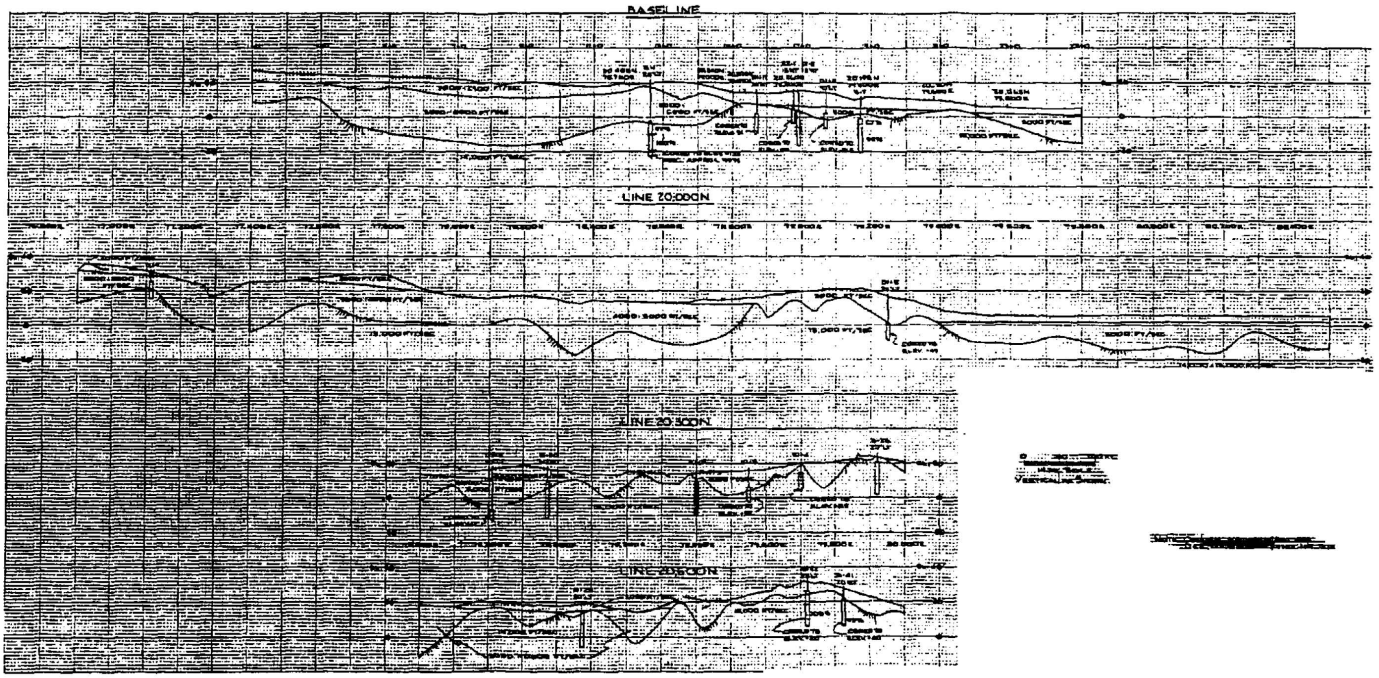
5. Offshore Area

The results of the fathometer survey which took place in March and April 1973 are shown on Figure 2E-11. The bedrock contour map, Figure 2E-12, was constructed from seismic reflection and refraction data obtained in March and April 1973, and from a seismic refraction survey conducted during the fall of 1968. The track map for the 1973 reflection and refraction surveys is shown on Figure 2E-13. The 1968 seismic refraction survey was conducted in an area extending in an east-northeasterly direction for a distance of about a mile from the Hampton State Beach.

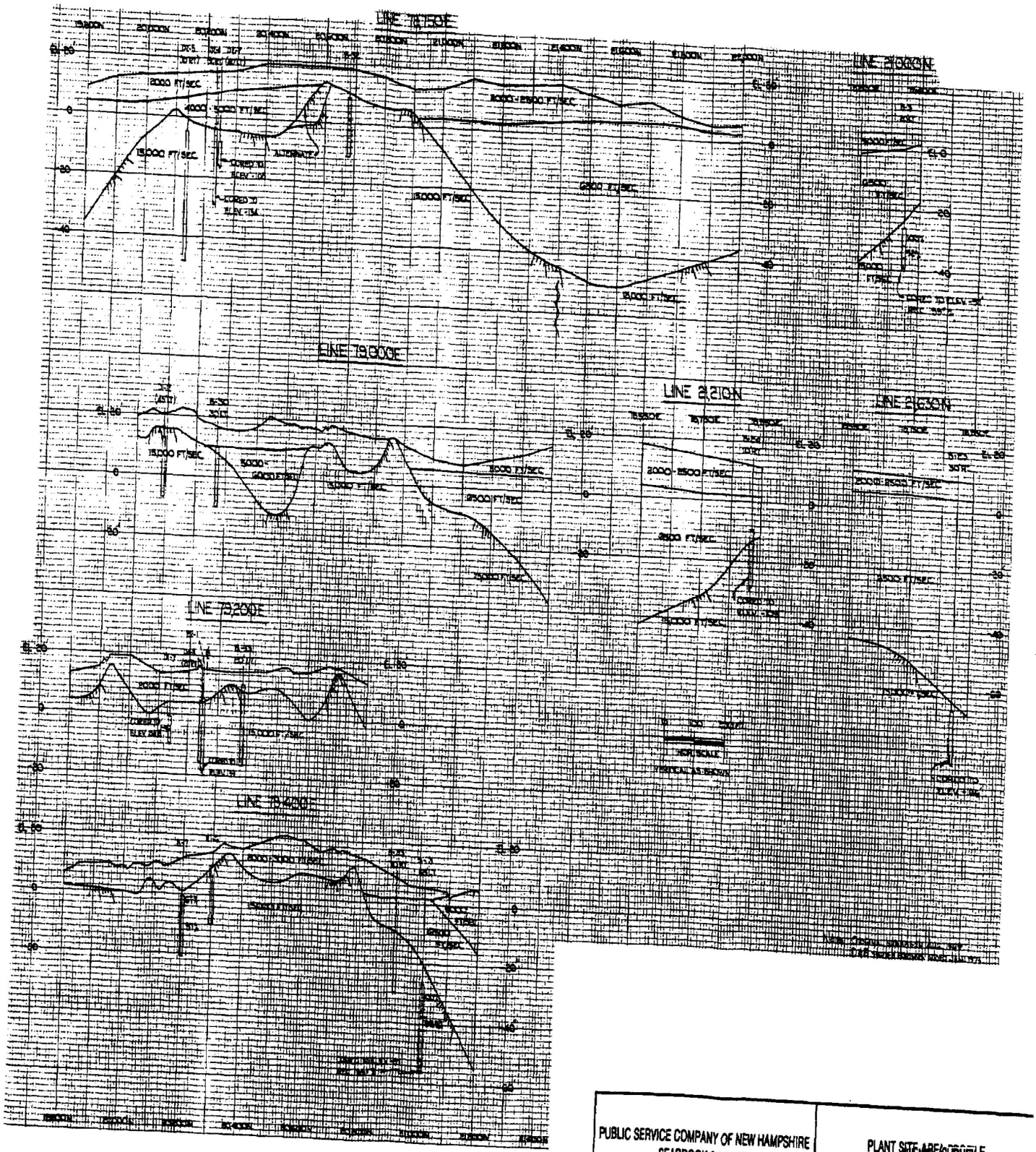
The contour maps show that much of the ocean bottom offshore consists of highly irregular bedrock outcrops. A denser material, possibly glacial till as indicated by the seismic refraction velocities, was found along the northern and western sides of the ledge outcrops. Refraction velocities in the 5,500 to 5,700 ft/sec range were found in this area, while away from the area, velocities generally ranged between 5,100 and 5,400 ft/sec. The seismic reflection data showed both glacial till and bedrock, although in some areas, reflections were only obtained from the till. In these latter cases, the refraction data provided the basis for the bedrock contours. Borings P-2 through P-10 conformed to the general picture shown by the seismic data.



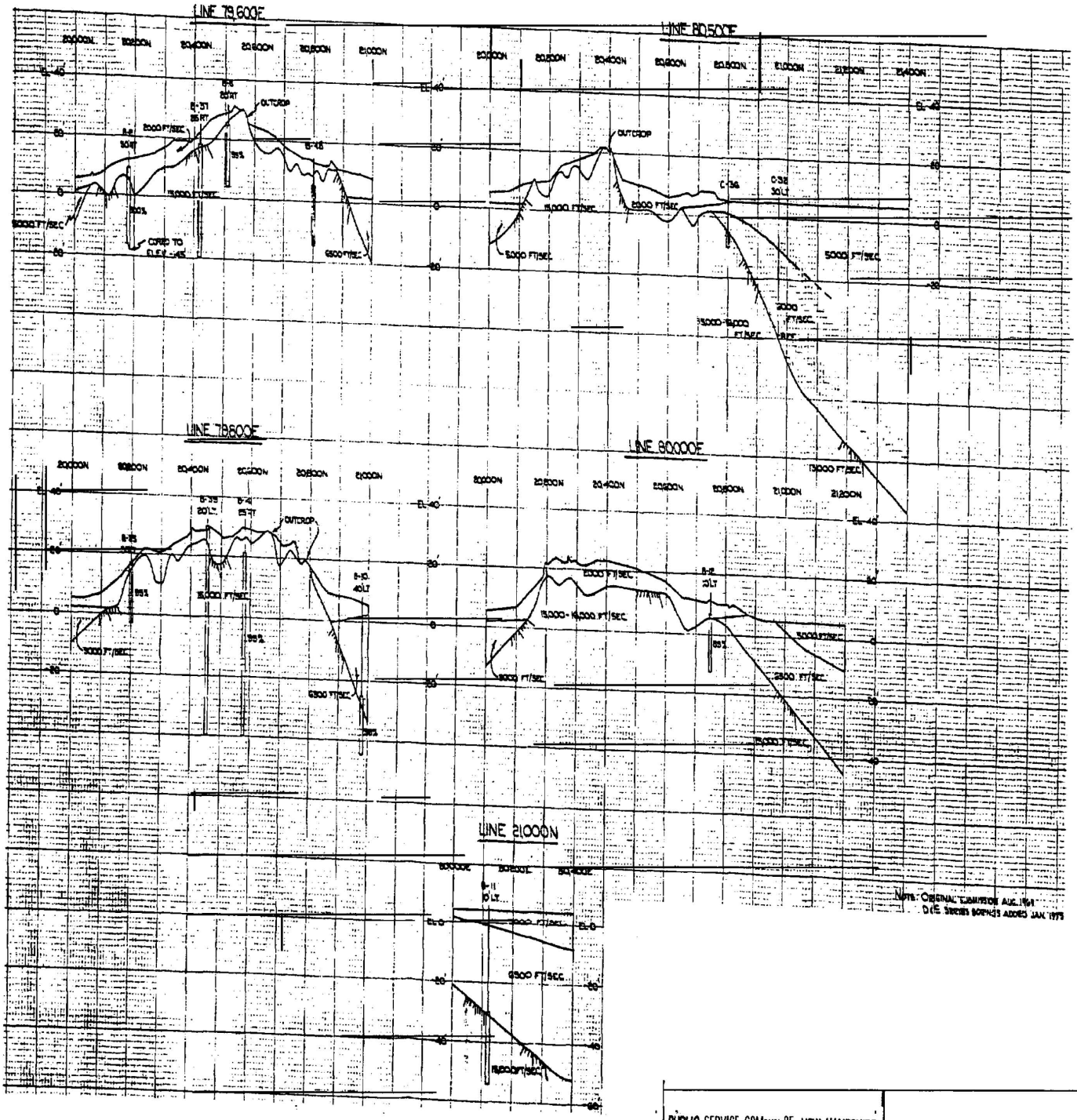
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION FINAL SAFETY ANALYSIS REPORT	PLANT SITE AREA PLAN MAP SEISMIC SURVEY
	FIG. 2.5-1 | SB 1 & 2



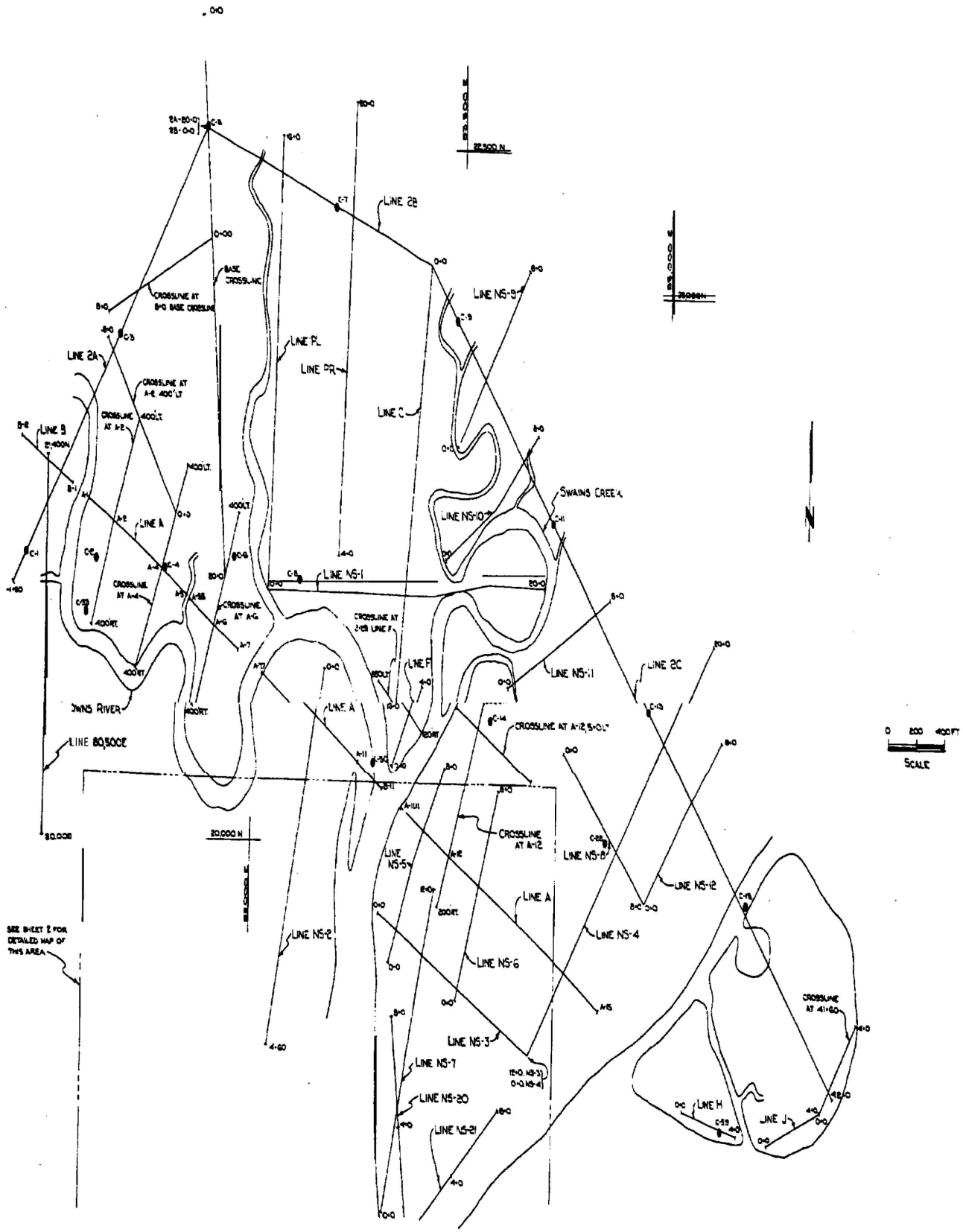
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION FINAL SAFETY ANALYSIS REPORT	PLANT SITE AREA PROFILE SEISMIC SURVEY
	FIG. 2E-2 SH.1 SB.1 & 2



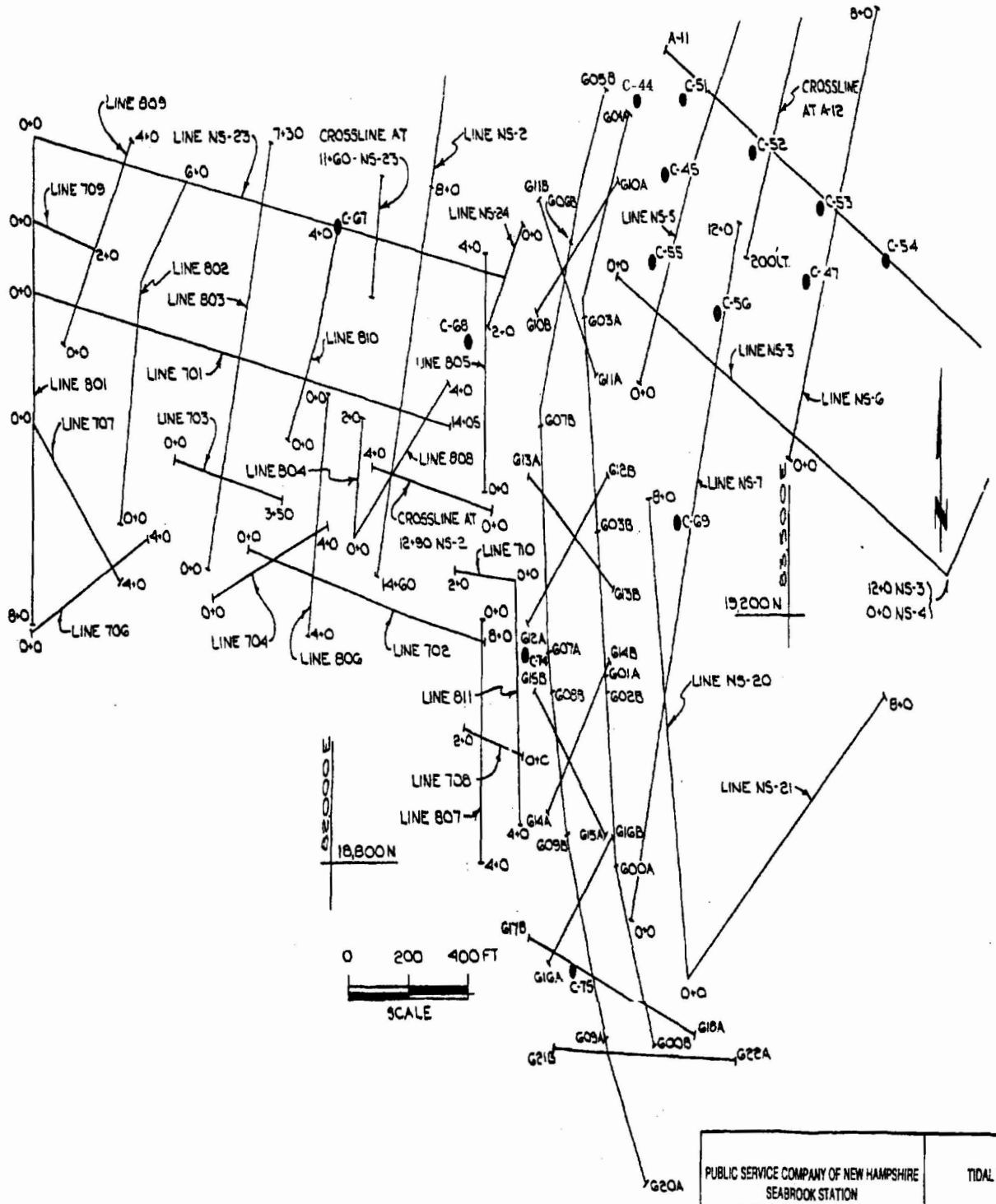
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION FINAL SAFETY ANALYSIS REPORT	PLANT SITE AREA SEISMIC SURVEY	
	FIG. 2E-2	SH.2 SE162



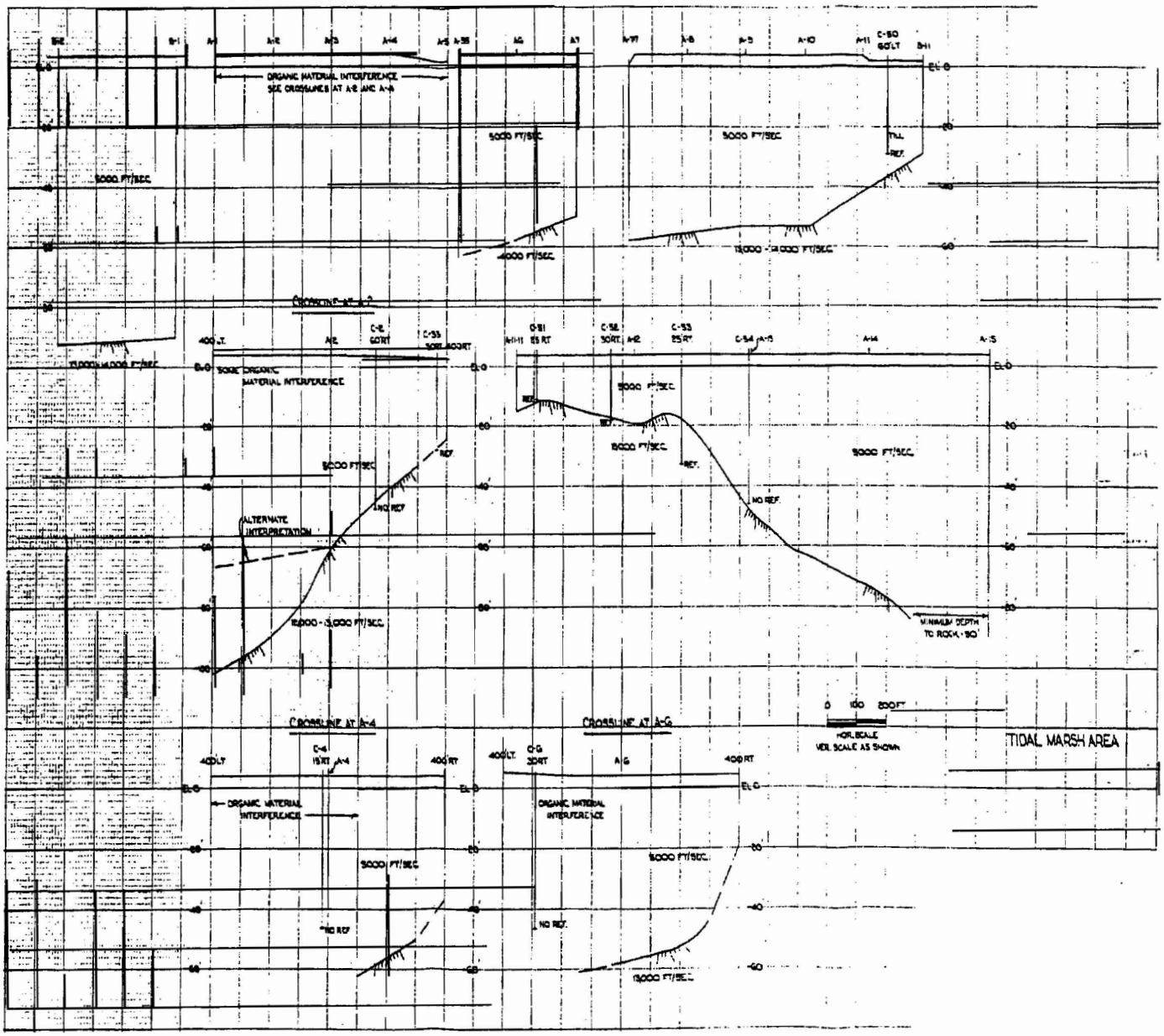
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION FINAL SAFETY ANALYSIS REPORT	PLANT SITE AREA PROFILE SEISMIC SURVEY
	FIG. 2E-2 SH.3 SB 1 & 2



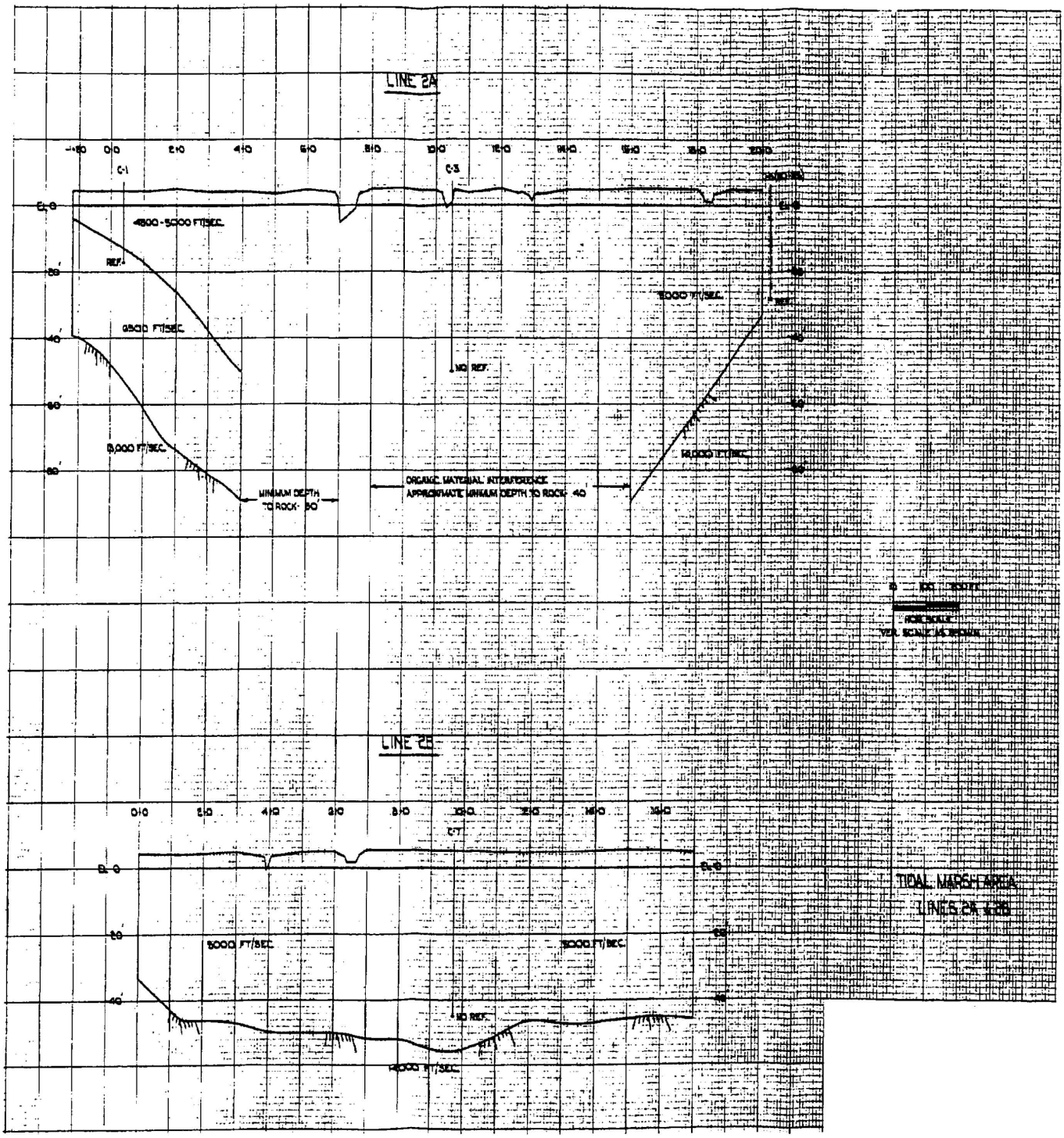
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION FINAL SAFETY ANALYSIS REPORT	TIDAL MARSH AREA PLAN MAP SEISMIC SURVEY FIG. 2E-3 SH.1 S81&2



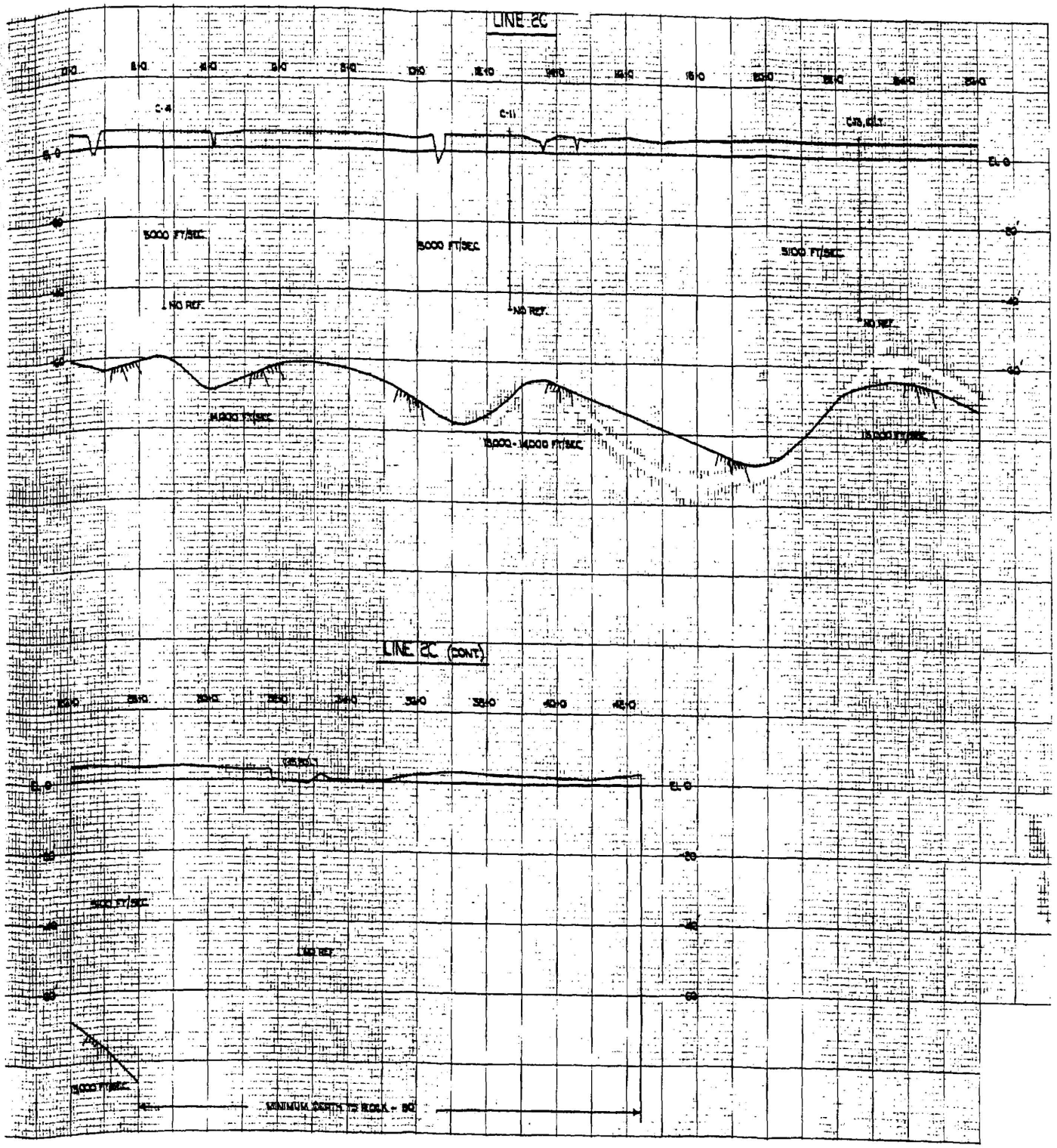
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION FINAL SAFETY ANALYSIS REPORT	TIDAL MARSH AREA PLAN MAP SEISMIC SURVEY	
	FIG. 2.5-3	SH.2 SB 1 & 2



PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION FINAL SAFETY ANALYSIS REPORT	TIDAL MARSH AREA PROFILE SEISMIC SURVEY
	FIG. 2E-4 SH. 1 SB 1 & 2



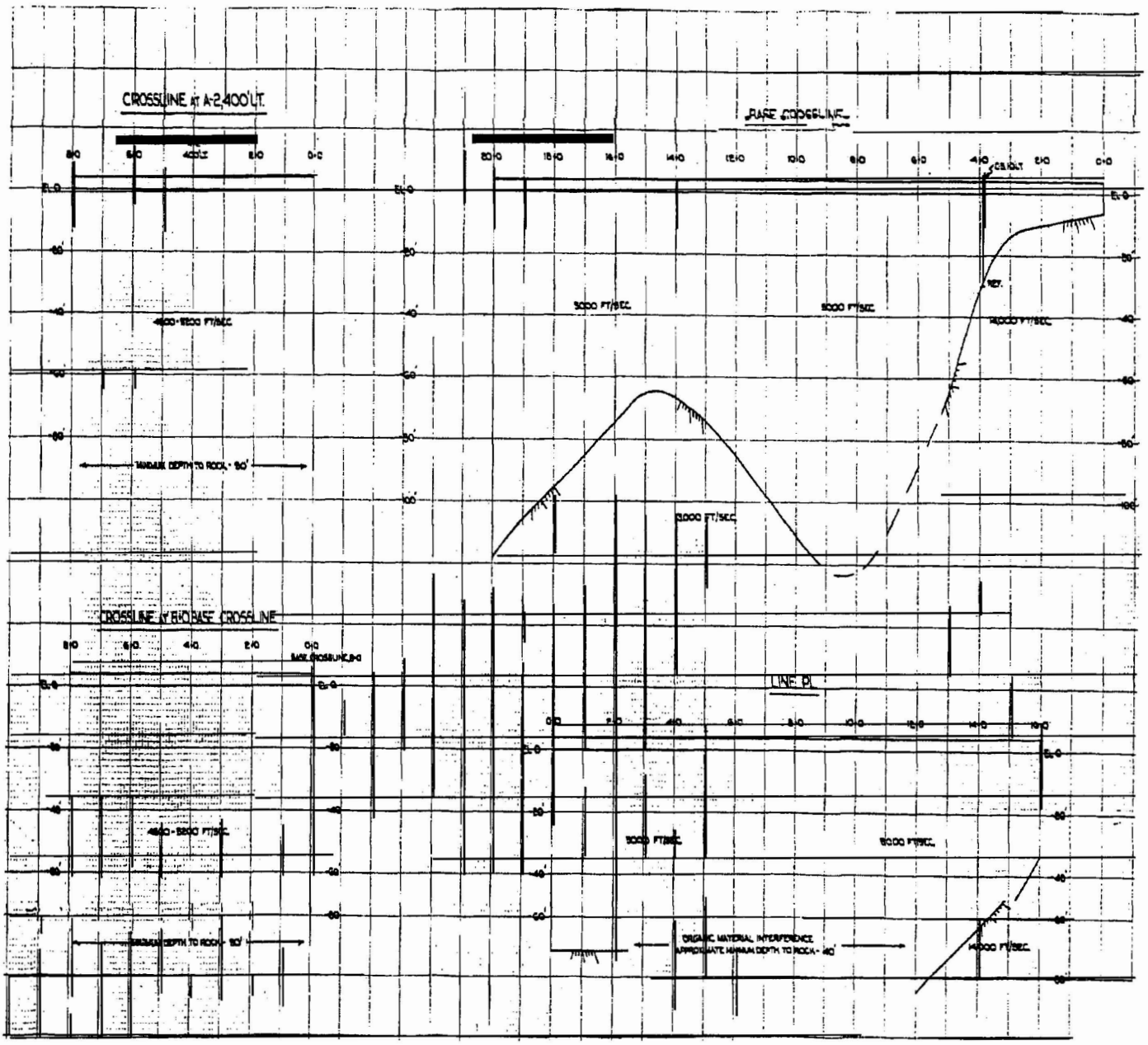
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE **SEABROOK** STATION FINAL SAFETY ANALYSIS REPORT	TIDAL MARSH AREA PROFILE SEISMIC SURVEY		
	FIG. 2E-4	SH.2	SB 1 & 2



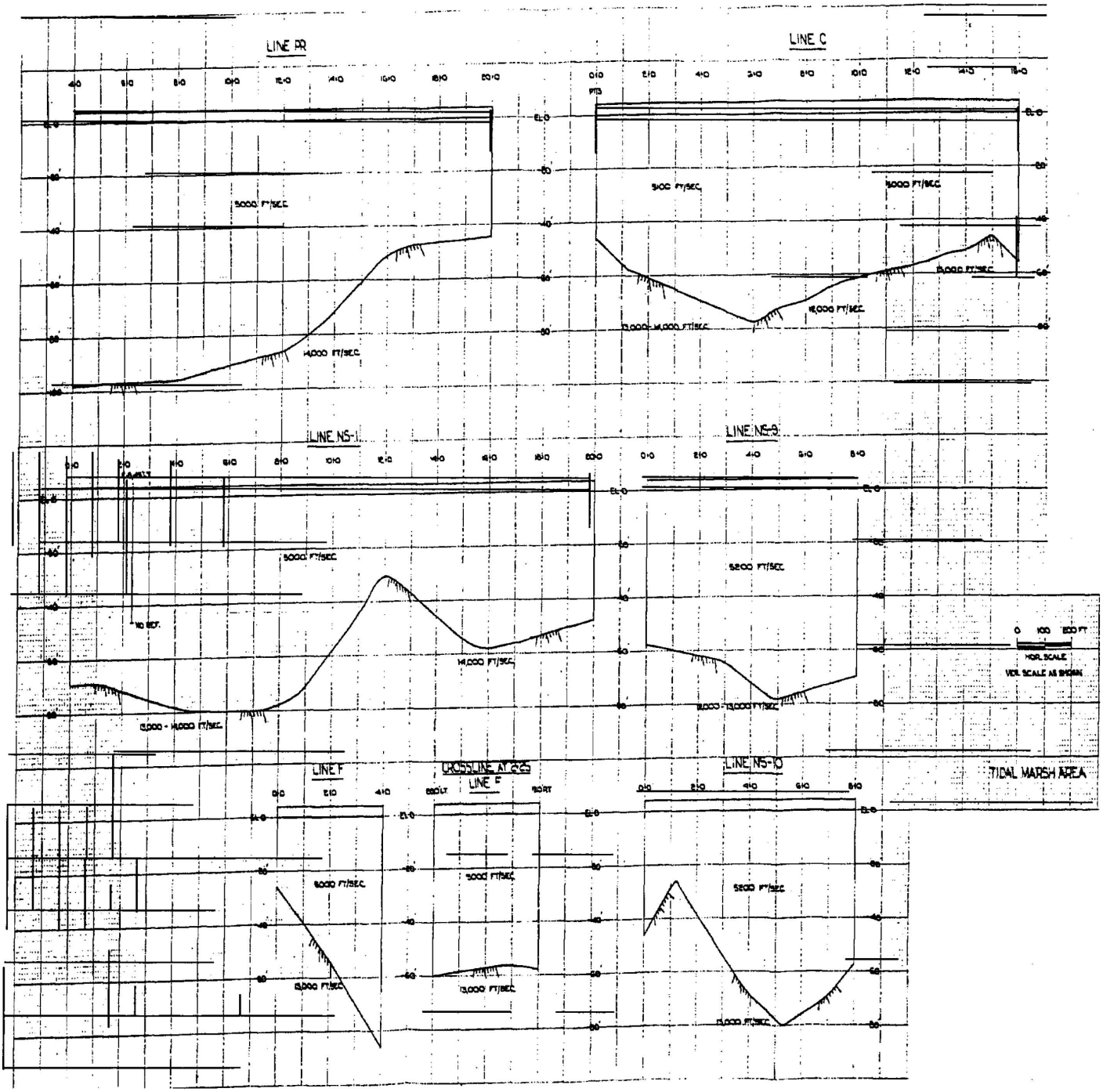
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE
SEABROOK STATION
FINAL SAFETY ANALYSIS REPORT

PROFILE
SEISMIC SURVEY

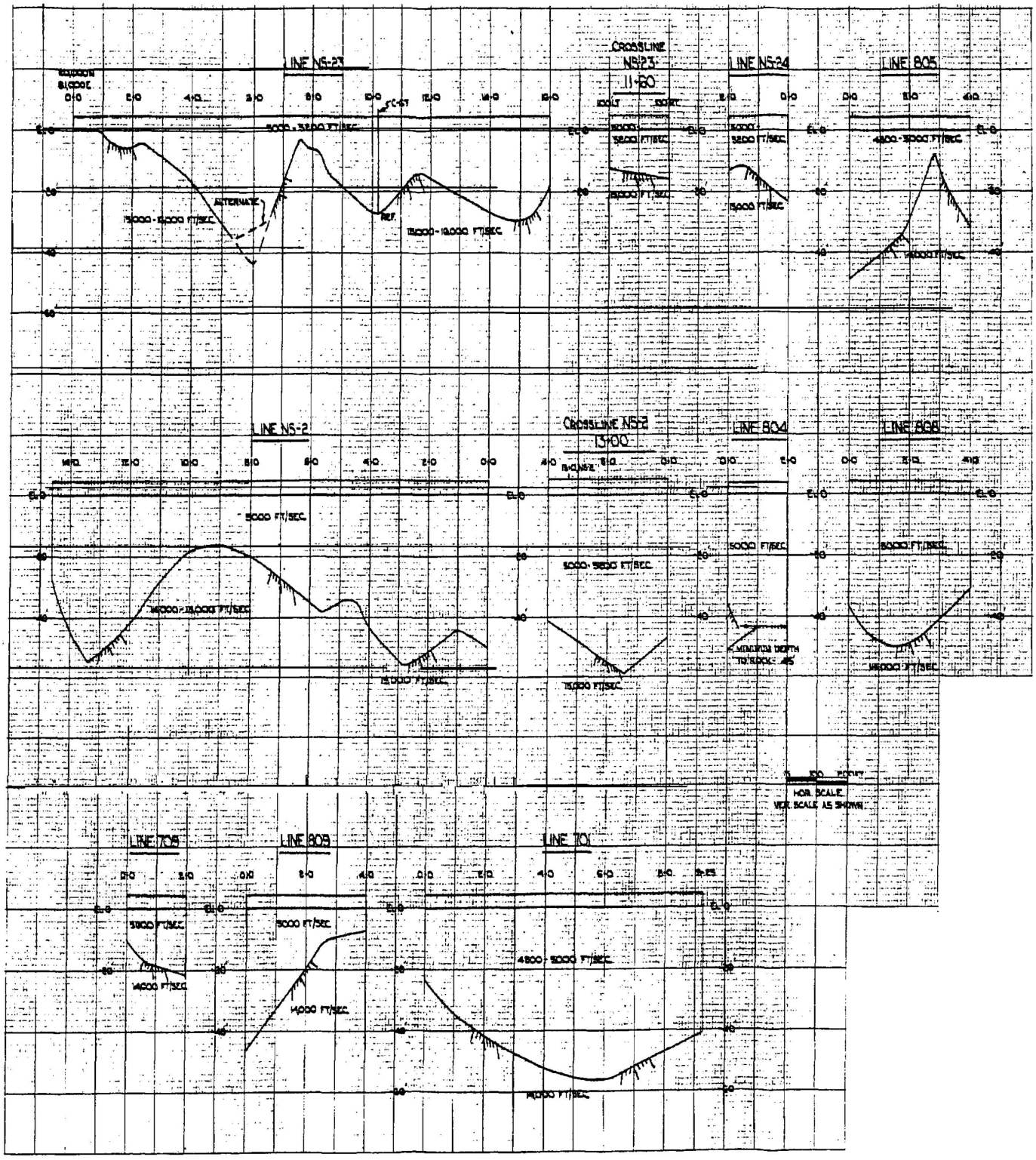
FIG. 2E-4	SH.3	SB 1 & 2



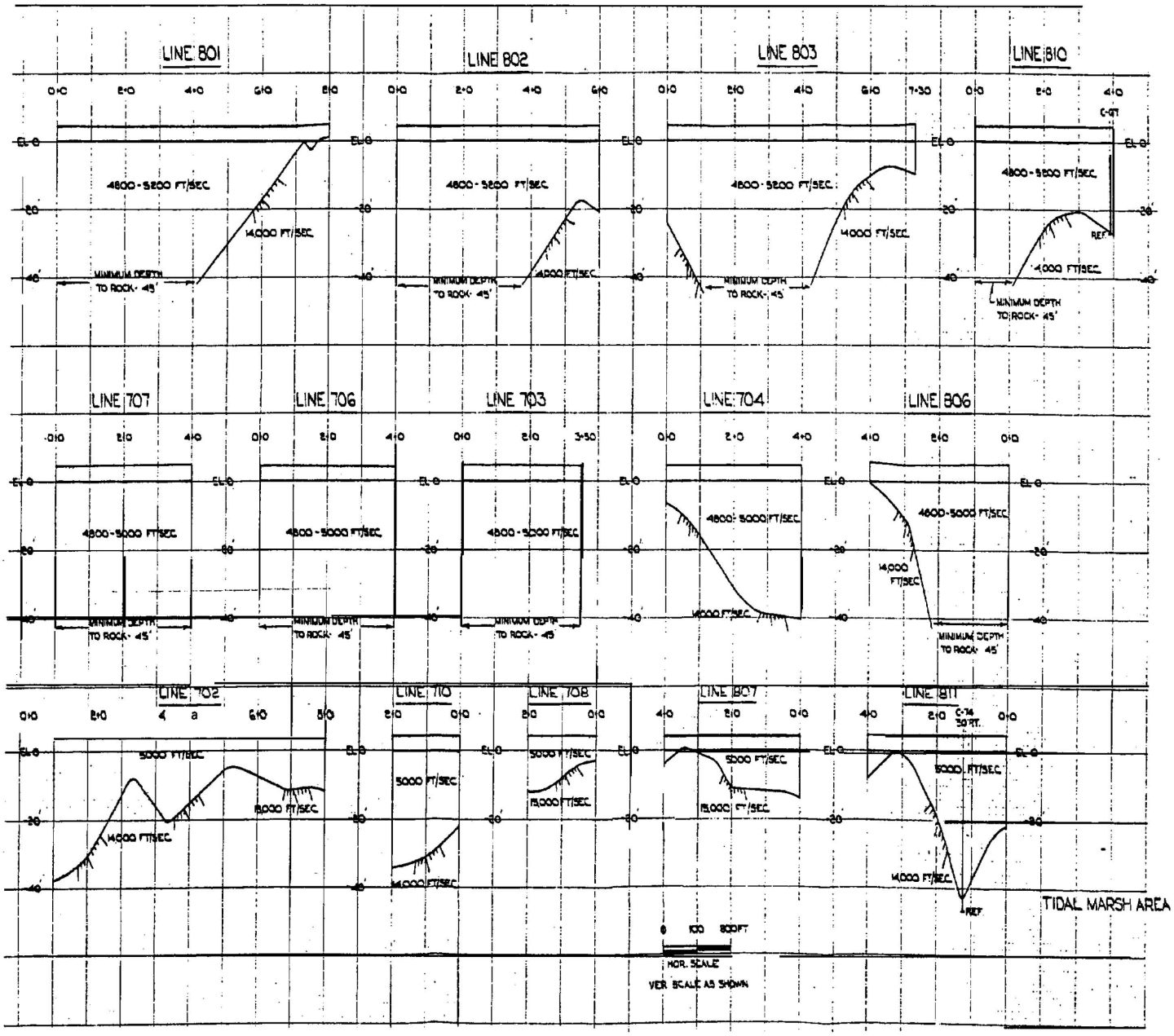
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION FINAL SAFETY ANALYSIS REPORT	TIDAL MARSH AREA PROFILE SEISMIC SURVEY
	FIG. 2E-4 SH.4 SB 1 & 2



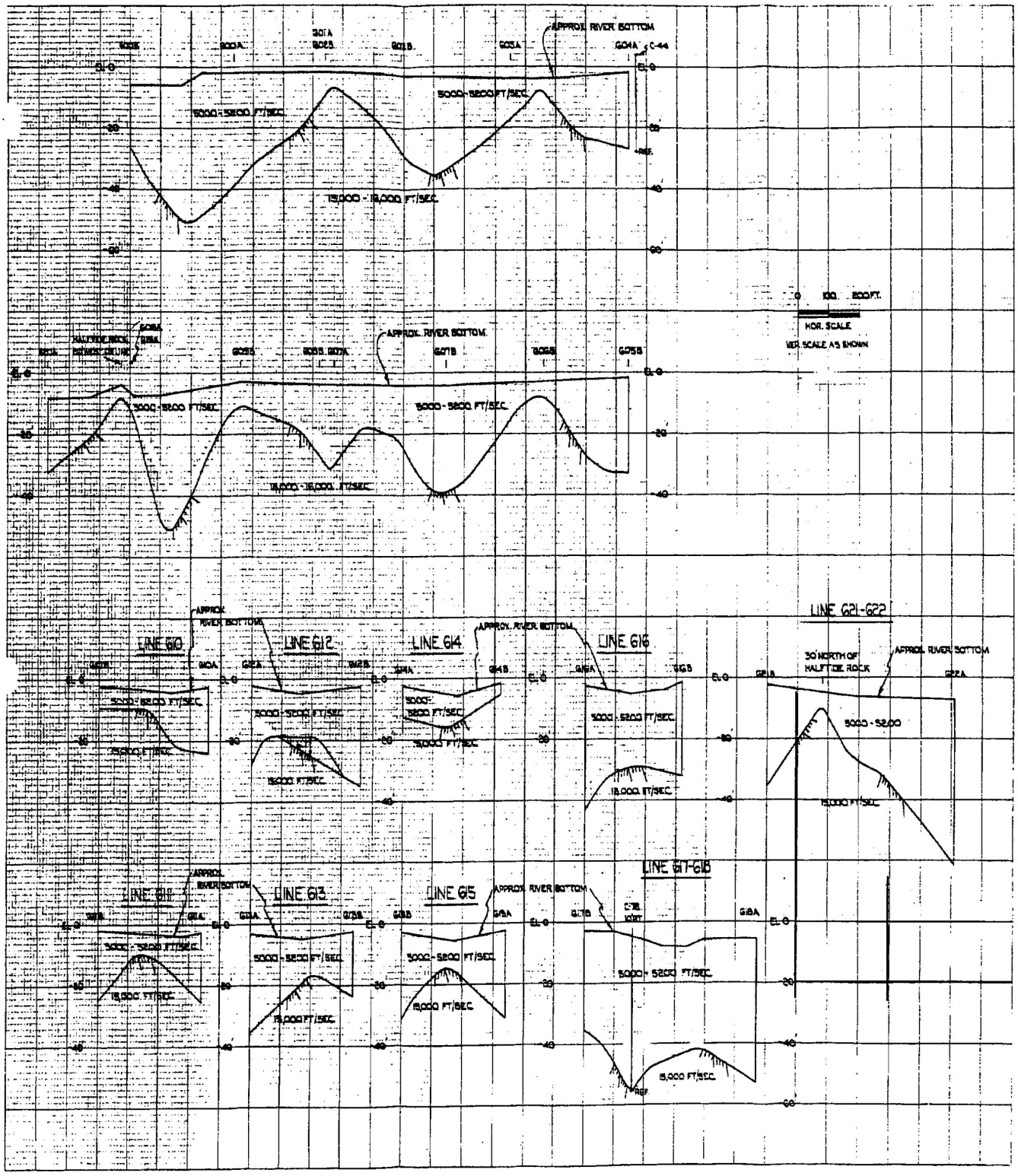
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION FINAL SAFETY ANALYSIS REPORT	TIDAL MARSH AREA PROFILE SEISMIC SURVEY
	FIG 2.5-4 SH. 5 | SB 1 & 2



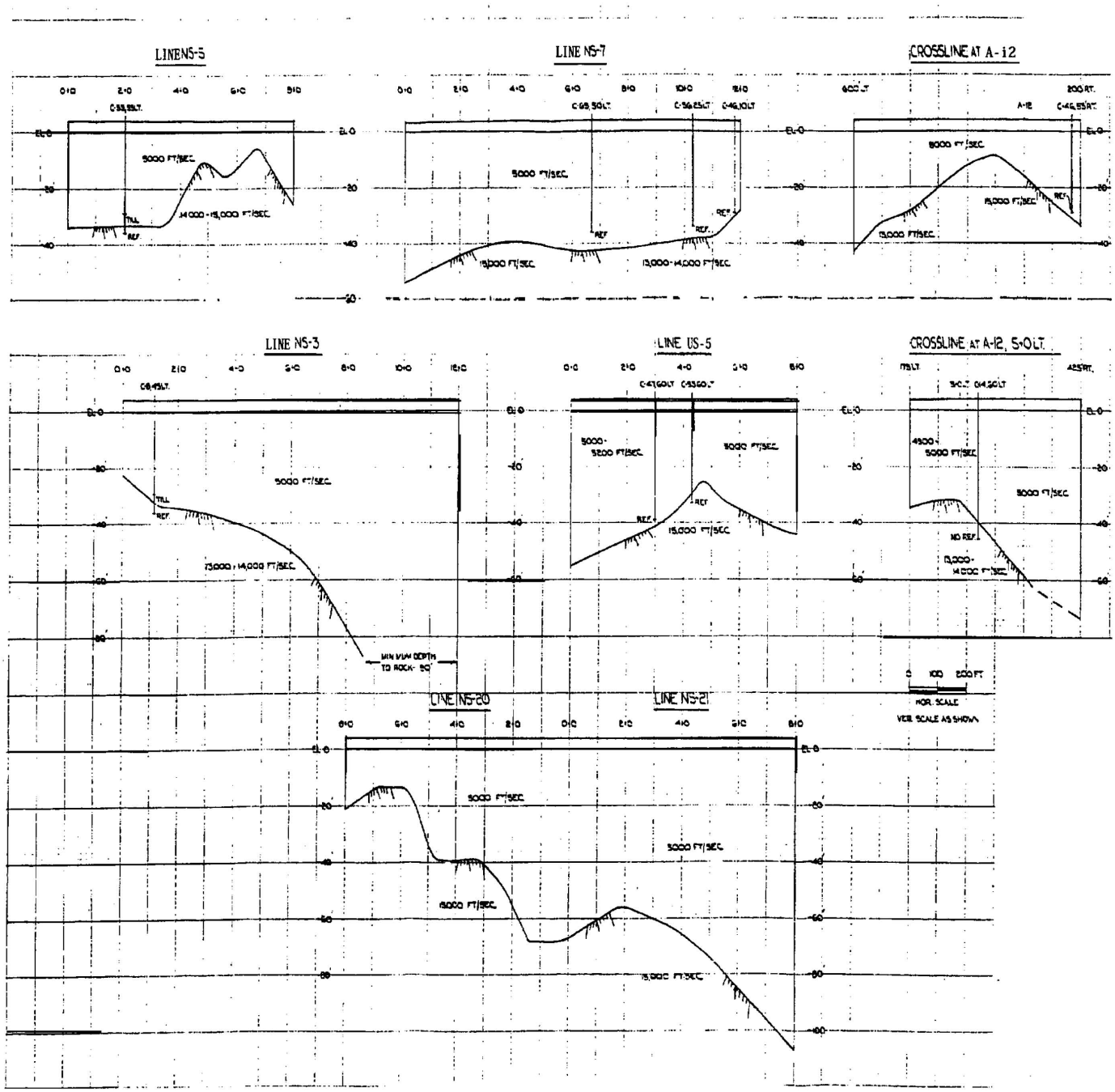
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION FINAL SAFETY ANALYSIS REPORT	TIDAL MARSH AREA PROFILE SEISMIC SURVEY		
	FIG. 2E-4	SH.6	SR 1 & 2



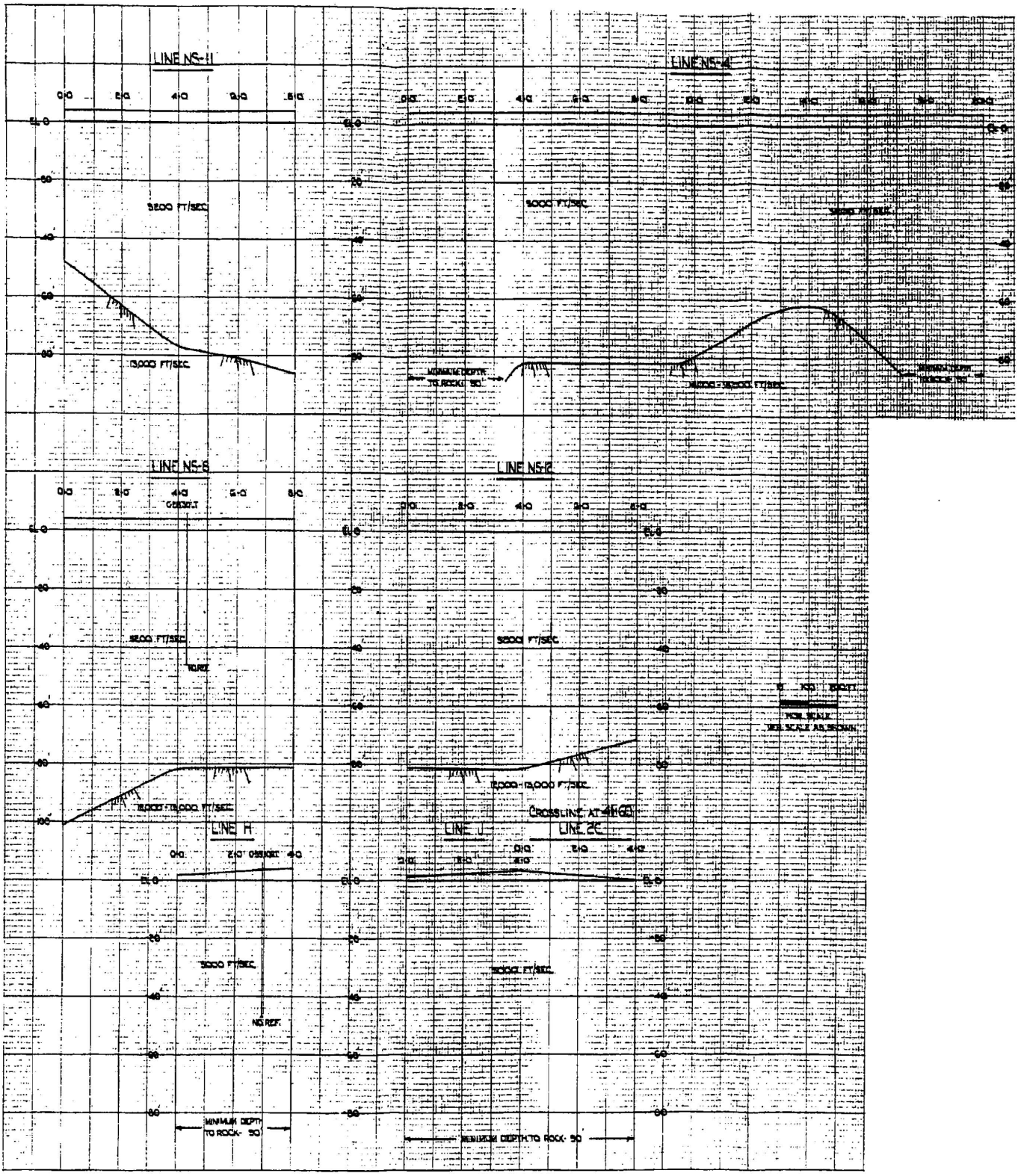
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION FINAL SAFETY ANALYSIS REPORT	TIDAL MARSH AREA PROFILE SEISMIC SURVEY		
	FIG. 2E-4	SH.7	SB 1 & 2



PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION FINAL SAFETY ANALYSIS REPORT	TIDAL MARSH AREA PROFILE SEISMIC SURVEY		
	FIG. 2E-4	SH.8	SB 1 & 2



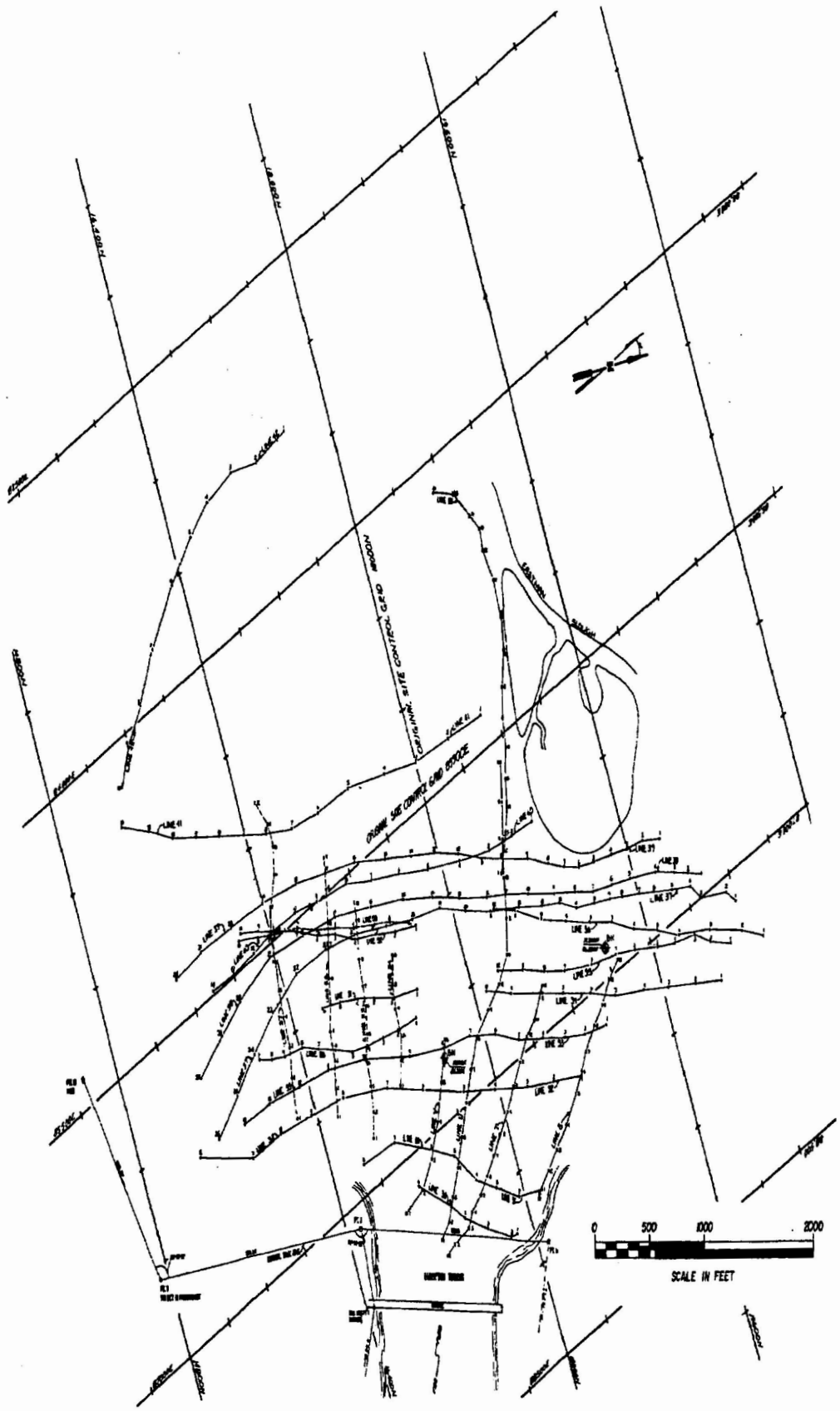
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION FINAL SAFETY ANALYSIS REPORT	TIDAL MARSH AREA PROFILE SEISMIC SURVEY		
	FIG. 2E-4	SH.9	SB 1 & 2



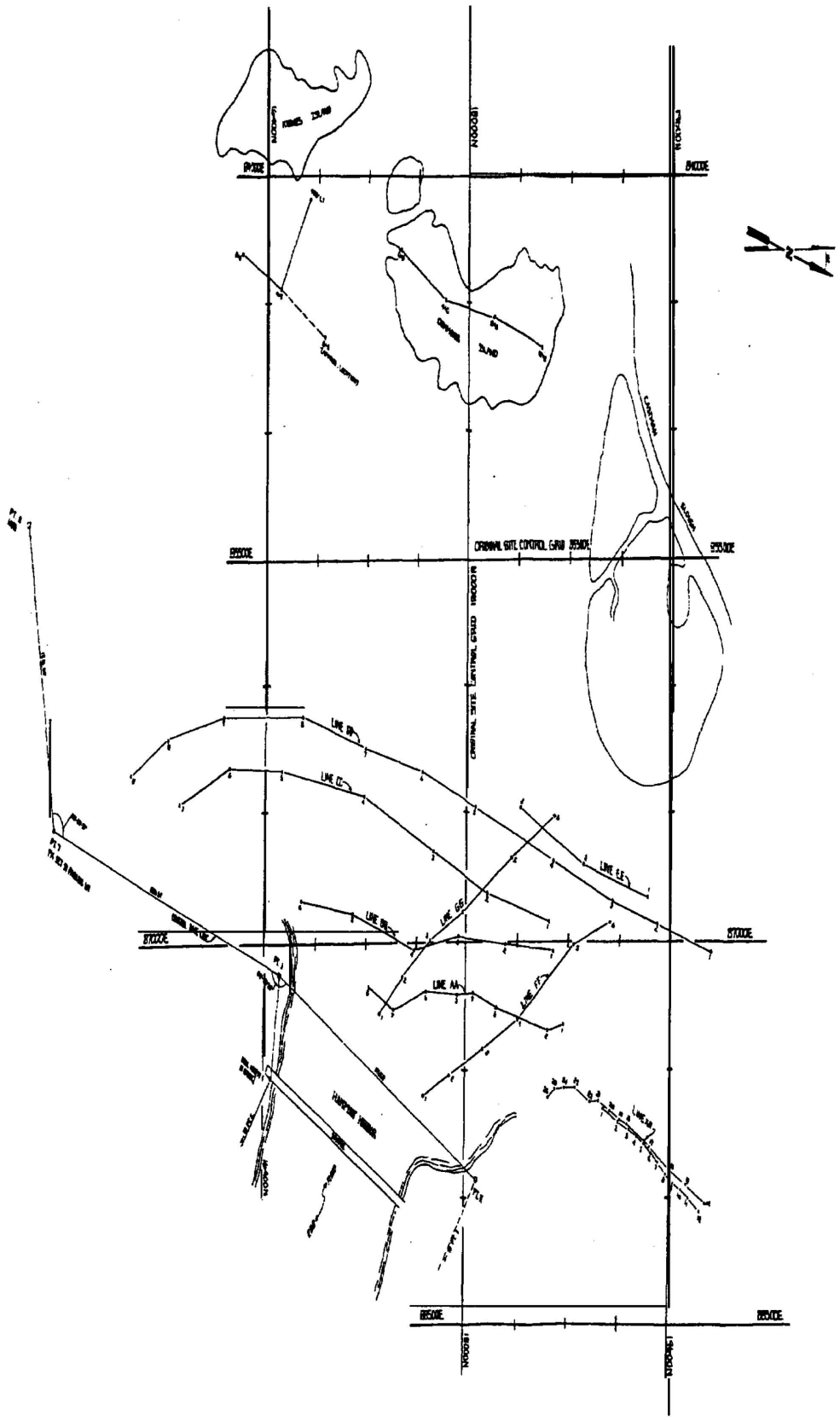
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION FINAL SAFETY ANALYSIS REPORT	TIDAL MARSH AREA PROFILE SEISMIC SURVEY
	FIG. 2E-4 SH.10 SB1&2

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION FINAL SAFETY ANALYSIS REPORT	HAMPTON HARBOR AREA BOTTOM CONTOUR MAP SEISMIC SURVEY	
	FIG. 2E-5	SB 1 & 2

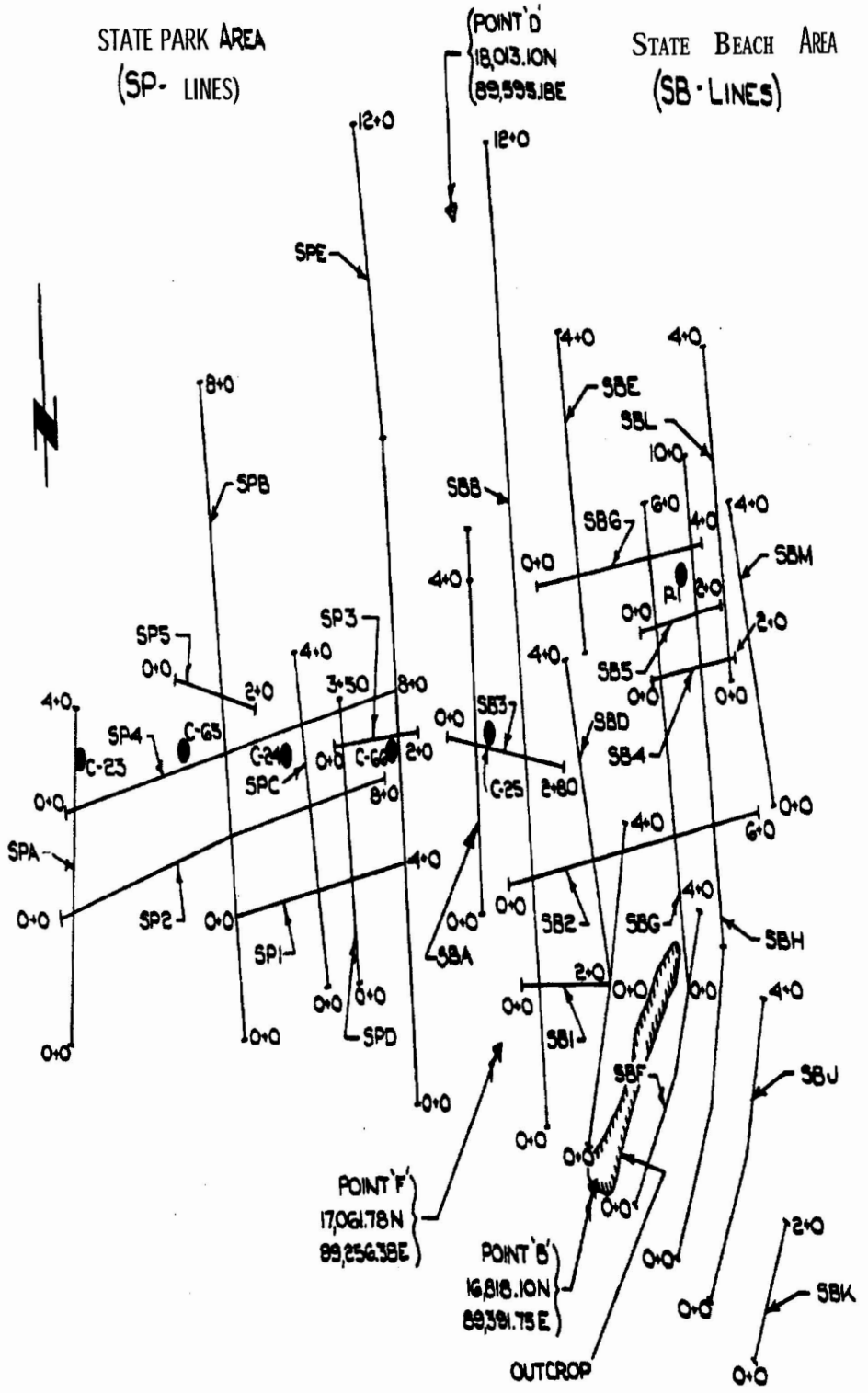
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE **SEABROOK** STATION FINAL SAFETY ANALYSIS REPORT	HAMPTON HARBOR AREA BEDROCK CONTOUR MAP SEISMIC SURVEY	
	FIG. 2E-6	SB 1 & 2



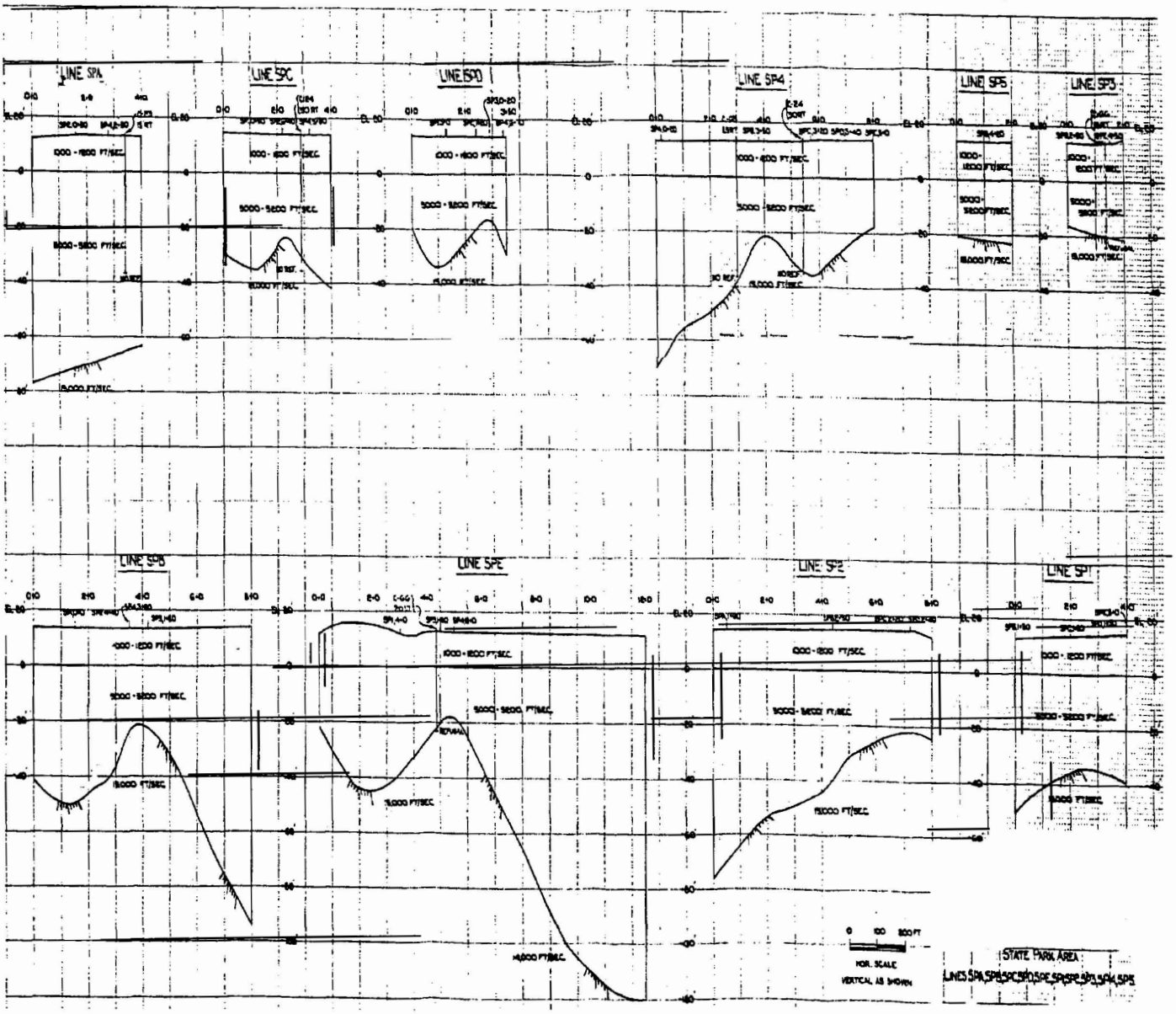
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION FINAL SAFETY ANALYSIS REPORT	HAMPTON HARBOR AREA TRACK MAP - REFLECTION SEISMIC SURVEY	
	FIG. 2E-7	SB 1 & 2



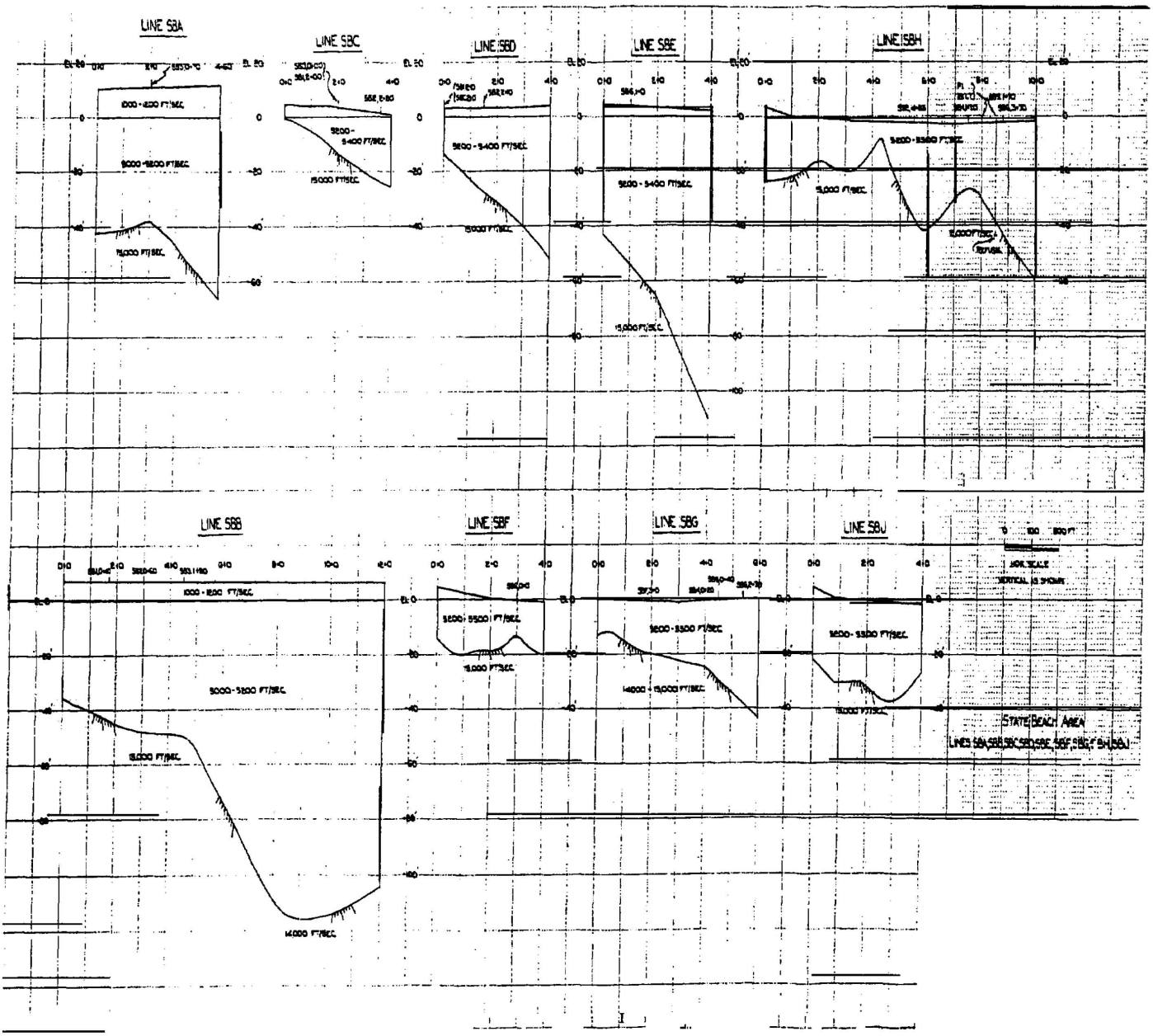
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION FINAL SAFETY ANALYSIS REPORT	HAMPTON HARBOR AREA TRACK MAP - REFRACTION SEISMIC SURVEY
	FIG. 2E-6 | SB 1 & 2



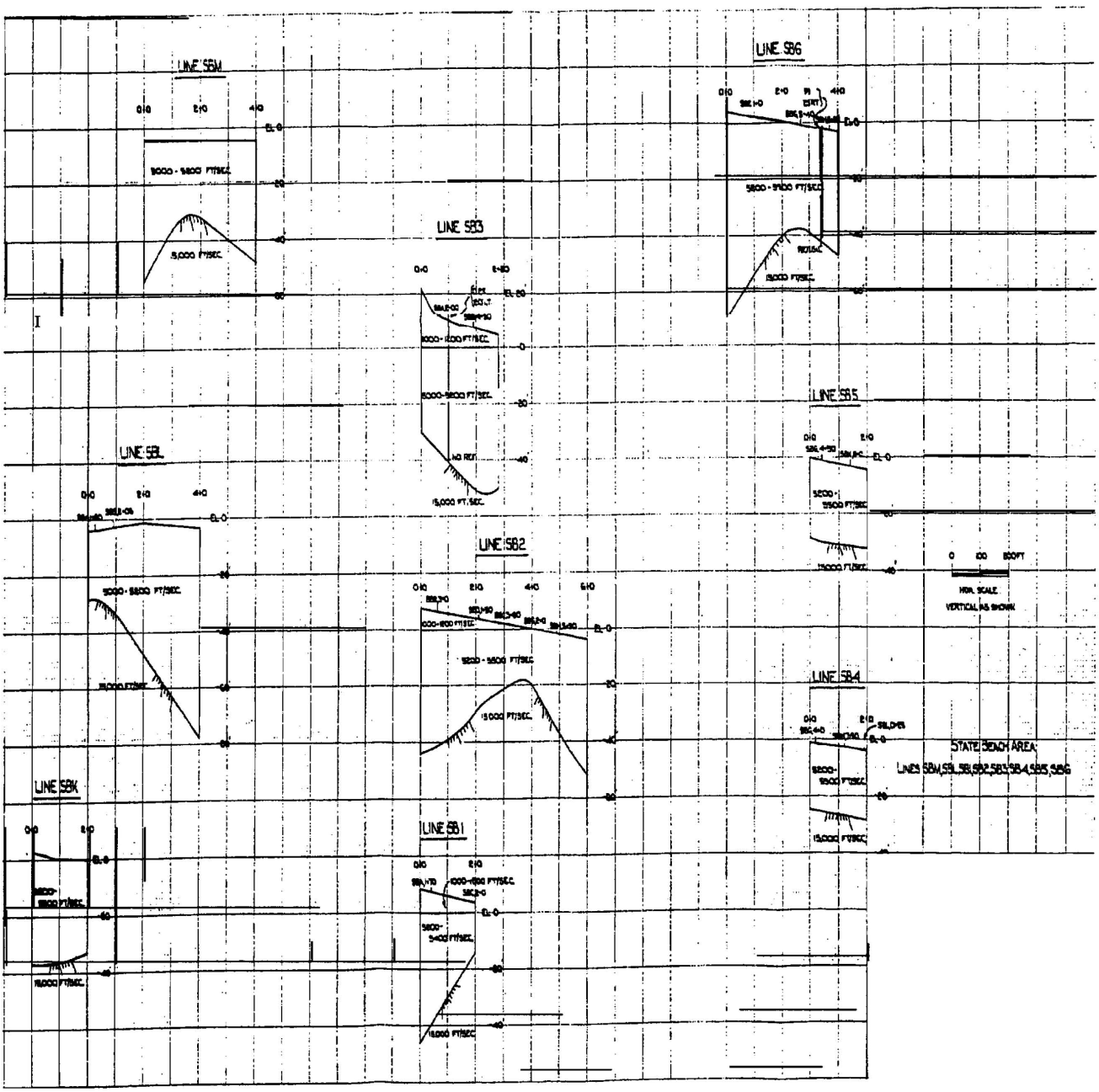
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION FINAL SAFETY ANALYSIS REPORT	STATE PARK STATE BEACH AREA PLAN MAP SEISMIC SURVEY
	FIG. 2E-9 | SB 1 & 2



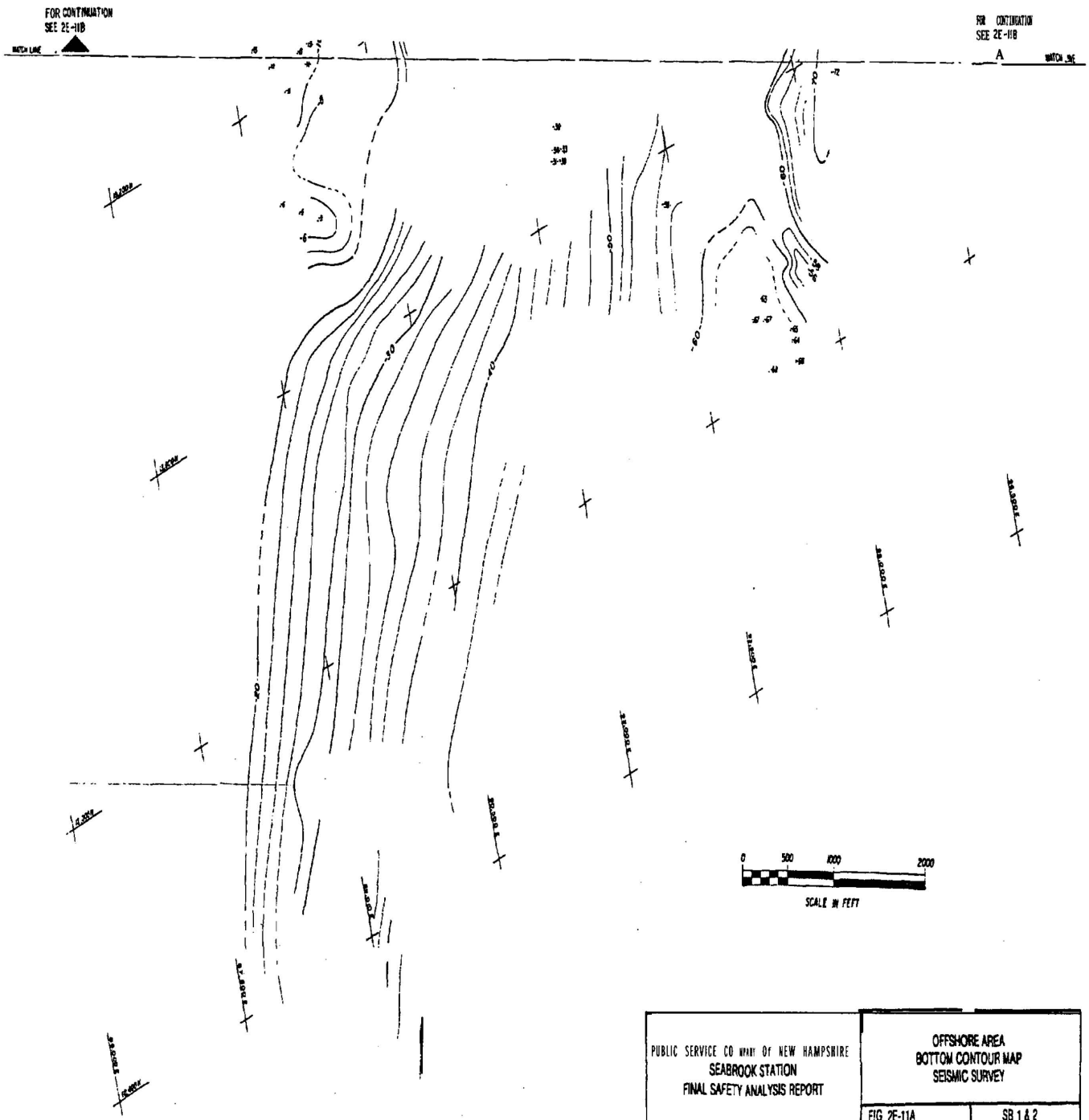
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION FINAL SAFETY ANALYSIS REPORT	STATE PARK STATE BEACH AREA PROFILE SEISMIC SURVEY
	FIG. 2E-10 SH. 1 SB 1 & 2



PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION FINAL SAFETY ANALYSIS REPORT	STATE PARK STATE BEACH AREA PROFILE SEISMIC SURVEY		
	FIG. 2E-10	SH.2	SB 1 & 2



PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION FINAL SAFETY ANALYSIS REPORT	STATE PARK STATE BEACH AREA PROFILE SEISMIC SURVEY
	FIG. 2E-10 SH.3 SB 1 & 2

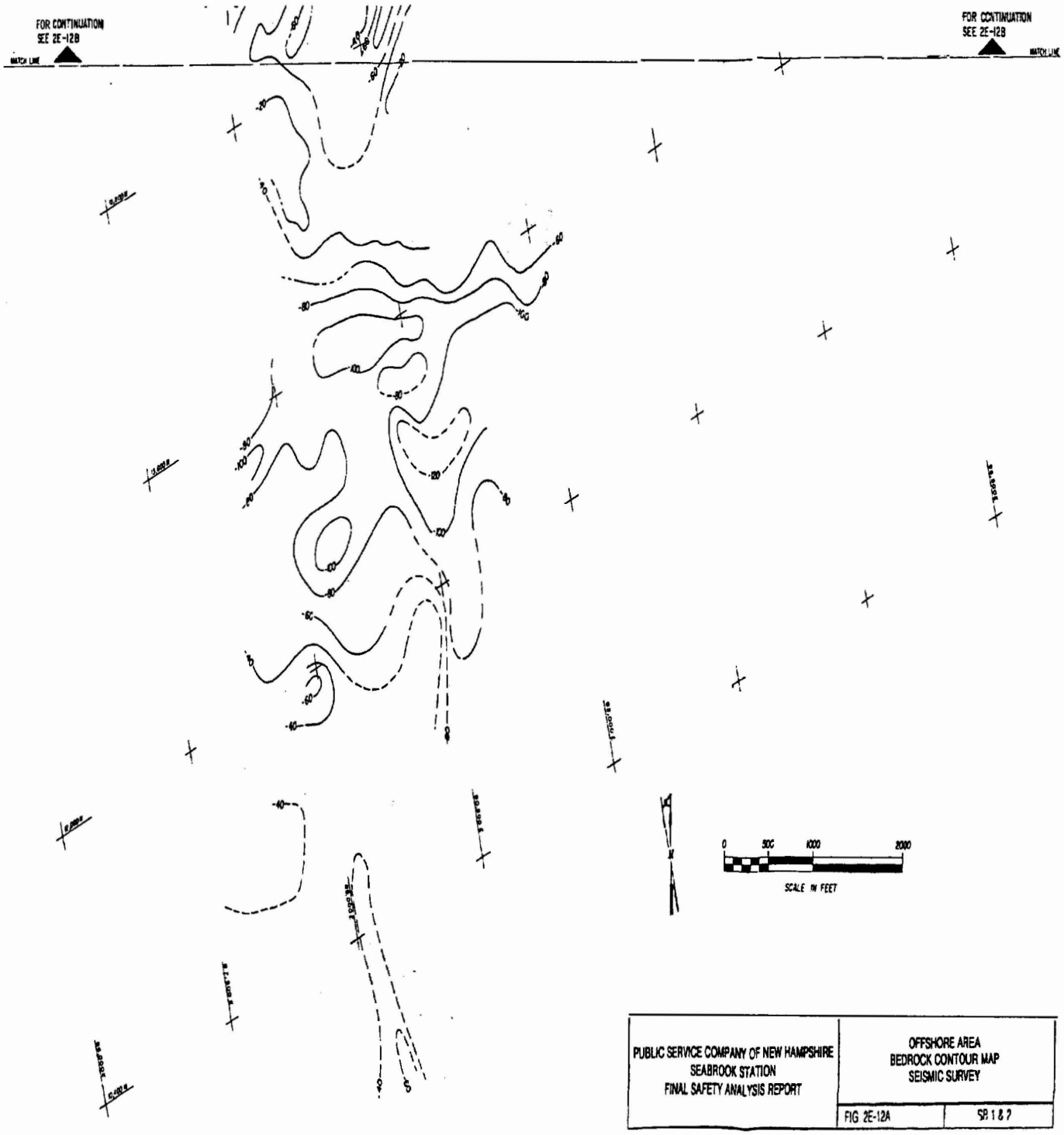


PUBLIC SERVICE CO MPANY Of NEW HAMPSHIRE SEABROOK STATION FINAL SAFETY ANALYSIS REPORT	OFFSHORE AREA BOTTOM CONTOUR MAP SEISMIC SURVEY
	FIG. 2E-11A | SB 1 & 2

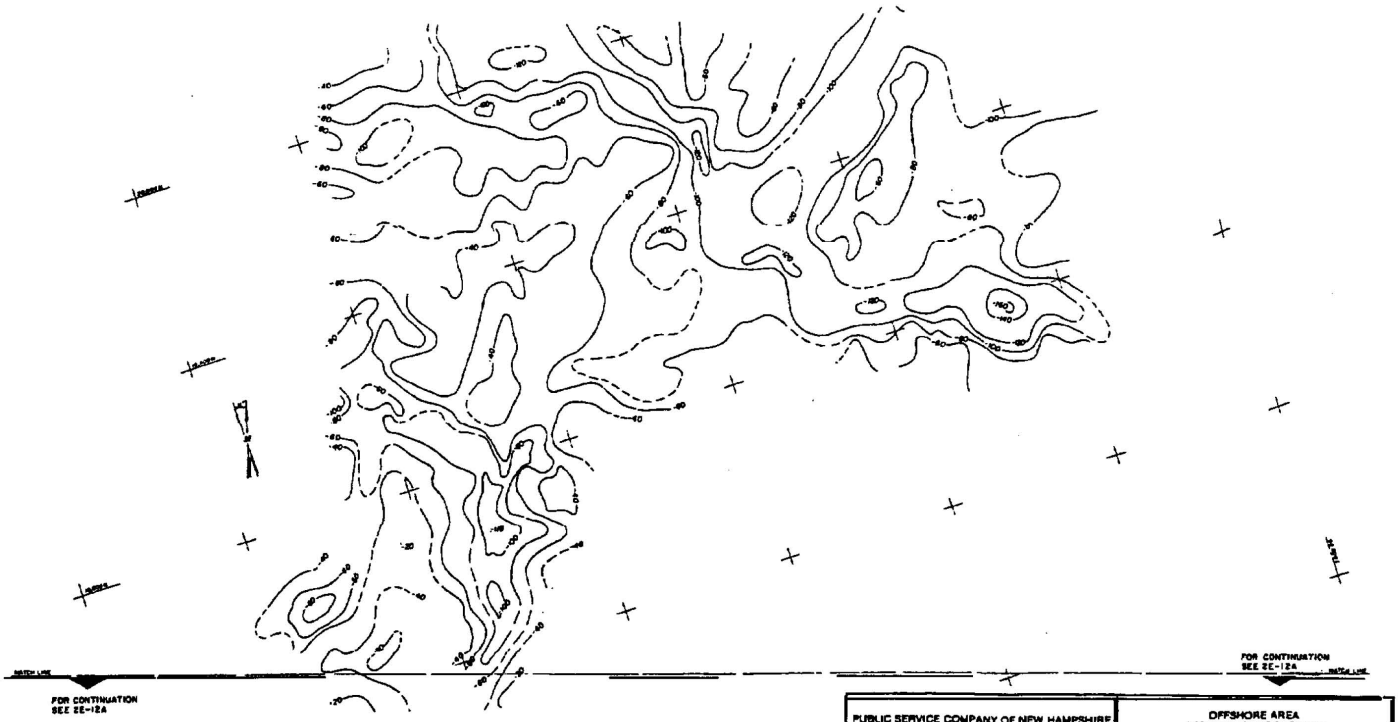
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE
SEABROOK STATION
FINAL SAFETY ANALYSIS REPORT

OFFSHORE AREA
BOTTOM CONTOUR MAP
SEISMIC SURVEY

FIG 2E-11B SB 1 & 2



PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION FINAL SAFETY ANALYSIS REPORT	OFFSHORE AREA BEDROCK CONTOUR MAP SEISMIC SURVEY	
	FIG 2E-12A	SB 1&2



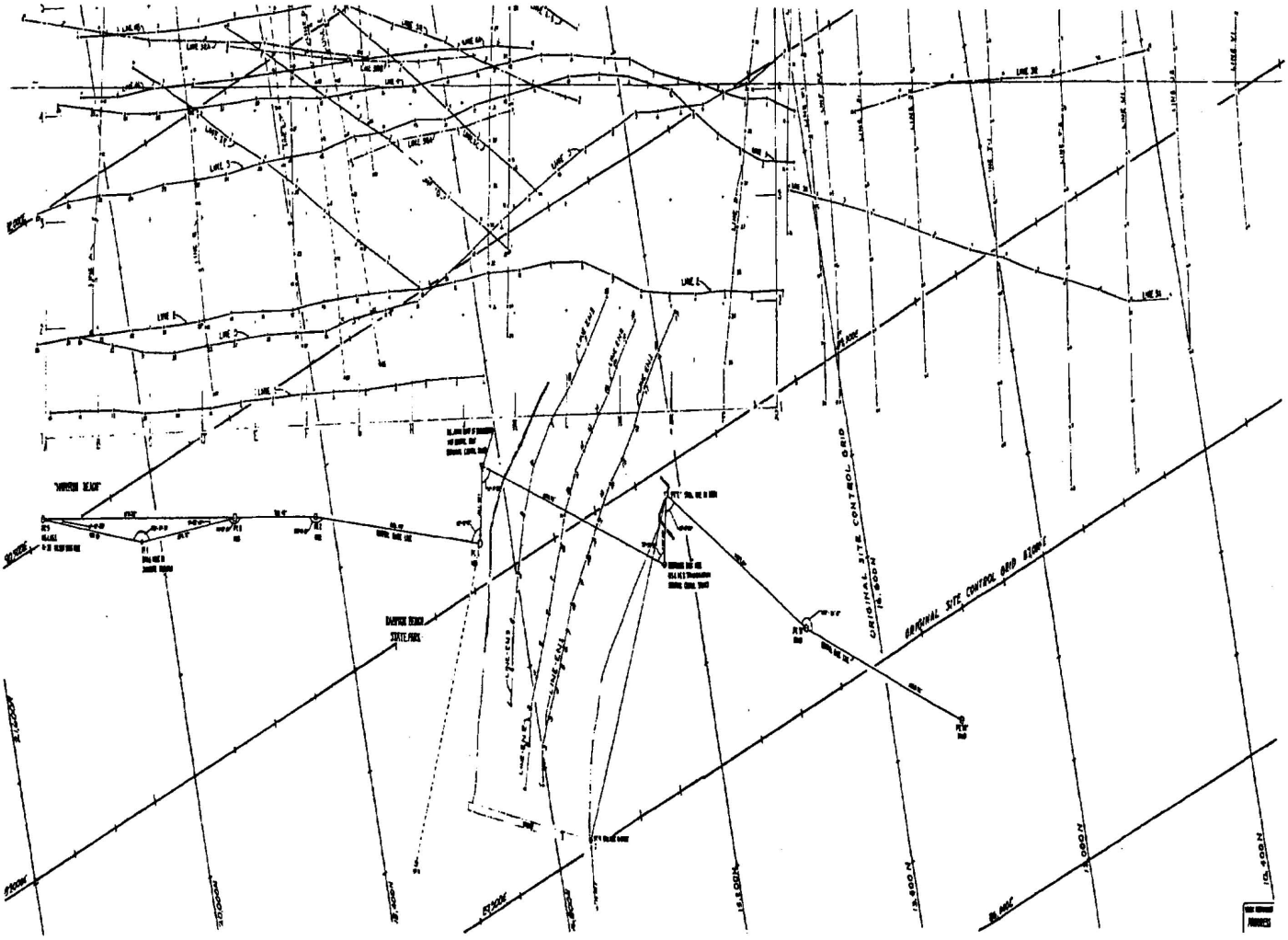
PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION FINAL SAFETY ANALYSIS REPORT	OFFSHORE AREA BEDROCK CONTOUR MAP SEISMIC SURVEY	
	FIG. 2E-12B	SB 1 & 2

FOR CONTINUATION
SEE 2E-13B

A

FOR CONTINUATION
SEE 2E-13B

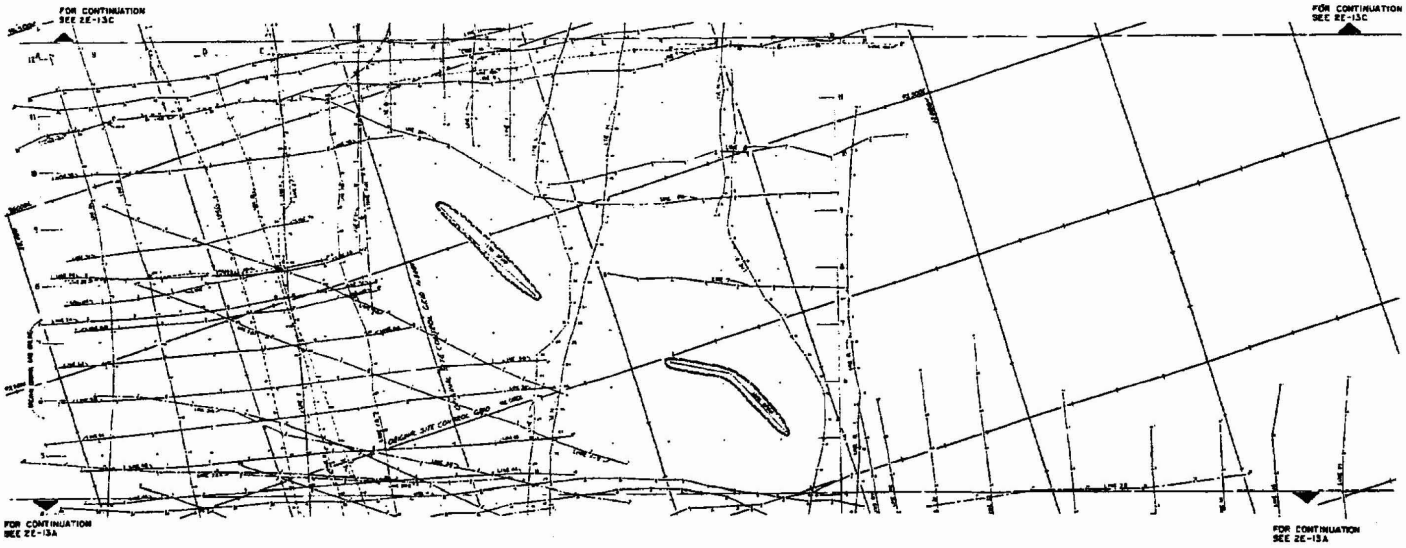
A



0 500 1000 2000

SCALE IN FEET

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION FINAL SAFETY ANALYSIS REPORT	OFFSHORE AREA TRACK MAP REFLECTION AND REFRACTION SEISMIC SURVEY
	FIG. 2E-13A | SB 1 & 2



PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE SEABROOK STATION FINAL SAFETY ANALYSIS REPORT	OFFSHORE AREA TRACK MAP REFLECTION AND REFRACTION SEISMIC SURVEY
	FIG. 2E-13B | SB 1 & 2