UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

POTENTIAL GEOLOGIC HAZARDS AND CONSTRAINTS FOR BLOCKS IN PROPOSED SOUTH ATLANTIC OCS OIL AND GAS LEASE SALE 56

By

George B. Carpenter

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This report has not been edited for conformity
with Geological Survey editorial standards
or stratigraphic nomenclature.

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ILLUSTRATIONS

[Plate 1, 2 sheets, in pocket]

Metric equivalents:

1 meter = 3.2808 feet

1 kilometer = 0.6214 statute miles

1 nautical mile = 1.1515 statute miles = 1,853 meters

POTENTIAL GEOLOGIC HAZARDS AND CONSTRAINTS FOR BLOCKS IN PROPOSED SOUTH ATLANTIC OCS OIL AND GAS LEASE SALE 56

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ABSTRACT

Analysis of high-resolution geophysical data collected over the 286 blocks tentatively selected for lease in OCS Oil and Gas Lease Sale 56 revealed potential geologic hazards to oil and gas exploration and development activities: shallow recent faulting and evidence of mass movement on the continental slope. No potential hazards were observed on any blocks on the continental shelf.

Other geology-related problems, termed constraints because they pose a relatively low degree of risk, can be routinely dealt with using existing technology. Constraints identified in the proposed sale area are erosion, scour, sand waves, filled channels, deep faults, and gassy sediments.

INTRODUCTION

This document reports the results of the U.S. Geological Survey's high-resolution geophysical study conducted for assessment of potential geologic hazards for blocks in proposed South Atlantic OCS Lease Sale 56. The blocks in the survey area are located in the Southeast (SE) Georgia Embayment in water depths of 14 to 2,025 m (fig. 1).

Geologic features and conditions having a potential for risk to oil and gas exploration and development operations are classified into two general catagories, depending on their degree of risk. The first and potentially most serious of these is termed hazards. Hazards can have a relatively high inherent risk because existing technology cannot routinely eliminate their potential for damage to drilling structures. Shallow recent faulting with displacement of surficial sediments and mass movement (slumps, slides) of surface sediments are hazards which have been identified and located in the proposed Lease Sale 56 area.

The other risk-related geologic grouping is termed constraints; these have less risk because their adverse effects can be eliminated or reduced to an acceptable level through conventional engineering practices. Constraints noted and mapped in the proposed sale area are erosion, scour, sand waves, filled channels, deep faults, and gassy sediments (including gas hydrate zones)

The rationale for these groupings and for the assessment of risk related to specific geologic features and conditions is given under the individual subject headings. Location and identification of geologic problems discussed in this report are largely a result of a multi-sensor high-resolution geophysical survey, a comprehensive literature search, and personal contacts with scientists and engineers from other Federal agencies, academia, and the private sector. We do not attempt to assess the impact of natural hazards resulting from weather or ocean dynamics, because they are not directly definable with our data base. Hazards and constraints related to

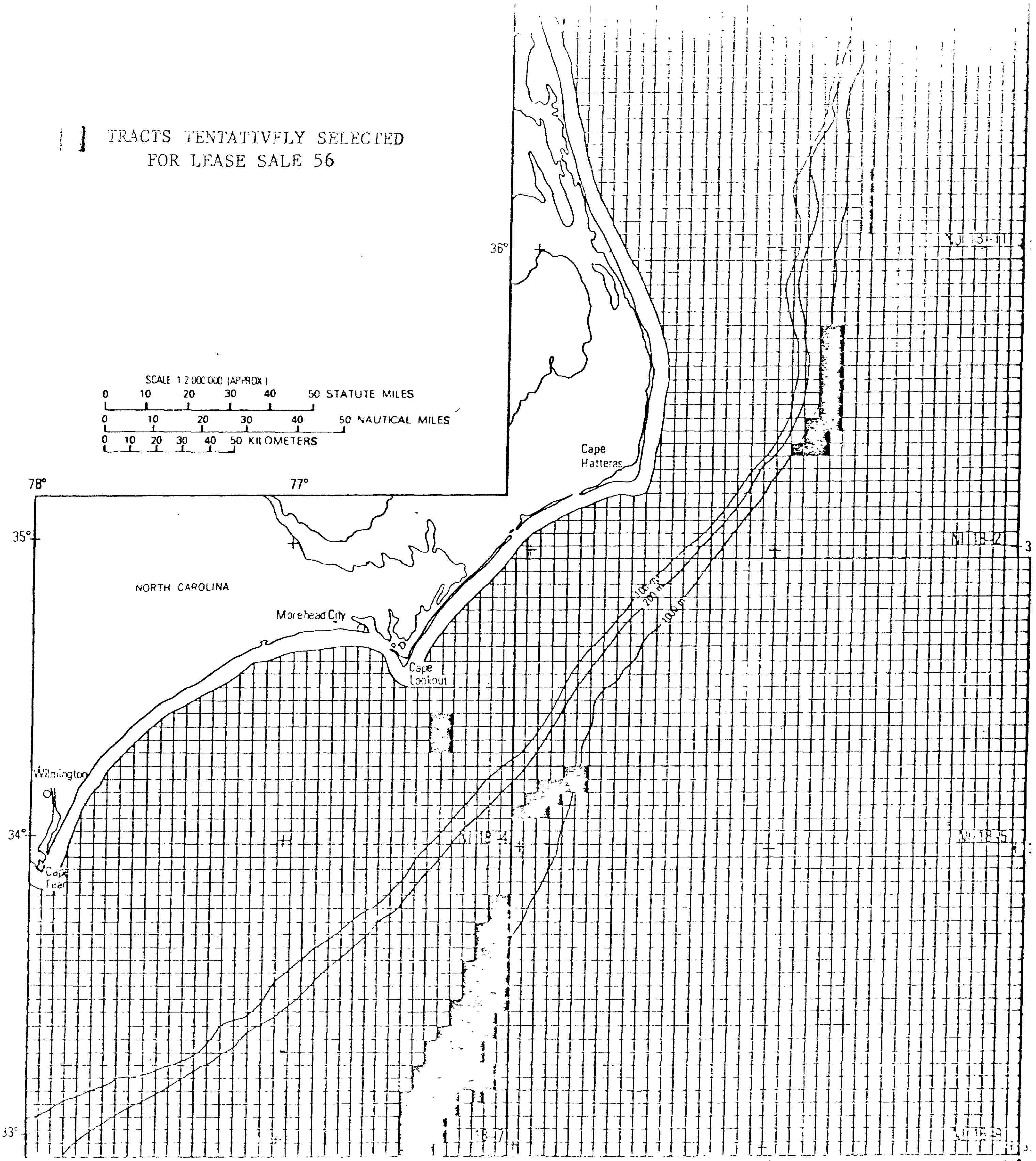

Figure 1A.--Map (north half) showing the blocks tentatively selected for leasing and surveyed for geohazards in connection with OCS Oil and Gas Lease Sale 56.

TRACTS TENTATIVELY SELECTED FOR LEASE SALE 56

TRACTS INCLUDED IN LEASE SALE 43

Figure 1B.--Map (south half) showing the blocks tentatively selected for leasing and surveyed for geohazards in connection with OCS Oil and Gas Lease Sale 56.

seismicity and soil stability, though not directly definable with high-resolution geophysical (HRG) data, can often be inferred. HRG data merely detect (sometimes ambiguously) the geologic consequences of seismicity or unstable soil conditions in the form of shallow faults or structural complexes on HRG data which appear to be the result of mass movement of sediments. Obviously, the timing and frequency of these events cannot be directly evaluated solely with geophysical data. Seismicity and soil mechanics studies tailored to specific problems might be necessary to substantiate or clarify conclusions based on high-resolution geophysical surveys.

This is the second open-file report dealing specifically with potential geologic hazards and constraints in the SE Georgia Embayment. The first (McCarthy and others, 1980), a hazards assessment for blocks involved in OCS Lease Sale 43, revealed that the general area of the continental shelf in the SE Georgia Embayment Lease Sale 43 acreage in particular is relatively free of hazards to petroleum exploration and development activities.

Acknowledgments--Data reduction and analysis for this report were a group effort by the Hazards Analysis Unit. Significant contributions to this document were made by A. Cardinell, C. Davis, R. Ensminger, L. Good, F. Keer, R. Lewis, N. Stiles, and T. Wilson.

DATA COLLECTION AND INSTRUMENTATION

The majority of the geophysical data involved in this report were collected by Fairfield Industries of Houston, Texas, under contract to the U. S. Geological Survey (Contract No. 14-08-0001-18908). The contractor supplied high-resolution geophysical data and related processing services. Data collection was monitored throughout the course of the fieldwork by U.S.G.S. observers.

The equipment used for data collection consisted of a Raytheon* 12 kHz fathometer, Edo Western Model 515-150T, 1.5-kHz subbottom profiler, single channel 1/4-ms, and multichannel 1/2-ms digital deep seismic profiler. A Fairflex mini-sleeve exploder was used as the sound source for the 1/4- and 1/2-ms digital data. Dip profiles read from west to east, strike profiles read from north to south on all maps and figures in this report. Navigation was provided by Navigation Services Inc. and utilized an integrated ARGO, LORAN C, and Satellite Navigation system. All analog subbottom reflection data was recorded on EPC 3200, 19-inch flatbed recorders. A Klein Model 520 Side-Scan Sonar was used for the detection of obstructions and small scale bottom topography.

A total of 6,400 km of multi-spectral high resolution acoustic data was collected from November 1979 to March 1980 aboard MV "Miss Freeport" and RV "Pierce." These data were arranged in a 800 x 3200 m grid on the continental slope (seaward of the shelf break) and a 1600 x 3200 m grid on the continental shelf (landward of the shelf break). (As used in this report,"shelf break" refers to the boundary between the continental shelf and the continental slope). These data grids were selected to (1) minimize cost and (2) maximize data coverage on the continental slope where extensive evidence of mass movement of surface sediments indicated possible hazards to oil and gas exploration, particularly in the groups of blocks on the slope off Cape Hatteras.

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* Any trade names in this report are used for descriptive purposes only and do not constitute endorsement by the U.S. Geological Survey.

Side-scan sonar data were not collected seaward of the 200-m contour because the vessel speed was too great. Digitally recorded single channel data were substituted for multichannel recording seaward of the 400-m contour because the geometry of the common-depth-point (CDP) process precluded stacking in greater water depths. Overall data quality ranged from good to excellent with good resolution and penetration on all systems.

OCS Lease Sale 56 includes 100 blocks previously surveyed for geohazards in connection with OCS Lease Sale 43. It was not considered cost effective to resurvey these blocks. Despite the fact that different systems which varied in terms of accuracy, resolution, and depth of subbottom penetration were used for the two surveys, the match across the survey boundary is good, particularly with respect to structural information. However, due largely to the use of different values for sound velocity in water, the depth calculations and resultant isobaths mismatch by a minor amount, usually no more than 4-5 percent.

Copies of all contracted deliverables have been archived with the National Oceanic and Atmospheric Administration, EDIS/NGSDC, Code D-621, 325 Broadway, Boulder, Colorado 80303) and are accessible to the public (Refer to data set AT18908). This data bank includes microfilm copies of geophysical profiles and a series of navigation maps submitted by the contractor at a scale of 1:48,000. The map of surface and near-surface geology and potential hazards and constraints (pl. 1A and B) supersedes all previous compilations and should be considered the most up-to-date appraisal of hazards and constraints in the Lease Sale 56 area.

GEOLOGIC SETTING

The continental margin off the southeast coast of the U. S. is a seaward dipping prism of marine and continental sediments of probable Triassic through Holocene age. Sediments in the basins distributed along the East Coast margin range in thickness from 6 to 14 km (Ewing and others, 1973), and include a diverse suite of carbonates, shales, evaporites, and continental clastics. Acreage involved in Lease Sale 56 covers parts of three major basins of primary interest for petroleum development: the Southeast Georgia Embayment, the Blake Basin, and the Carolina Trough.

The continental shelf in this area is generally flat, featureless, and slopes gently seaward with a regional gradient of less than one degree. The subsurface geology exhibits a similar pattern with flat, level-bedded reflectors which generally parallel the sea floor (fig 2). Surface sediments on the shelf tend to be mostly well-sorted quartz and carbonate sands with significant fractions of silt and gravel as localized accumulations (Dillon and others, 1975). Bottom currents have constructed sand waves ranging in size from ripple marks to features more than 5 m in height, particularly near the shelf break where circulation is intensified (McCarthy and others, 1980). Exposures of lithified substrate (hardgrounds), which appear as low relief, highly reflective zones on HRG data, are widespread on the continental shelf in the study area. The most prominent hardground trend occurs near, and parallel to, the shelf break from approximately Cape Hatteras southward (Avent and others, 1977) where it takes the form of a linear, discontinuous ridge of about 10 m relief (pl. 1).

Much of the present morphology and shallow structure of the inner shelf results from modification of preexisting subaerial landforms by transgressing post-Pleistocene seas. Stream and tidal channels incised into the shelf when it was exposed have been filled and partially obliterated. Coastal beach/barrier island/lagoon complexes have been

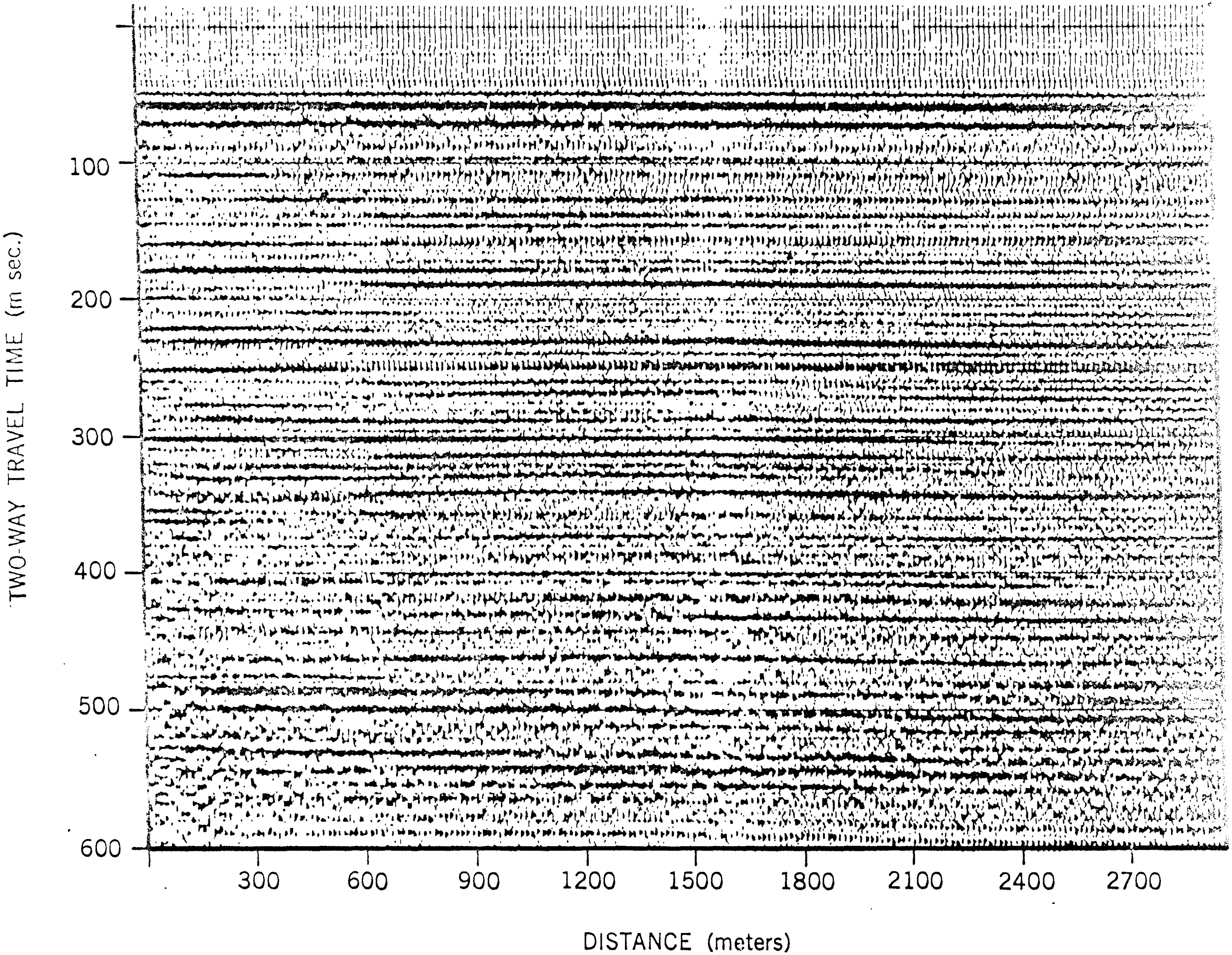

Figure 2.--Profile (1/2 m sec CDP) showing flat lying, parallel bedded reflecting horizons typical of much of the continental shelf in the sale area. Vertical exaggeration X5. (See pl. 1B, block NH 17-5-292.)

submerged and subsequently obscured by submarine erosion, reworking, and resedimentation. Incursions of the Gulf Stream through time probably have been significant in reshaping submarine bedforms as well. Some seismic profiles in the southern part of the sale area show evidence of a buried subaerial solution surface (karst topography) (McCarthy and others, 1980). The post-Pleistocene marine transgression obviously has resulted in erosion, leveling and reshaping of what once was undoubtedly a morphologically complex landscape.

A major break in shelf sedimentation due to the influence of the Florida Current occurs near Cape Hatteras. Because of increased bottom-current velocities, sediments to the south of Cape Hatteras tend to be coarser than those to the north (Doyle and others, 1979). An increase to the south in carbonate content of surface sediments also occurs at about that point.

The physiographic character of the continental slope changes dramatically south of Cape Hatteras in terms of its topography, morphology, sediment cover and regional gradient. South of Cape Hatteras, the topography and morphology are more subdued with little of the pronounced channeling due to submarine canyons and their tributary systems such as found to the north.

A major growth fault complex of regional proportions occurs on the slope roughly between points south and east of Capes Lookout and Romain at about 800 m water depth (Sylwester and others, 1979). Deep CDP data show a maximum offset of about 400 m at the limit of acoustic penetration. The high-resolution data collected for this survey do not show evidence of offset at the sea floor, indicating recent motion along the fault plane is nil or very low. The first detectable offset of reflecting horizons occurs at about the 30-m level which would seem to point to a considerably long period of quiescence. The formation and maintenance of the growth fault complex may be a function of salt withdrawal related to a linear zone of diapirs which approximately parallels both the growth fault trend and the base of the slope (Sylwester and others,1979)

The continental slope off Florida is divided into two provinces separated by the Blake Plateau. The inshore (western) part is progradational and gently sloping with relatively little vertical relief. Seaward (east), the slope is extremely steep with vertical relief exceeding 2000 m. The steepest segment (Blake Escarpment) is farther east, beyond the study area.

Considerable variability in many important aspects of the local and regional geology is apparent within the large area encompassed by OCS Lease Sale 56. Certain geologic features and conditions in the sale area pose potential problems for resource exploration and development and are discussed in detail in the following sections.

POTENTIAL GEOLOGIC HAZARDS

Shallow Recent Faulting

Faults that show evidence of recent movement (have essentially no post-failure sedimentation over them and displace the sea floor) can have serious consequences and can adversely affect exploratory drilling if they are not first identified and precisely located. Active fault displacement is perhaps the most obvious direct hazard because failure is unpredictable and could result in significant structural damage. However, near-surface faults can affect operations in other, perhaps less obvious, ways. Given the proper geologic setting, fault planes can function as conduits for high pressure gas from deeper in the geologic section.

Shallow recent faulting is relatively rare in the area included in Lease Sale 56. Most occurs on the slope in association with mass movements, particularly in the blocks east of Cape Hatteras. These faults are all rather small, having throws of several meters and traces usually less than a few kilometers in length. Their presence, however, is considered to indicate instability in surface sediments on the continental slope. No recent faulting was observed on the continental shelf.

As with any risk assessment based solely on geophysical data, there are elements of uncertainty related to the ability of the data to adequately resolve the geologic feature of interest. In the case of shallow recent faulting, our judgments concerning the age of the fault are limited by the capability of the reflection profiling system to define thin layers of sediment deposited since the last active displacement of any given fault. Resolution of layers roughly 1 meter in thickness is about the best that most systems provide. A reasonable sedimentation rate on the continental slope in this area is 10 cm/1000 years (Ewing and others, 1973). Thus, the system resolution limit of 1 meter represents a potential 10,000-year uncertainty in the age of the latest displacement of the fault.

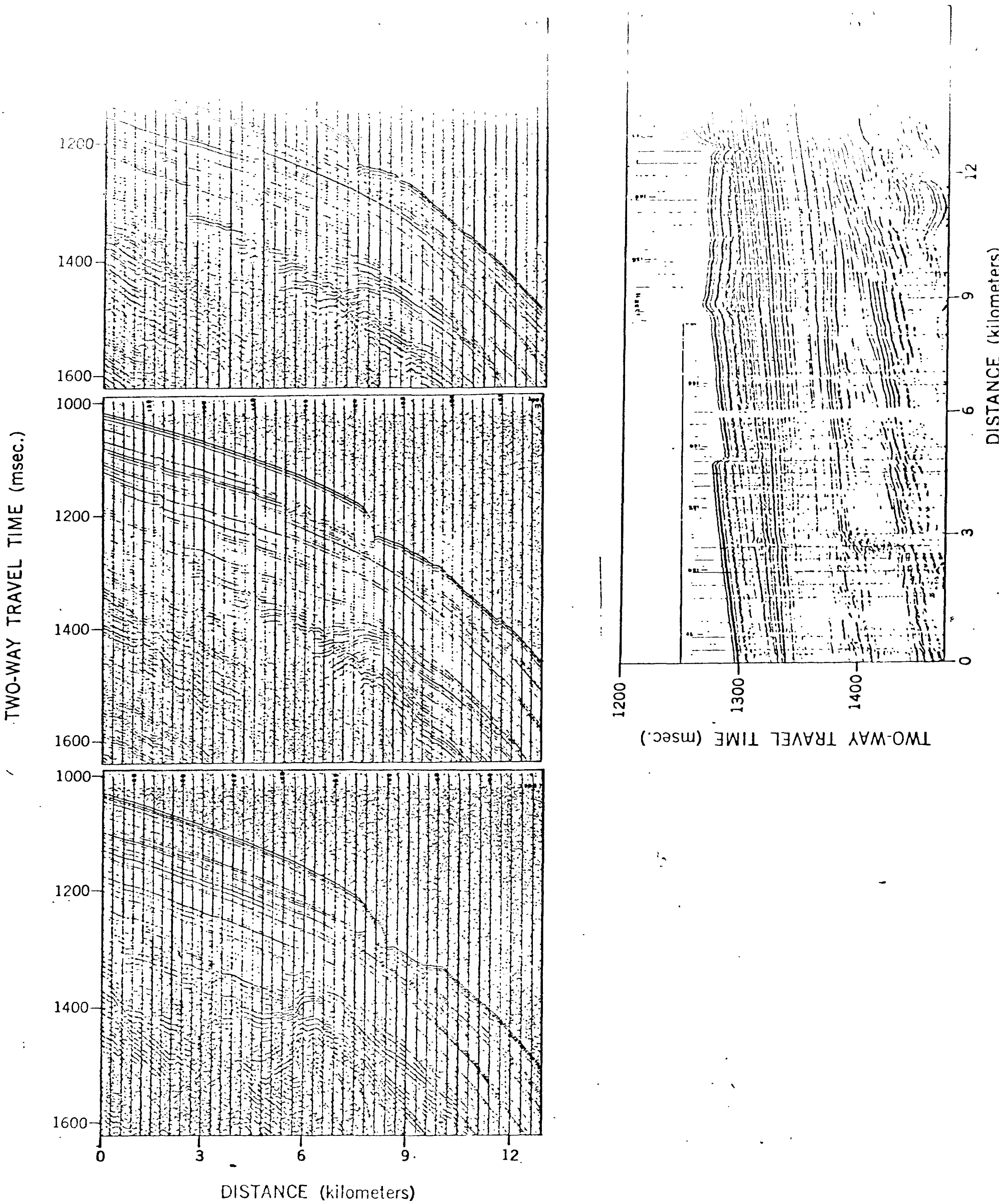

Figure 3.--Parallel stacked single-channel analog profiles along the minor axis of a sediment slump. The profile through the major axis is shown on the right. Vertical exaggeration X12. Note the sequence of reversely dipping reflectors at about 250 m sec subbottom beneath the slump. These reflectors are interpreted as a gas deposit. (See pl. IA, blocks NI 18-7-874, -875, -876, -918, and -919.)

Slumps or Slides

Extensive evidence of structural complexes which apparently result from failure of surface sediments indicate that hazards related to mass movement are likely to be the single most serious problem impacting exploratory drilling in the Lease Sale 56 area. Three groups of contiguous blocks, two off Cape Hatteras and one on the slope south-southeast of Cape Lookout, are affected.

The topography of the two groups of blocks off Cape Hatteras is similar to that on the upper slope of the Mid-Atlantic and North Atlantic regions; it is extensively dissected by submarine canyons and their tributary systems. This morphology complicates the interpretive process because many of the features seen on seismic reflection data (glide plane, slump block, scar, hummocky topography) which collectively define a sediment slump may be artifacts (side echoes from nearby canyon walls) superimposed on the normal incidence data. The side echoes are returned out of the vertical from high-angle slopes paralleling the dip direction of the profile. The net effect is to generate structural complexes on reflection data which appear to be slumps but are in fact of erosional origin. Any interpretation of slumping must therefore consider the three-dimensional aspects of reflection data, particularly in areas of extremely complex topography such as those found off and to the north of Cape Hatteras. Without sophisticated computer modeling techniques, it is difficult to identify and separate those complexes that are unambiguously the result of mass movement from those caused by erosion or some other process.

Another difficulty in the assessment of risk related to possible slump structures is assigning an age to them. Many of the slump structures, particularly the larger ones, may be Pleistocene in age (McGregor, 1977) and related to conditions prevailing during the low sea level stand. Because these conditions no longer exist, contemporary large-scale failure of

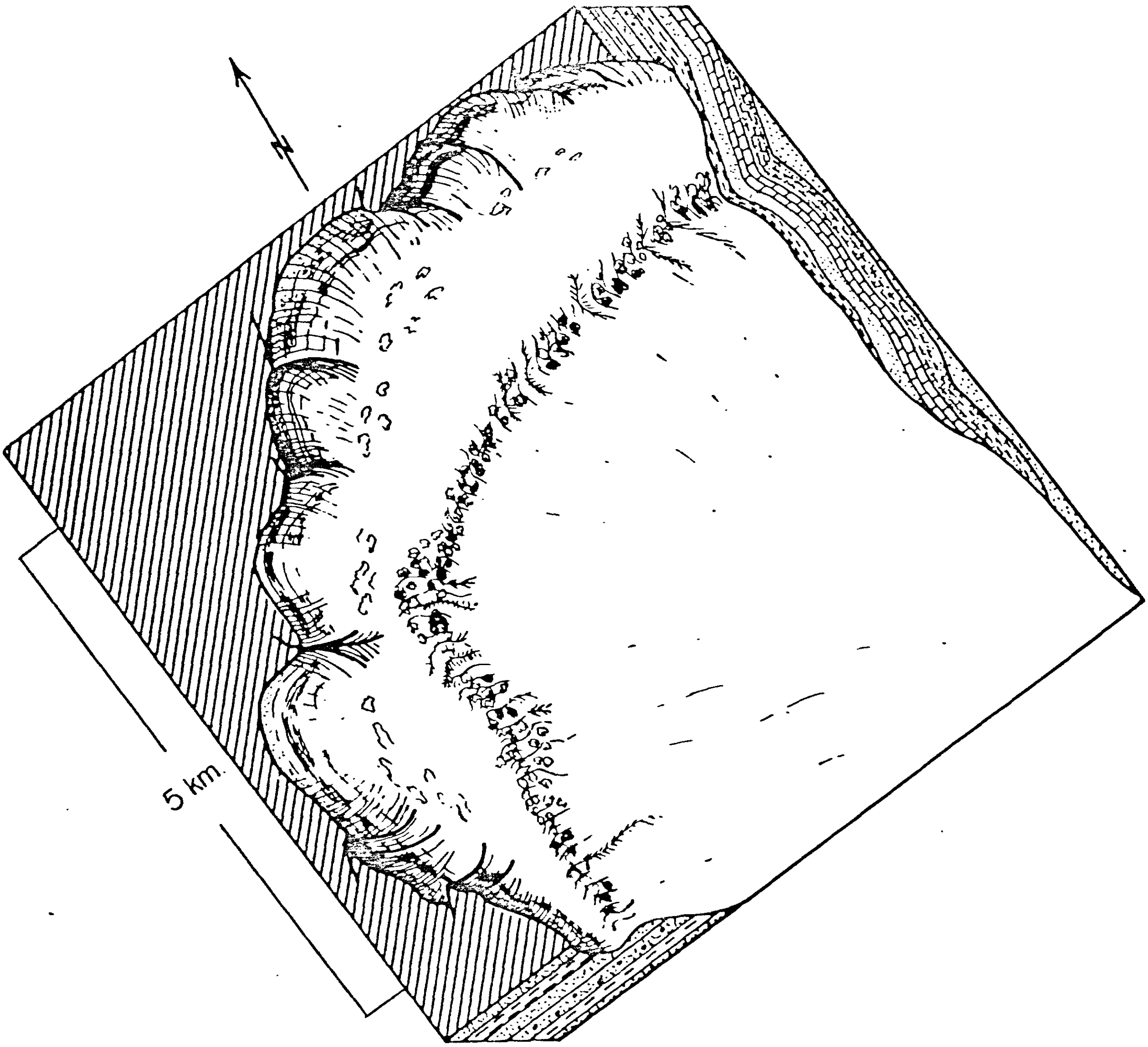

Figure 4.--Physiographic block diagram of a slump drawn from profiles shown in figure 3. The diagram schematically illustrates the major structural elements involved in the slump complex.

considerable masses of sediment (on the order of cubic kilometers) may not be a factor in oil and gas leasing on the East Coast.

A classic example of a sediment slump occurs in blocks NI 18-7-874, -875, -876, -918, and -919 on the upper continental slope east of Cape Romain (pl. 1A). The failed block is arcuate in plan view and the slump scar shows an abrupt truncation of essentially horizontal reflectors (figs. 3 and 4). A migration calculation performed on the digital data at the head of the slump shows a diffraction that, when collapsed, results in an extremely well defined and slightly concave outward slump scar (K. Good, U.S. Geological Survey, oral commun., 1980). The interpretation is not complicated by the effects of channeling; nearby topography is very smooth except where distorted at the foot of the failed block. Although the age of the feature is in doubt, very little post-failure sediment has accumulated on it (fig. 3). We propose that slippage along one of the area's many subsurface faults (pl. 1A) provided the primary mechanism which triggered the block's failure.

Interpretation of many of the features believed to be slumps in the groups of blocks off Cape Hatteras is complicated by three-dimensional effects superimposed on the data by the complex local topography. A somewhat different approach for the assessment of risk has been used in this area. Slumps (or slump-prone sediments) have been indicated on the block maps and plate 1 by hachuring. The data grid does not permit mapping of individual slump masses, but sediments believed to be prone to mass movements (as evidenced by structures on geophysical data which appear to be slumps) can be distinguished from those which are apparently stable. The slumps appear to be restricted to exposures of Pleistocene and Holocene sediment which take the form of "fingers" of linear deposits of intercanyon sediments. The fingers trend downslope and the sediments comprising them are relatively unconsolidated and can have high local slopes, particularly at the sides and leading edges of the fingers. They appear to have some potential for failure

(J. Robb, U.S. Geological Survey, oral commun., 1980). In places where the Pleistocene sediments have been removed, either by erosion or by mass movement, the exposed underlying sediments would probably be more resistant to failure because they would tend to be better consolidated than the fingers.

A complication in the assessment of risk in this valley and ridge province is that mass movements (especially gravity flows) originating at a locus of failure upslope of the lease blocks would sweep large volumes of debris through the blocks. Submarine canyons and their tributary systems would serve as obvious conduits for this debris. Data obtained from other USGS scientists indicate that the area above the blocks tentatively selected for lease also shows the same sort of possible slump structures as those in the blocks themselves (P. Popenoe, U.S. Geological Survey, oral commun., 1979).

It is difficult to definitively and properly assess the impact of mass movement related hazards on OCS lands because of the many interpretational problems and the difficulty in assigning an age to the time of failure. These events may be so rare as to be within any reasonably definable assessment of acceptable risk; their time frame may be geologic as opposed to historic. Further studies, particularly soil mechanics analyses which are of proven value in risk assessment, are needed to fully resolve these questions.

CONSTRAINTS

Erosion/Scour/Sand Waves

Erosion, scour, and sand waves are conditions and features directly related to bottom currents and circulation patterns. The degree to which they are a problem is dependent on the intensity of bottom-water circulation. Bottom-water circulation is in turn directly related to the northwestward-flowing surface currents of the Gulf Stream. Approximately 95 percent of the acreage in Lease Sale 56 is within the 100 cm/sec isovelocity contour of the Gulf Stream. However, only three groups of blocks are affected by bottom current activity to such an extent that problems might result. The first is the group of six blocks about 25 km south-southeast of Cape Lookout (See pl. 1 for location).

Intense bottom-water circulation around Cape Lookout has generated sand waves in excess of 15 m in height (fig. 5). Since high bottom current velocities still prevail in this area (Bumpus, 1973), at least some of the sand waves may be presumed to be migrating at some measurable (but unknown) rate. Severe storms which tend to temporarily increase circulation might accelerate their migration and complicate development in those blocks by either removing foundation materials or burying critical wellhead structures as the sand wave moves horizontally. As consequences of active sand wave construction, erosion and scour are also likely to present problems to bottom-sited structures in the area.

Erosion and scour are likely to also be a problem in the group of 13 blocks east of Jacksonville in about 600-m water depth (pl. 1B). Figure 6 shows very rough topography interspersed with relatively flat areas. The flat areas are highly reflective with no visible internal structure and no significant acoustic penetration. These conditions are thought to indicate (in this area) high-velocity bottom currents which have reworked surficial sediments, winnowed out fines, and left coarse

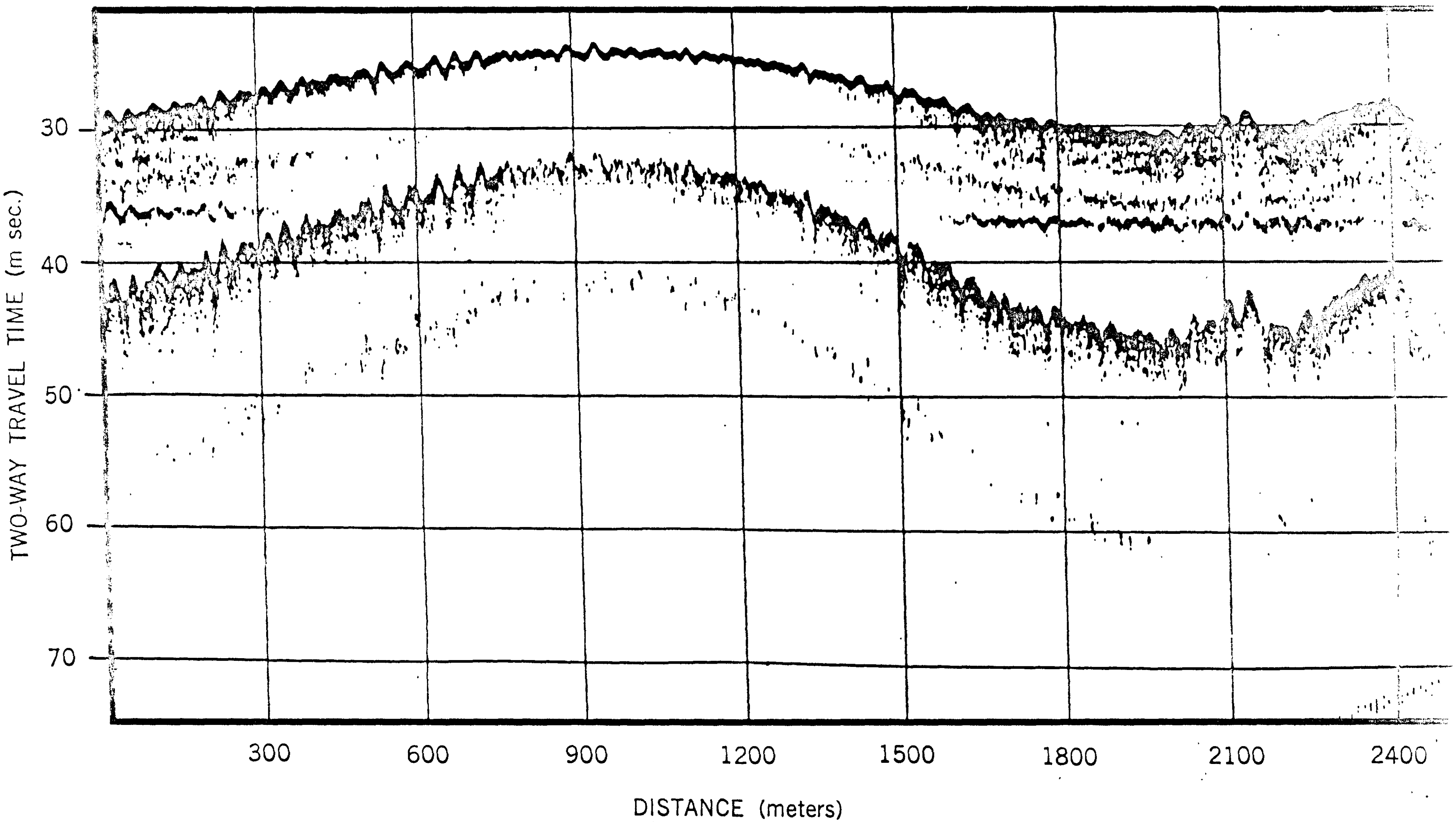

Figure 5.--Profile (1.0 kHz) showing sand waves of various sizes on the continental shelf SSE of Cape Lookout. The shortest wavelength superimposed on the bottom return is the result of sea state and not bottom morphology. Note that the sand waves appear to be constructed on a relatively flat lying subsurface reflector. Vertical exaggeration X14. (See pl. 1A, block NI 18-4-654.)

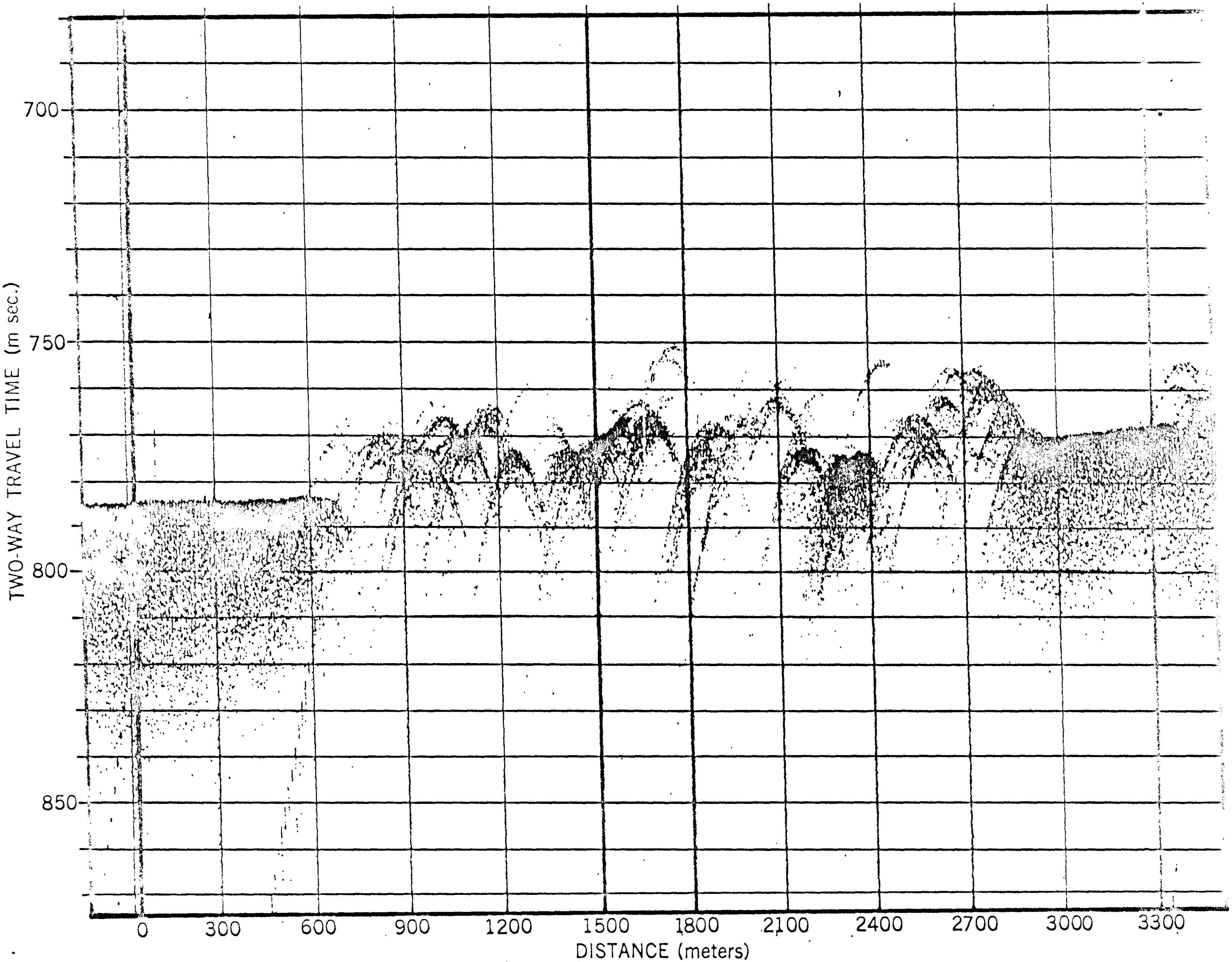

Figure 6.--Echogram (12 kHz) showing scoured zone of rough topography on the Blake Plateau. Vertical exaggeration X12. (See pl. 1B, blocks NH 17-6-269, -313.)

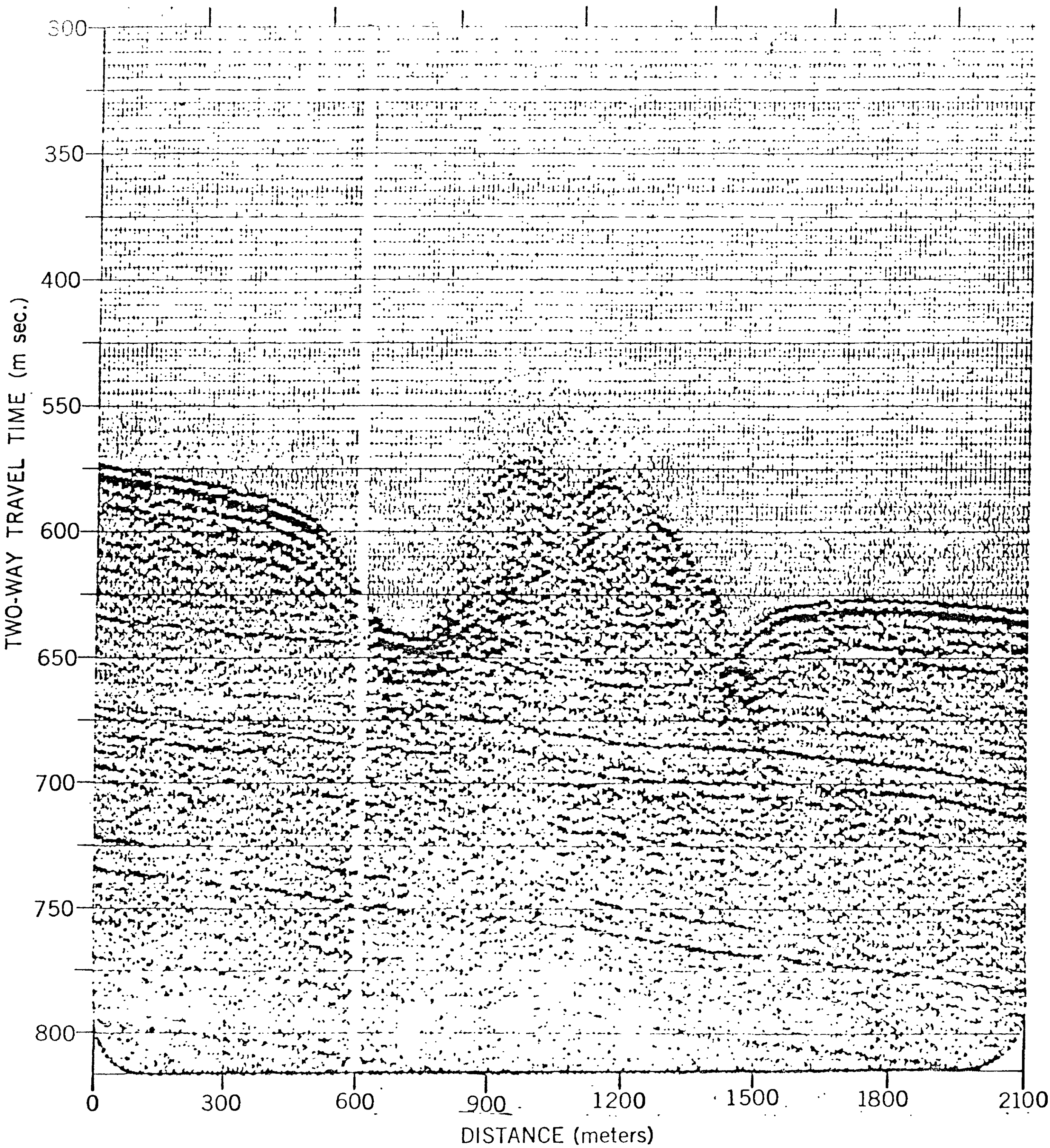

Figure 7.--Profile (1/2 m sec CDP) showing erosion around a lithified ridge near the shelf edge. Vertical exaggeration X5. (See pl. 1A, block NI 18-5-795.)

calcareous sands as the dominant component in surface sediments. Bottom circulation also prevents deposition of sediment and maintains the high local slopes found in this area. These high slopes themselves present some problems to development such as in the emplacement of base plates or other angle-sensitive structures.

Erosion (or possibly nondeposition) has constructed a moat or channel parallel to the shelf-edge reef in the group of blocks about 65 km southeast of Cape Lookout (fig. 7, pl. 1A). The level of activity of the erosion in this area is probably high enough to present some problems related to scour.

Filled Channels

Cut-and-fill structures, such as those incised on the shelf during the Pleistocene low sea-level stand or cut into the sea floor in deeper water by intense bottom currents, are relatively common in the sale area (fig. 8). Another type of filled linear depression, probably of structural origin, has been mapped in the southernmost sale area. These tectonic folds occur in several places in the southern part of the SE Georgia Embayment and some affect the entire stratigraphic section (Meisburger and Field, 1976) (fig. 9). Buried channels and their included fill deposits present constraints to drilling operations, none of which are particularly serious.

If the sediment fill in buried channels is composed of interlayered deposits of varying lithology and porosity, mud circulation problems can arise during drilling through porous zones. The lack of uniformity in fill deposits can also affect their load bearing properties and must be considered in the positioning of bottom-sited structures. Drilling platforms which straddle the boundary between fill deposits and the surrounding sediments could conceivably tilt because of load bearing contrasts.

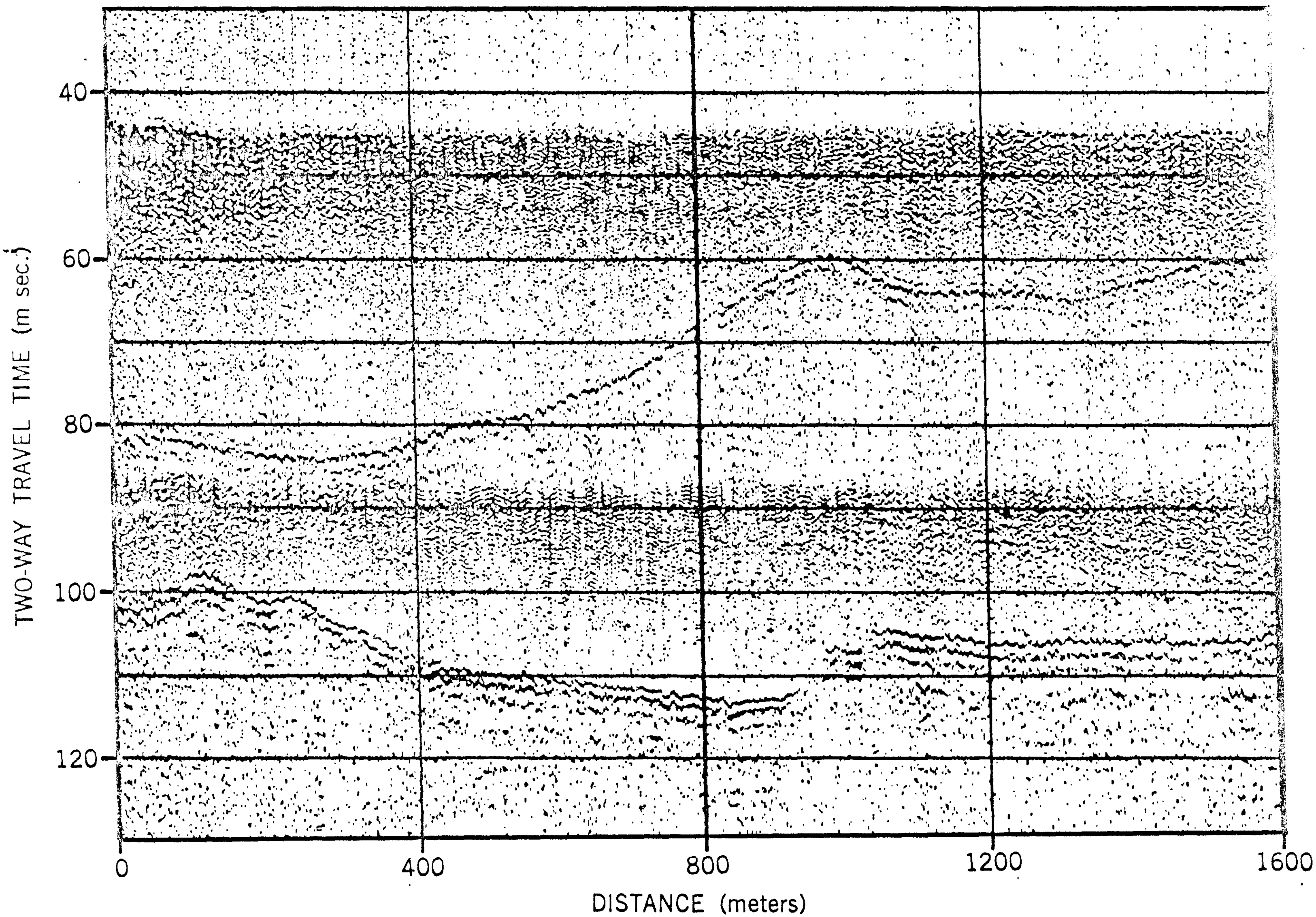

Figure 8.--Profile (1.0 kHz) showing a filled channel. Vertical exaggeration X12. (See pl 1B, block NI 17-12-242.)

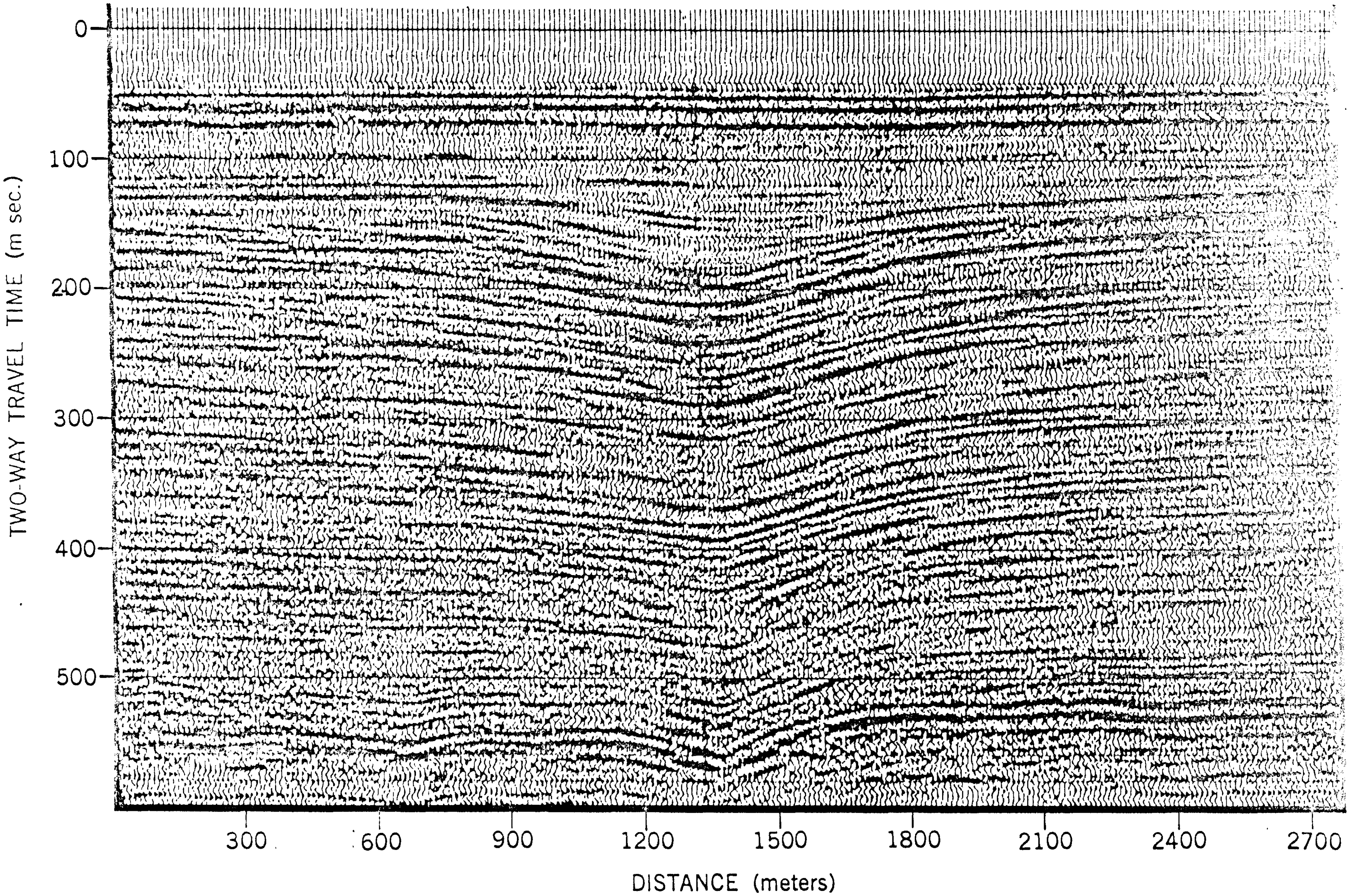

Figure 9.--Profile (1/2 m sec CDP) showing a tectonic fold which has been filled with post-tectonic sediments. Vertical exaggeration X5. (See pl. 1B, block NH 17-5-645.)

Deep Faulting

On the Continental Shelf, deep faults (fig. 10) below unconsolidated foundation zone sediments are considered to be constraints to operations rather than hazards because they do not displace the sea floor or any of the unconsolidated material and are probably Pleistocene (generally thought to be the age of the unconsolidated sediments) in age. The risk of reactivation of these old, deep faults is probably minimal because of the low level of earthquake activity prevailing in the area (Coffman and von Hake, 1973). Despite low seismicity and long quiescence, these faults are planes of weakness and should be considered to have a limited potential for failure. Fault planes also are potential conduits for gas, originating at depth and migrating upward, which may pose some risk related to blowouts or cratering of surficial sediments.

On the Continental Slope also, deep relatively old faulting is present, particularly in the south-central part of the survey area. A growth fault complex of regional extent distributed about the 800-m isobath has been described and mapped on the slope by Sylwester and others (1979) and has been traced through the blocks involved in this survey as well (fig. 11 and pl. 1). The fault is not considered to be a serious problem because it shows no sign of surface displacement anywhere along its length. Figure 11 shows that no detectable offset of strata is evident above approximately 30 m subbottom indicating that the sedimentation rate is keeping pace with fault growth. Sylwester and others (1979) propose salt withdrawal related to a linear diapir trend near the upper continental rise as the forcing mechanism for sustained motion along the fault plane. However, gravity creep induced by sediment loading is equally likely.

Gassy Sediments (including gas hydrates)

Large concentrations of dissolved gas in the pore waters of near-surface sediments are not present on the shelf in the sale area because the surface

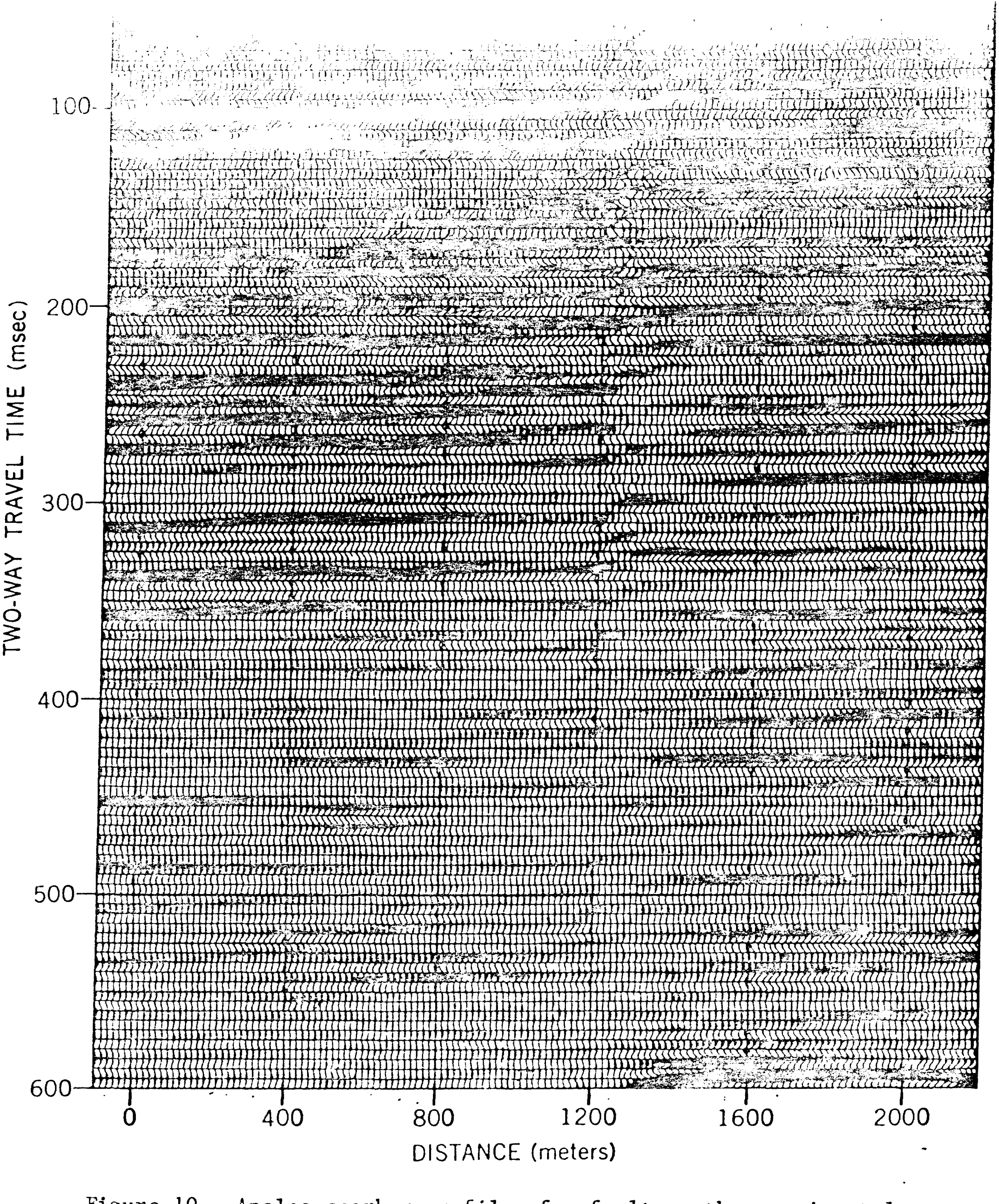

Figure 10.--Analog sparker profile of a fault on the continental shelf. Vertical exaggeration X7. (See pl. 1B, blocks NH 17-5-72, -116.)

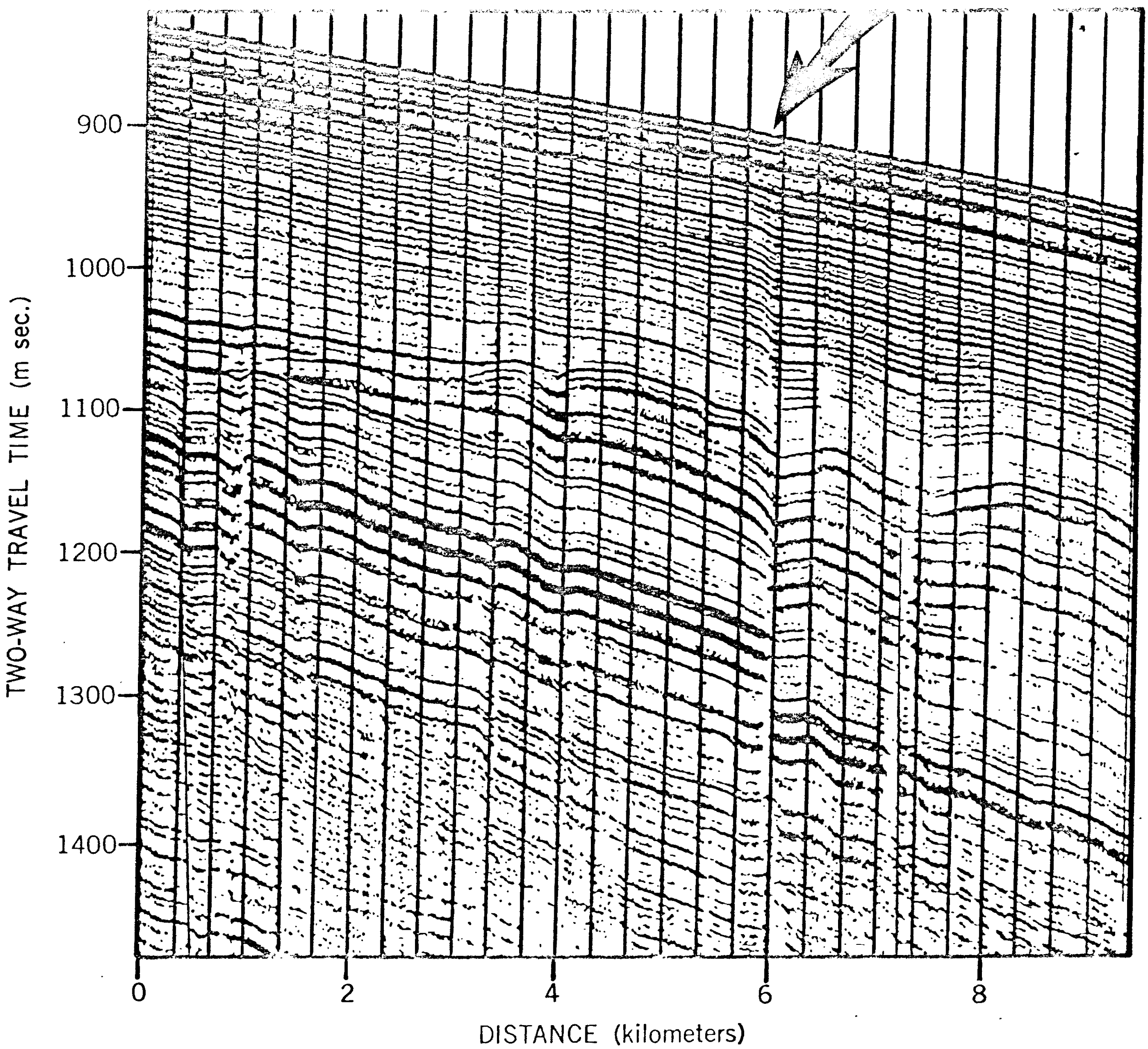

Figure 11.--Analog profile showing a prominent growth fault on the upper continental slope. Note the progressively increasing offset of the fault with depth. Vertical exaggeration X12. (See pl. 1B, blocks NI 18-7-611, -612.)

geology of the area is not conducive to gas generation and retention. Most surface sediments, particularly in the southern parts of the sale area on the continental shelf, are coarse grained carbonates with little included organic matter. Analyses of interstitial gas in the SE Georgia Embayment area conducted as part of the AMCOR project show only very slight amounts of biogenic gas in near-surface sediments (Hathaway and others, 1976).

Gas content of surficial sediments on the continental slope may be somewhat greater than on the shelf because of the generally finer grain size (silts, clays) and higher organic carbon content of slope sediments. Problems incident to large concentrations of gas such as liquefaction, mass flowage, and the sensitivity of gassy sediments to failure under cyclic loading would be aggravated by higher gradients on the slope. However, surface sediments with gas concentrations great enough to appear on high-resolution geophysical data as "acoustically turbid zones" occur on only a small percentage of acreage on the slope.

Gas in sediments can take various physical forms, one of which is a clathrate. A clathrate (gas hydrate) is an ice-like, crystalline lattice of water molecules in which gas molecules are physically contained under the proper conditions of temperature and pressure (Tucholke and others, 1977). Clathrates are rather common constituents of deep water (approximately 500+ m) sediments and are found in the Lease Sale 56 area, particularly in the large group of blocks on the slope about 100 km south-southeast of Cape Lookout. They are detectable on seismic reflection data because the clathrate produces a strong acoustic impedance contrast (owing to a pronounced velocity inversion) at its lower surface. Like any diagenetic horizon, clathrates can cross bedding planes which further increases the chances for locating them. Unfortunately, depositional processes on the slope are complex and many smaller clathrate horizons undoubtedly escape detection because geologic structure of the slope is generally complicated. Despite the fact that only a few of the larger deposits have been shown on plate 1, it can be assumed with some confidence that the likelihood of encountering shallow hydrates during exploratory drilling operations on the slope is rather high. This is particularly true because our seismic reflection profiles do not record data deeper than 0.5 sec two-way travel time. Many authors (Tucholke and others, 1977; Lancelot and Ewing, 1972) show convincing evidence of massive hydrate deposits at greater depths.

Figure 3 shows a probable clathrate deposit on the continental slope at roughly 250 msec below the sea floor. Note that the deposit underlies a sediment slump and the line tracing the slump scar (see pl. 1A and block maps) roughly defines the long axis of the clathrate deposit. Because of this and because similar slump/clathrate complexes have been observed on the slope outside the lease sale area, their relative positions may be more than simple coincidence. The inverse relationship between sediment shear strength and interstitial gas content is well established in the literature (Whelan and others, 1975; Booth and Dunlap, 1977) and it may be that gasification of near-surface sediments (possibly by degassing at the upper surface of the clathrate deposit) has weakened them to the point of failure. Pleistocene events, such as the eustatic sea level change or post-Pleistocene bottom water temperature increases, may have had a significant role in destabilizing the clathrate surface resulting in outgassing and subsequent failure of overlying sediments.

The direct risk (if any) that clathrates pose to drilling operations has not been thoroughly assessed despite more than 10 years of study of their properties and occurrence. Drilling into a clathrate deposit itself appears to present few problems because degassing is rather slow even after dramatic local changes in temperature and pressure (Stoll and others, 1971). Massive hydrated methane deposits on the Blake Outer Ridge were drilled and successfully cored without incident from the drillship "Glomar Challenger" (J. Ewing, Woods Hole Oceanographic Institution, oral commun., 1979). The possibility exists, however, that a clathrate horizon may function as an efficient structural trap and that the free gas zone below a clathrate layer may be significantly overpressured (Dillon and others, 1980). The sequence of short, high-amplitude, reversely dipping reflectors at about 250 msec subbottom under the slump shown in figure 3 is interpreted as such a free gas zone.

CONCLUSIONS

Blocks on the continental shelf tentatively selected for inclusion in OCS Lease Sale 56 were found to be free of potential hazards to exploratory oil and gas operations. However, geology-related near-surface hazards were found on many blocks on the continental slope. These potential hazards were limited to a few observations of shallow recent faulting and numerous structures believed to be the result of slumping. The slumping (mass movement of surface sediments on the slope) is believed to be the most serious and widespread potential hazard affecting hydrocarbon exploration and development on Sale 56 acreage.

The potential hazards and the blocks in which they occur are listed below. This listing is based on a literature search, a small number of sea-floor sediment samples, and high-resolution geophysical data collected under contract for Lease Sales 43 and 56.

Shallow recent faulting

NI 18-7-874,-875,-918,-919

Slump or Slide

NJ 18-11-777,-821,-865,-909,-953
NI 18-2-246,-247,-422,-423,-466,-510,-597,-598,-642
NI 18-7-874,-875,-876,-918,-919

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953	005

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554	021
555	022
597	023
598	024
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641	026
642	027

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567	029
610	030
611	031
654	032
655	033

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710	035
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752	037
753	038
754	039
794	040
795	041
796	042
837	043
838	044
839	045

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357.....285
399.....286

EXPLANATION FOR BLOCK MAPS

PROPOSED LEASE SALE 56

POTENTIAL GEOLOGIC HAZARDS

Shallow fault; bars on downthrown side

Slump or Slide

CONSTRAINTS

Fault; bars on downthrown side

Sand wave field

Filled channels

Erosion/Scour area

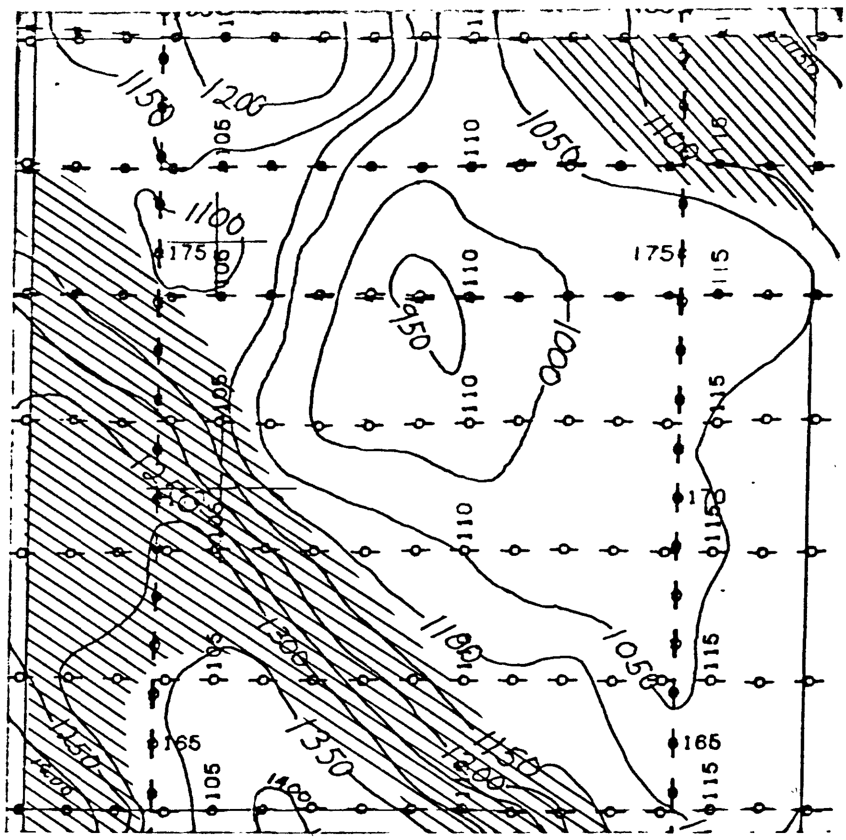
Gassy sediments

GENERAL INFORMATION

8500 0150 0100 8100 Navigation shot-points

Note: Pages 56-001 through 56-286 follow

Proposed
Lease Sale 56



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NJ 18-11-777

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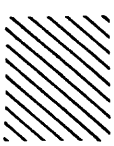
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 1400m, min. 940m
Slope Gradient: 68 m/km, Direction: S
Surface Sediment Type: Clay/Silt

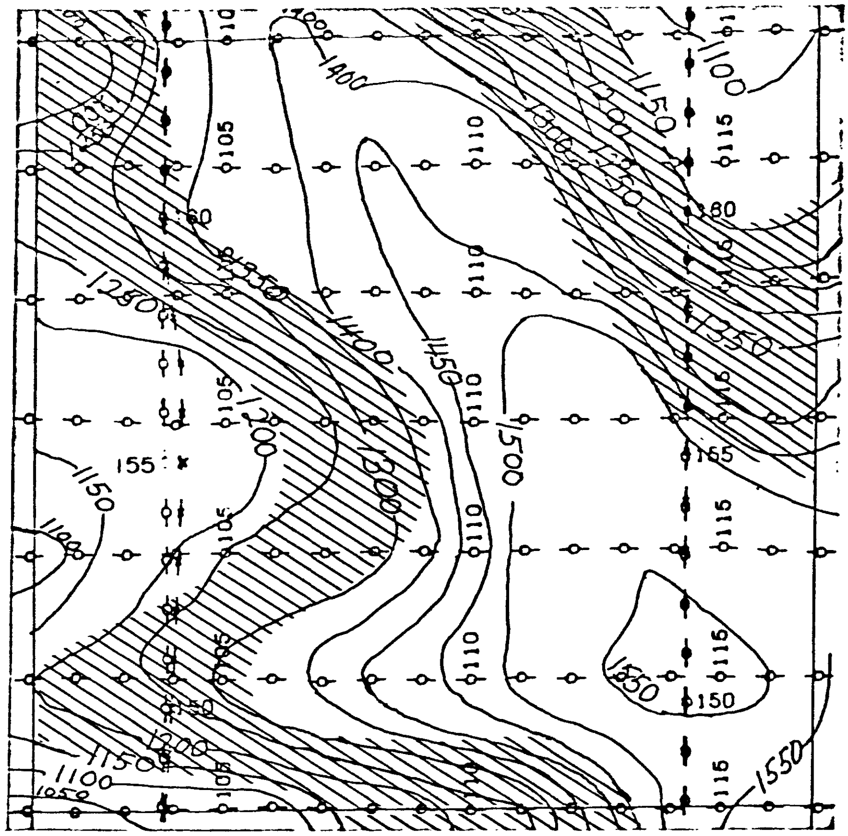
HAZARD



Slump or Slide

Proposed
Lease Sale 56

Block
NJ 18-11-821



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ISOBATHS IN METERS

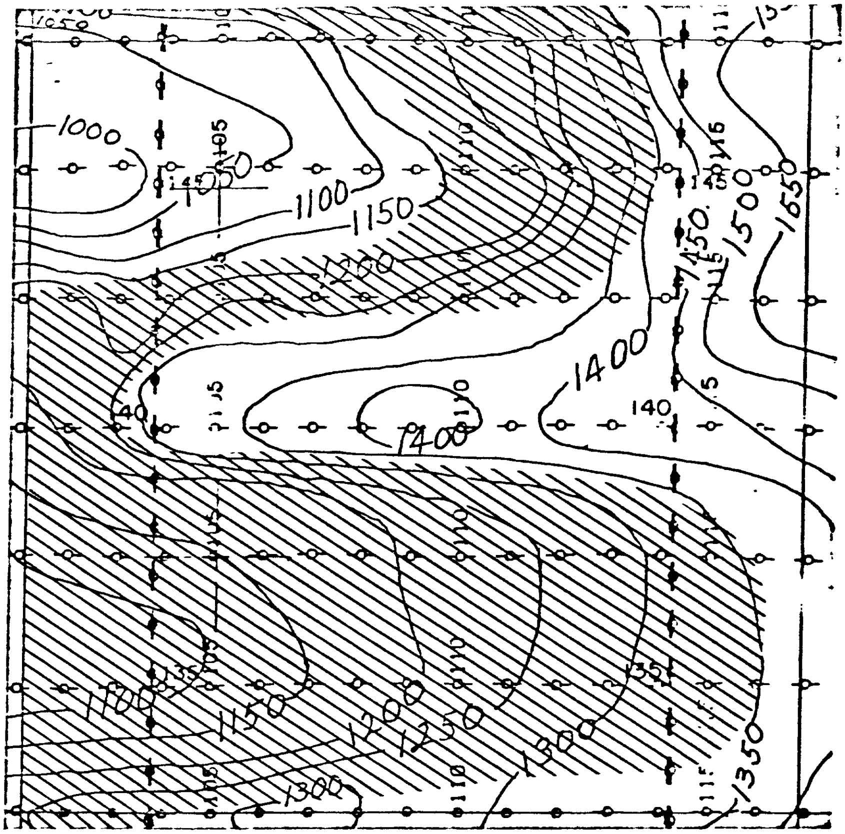
Water Depth: max. 1560m , min. 110Um
Slope Gradient: 68 m/km, Direction: E
Surface Sediment Type: Clay/Silt

HAZARD

Slump or Slide

Proposed
Lease Sale 56

Block
NJ 18-11-865



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Surface Sediment Type: Clay/Silt

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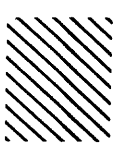
ISOBATHS IN METERS

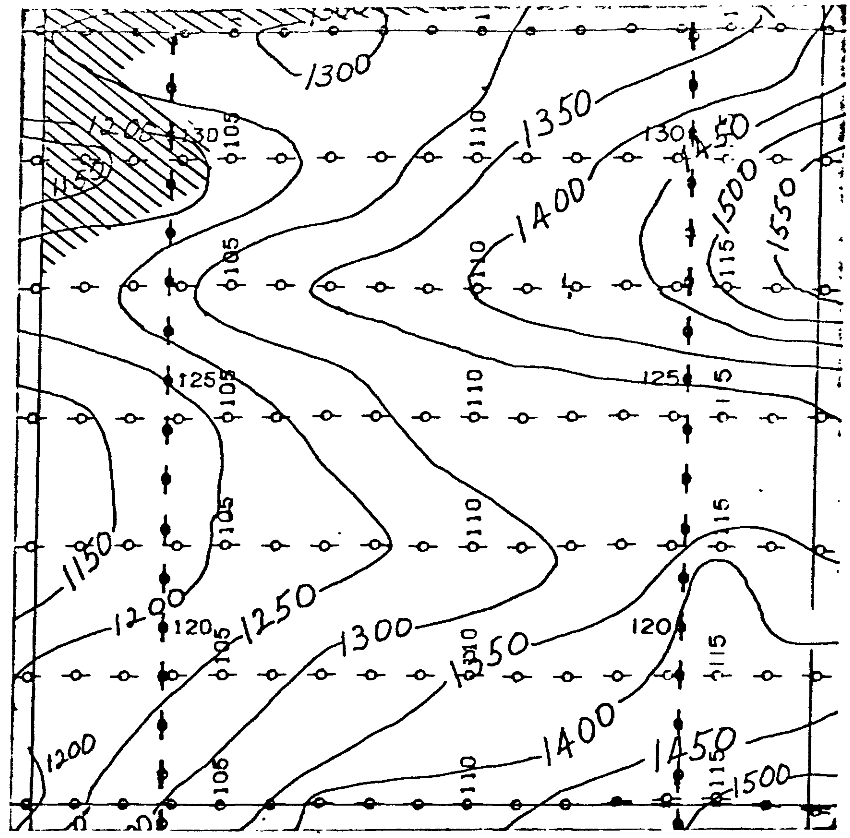
HAZARD



Slump or Slide

Proposed
Lease Sale 56

Block
NJ 18-11-909



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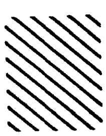
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max.1560m , min. 1145m
Slope Gradient: 61 m/km, Direction: NE
Surface Sediment Type: Clay /Silt

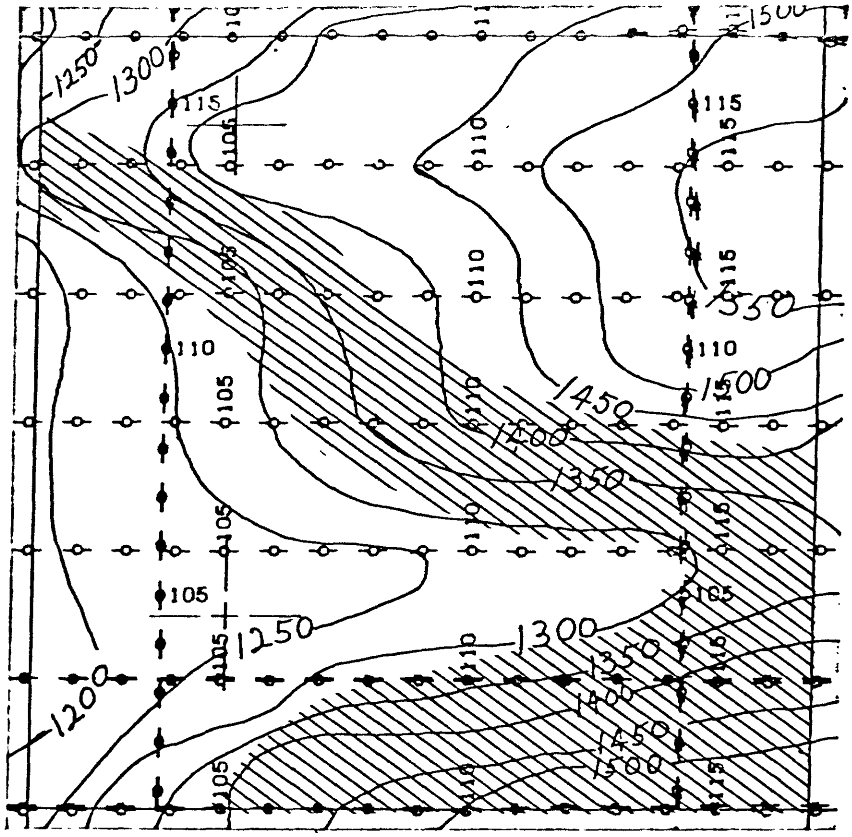
HAZARD



Slump or Slide

Proposed
Lease Sale 56

Block
NJ 18-11-953



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0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

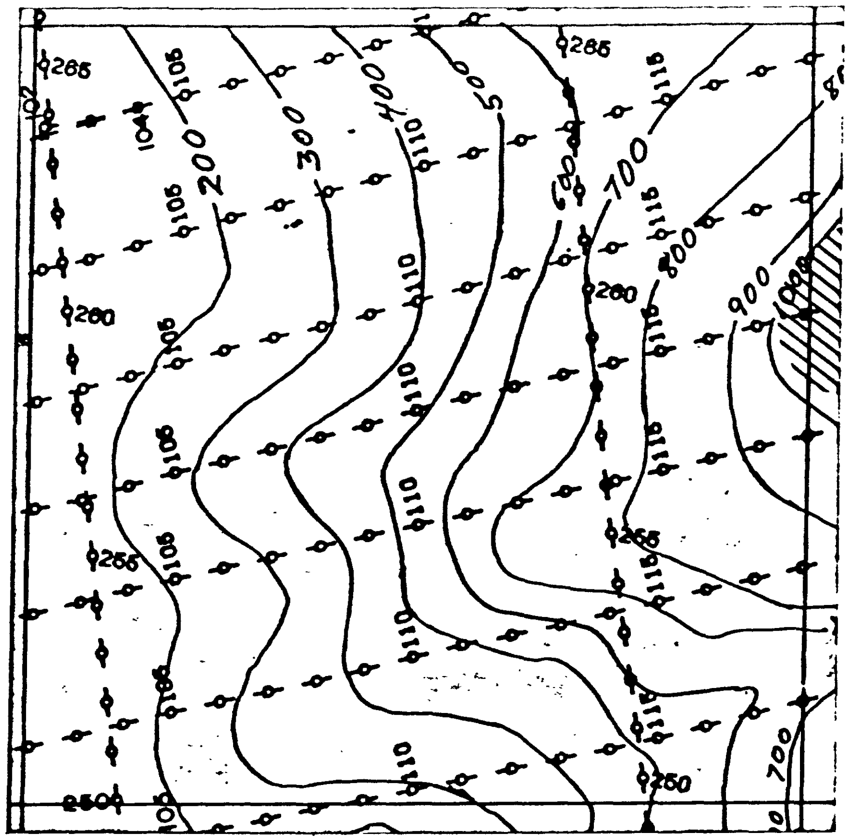
Water Depth: max. 1555m , min. 1190m
Slope Gradient: 54 m/km, Direction: NE
Surface Sediment Type: Clay/Silt

HAZARD

Slump or Slide

Proposed
Lease Sale 56

Block
NI 18-2-246



Water Depth: max. 1005m, min. 111m
Slope Gradient: 178 m/km, Direction: E
Surface Sediment Type: Clay/Silt

SCALE 1:48000
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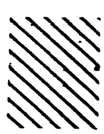
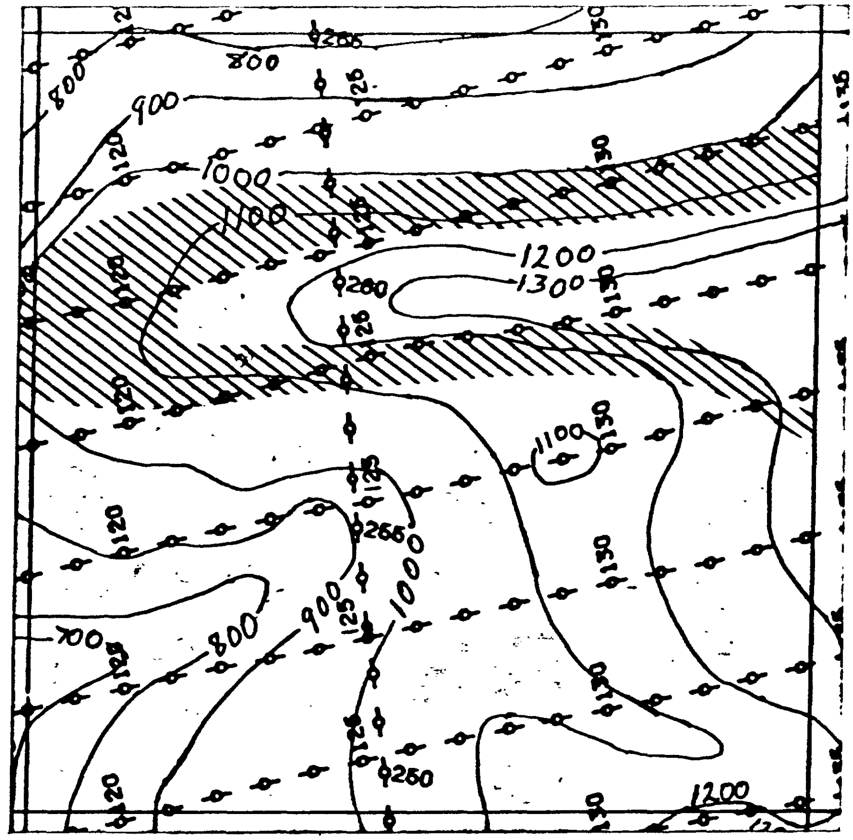
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

HAZARD


Slump or Slide

Proposed
Lease Sale 56



Block
NI 18-2-247

Water Depth: max. 1327m, min. 690m
Slope Gradient: 127 m/km, Direction: E
Surface Sediment Type: Clay/Silt

SCALE 1:48000

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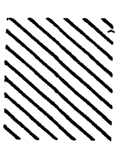
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

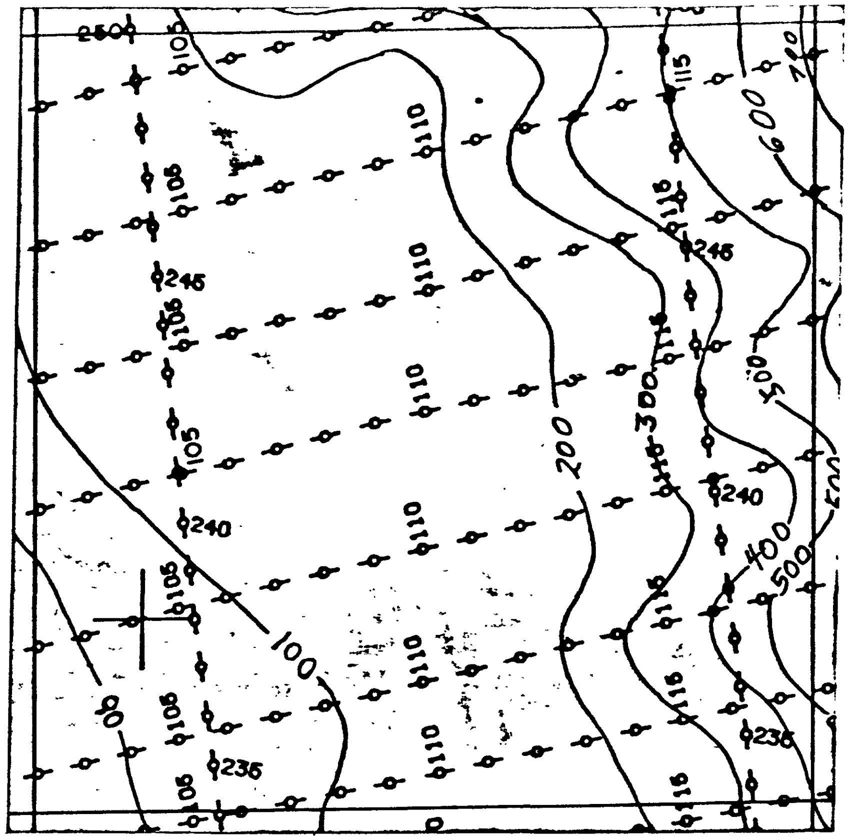
HAZARD



Slump or Slide

Proposed
Lease Sale 56

Block
NI 18-2-290



Water Depth: max. 720m , min. 86m
Slope Gradient: 127 m/km, Direction: E
Surface Sediment Type: Clay/Silt

SCALE 1:48000
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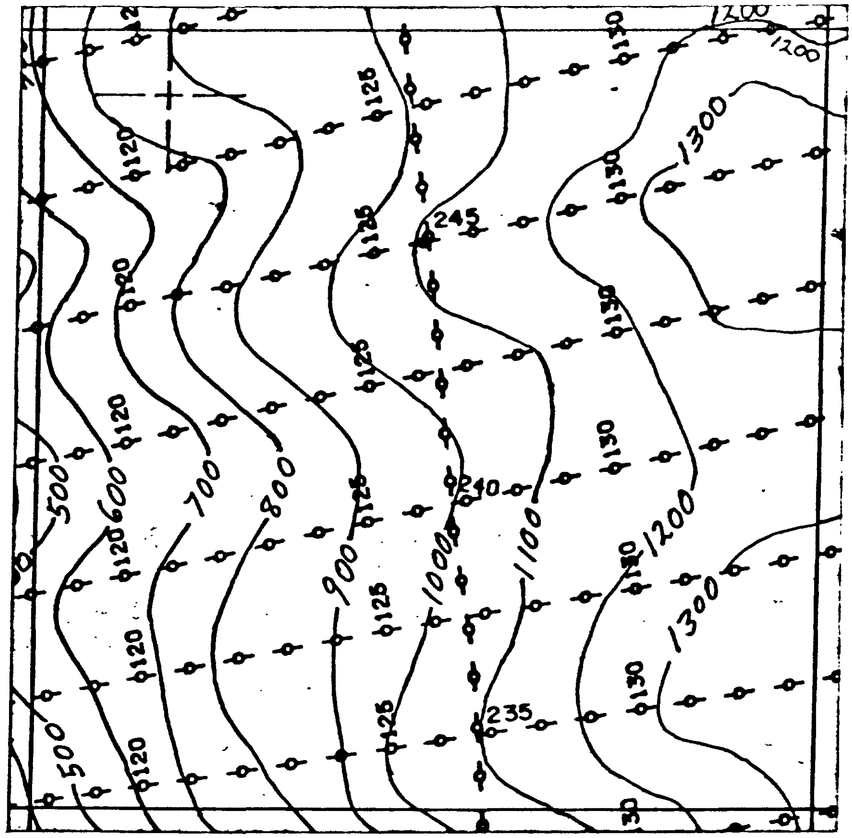
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NI 18-2-291



Water Depth: max. 1340m , min. 510m
Slope Gradient: 166 m/km, Direction: E
Surface Sediment Type: Clay/Silt

SCALE 1:48000

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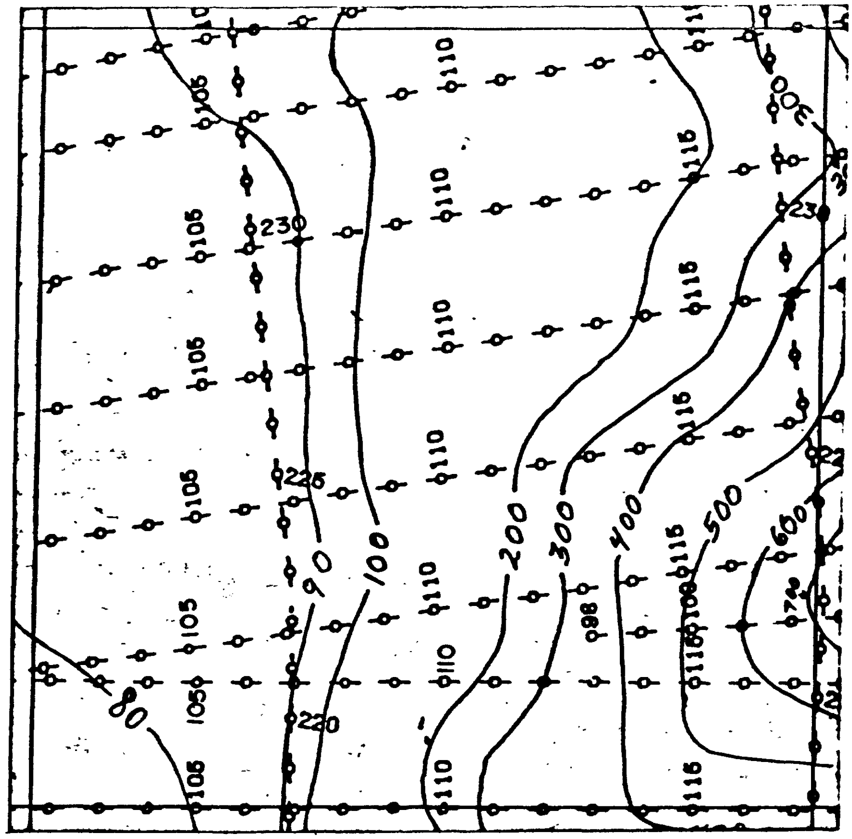
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NI 18-2-334



SCALE 1:48000

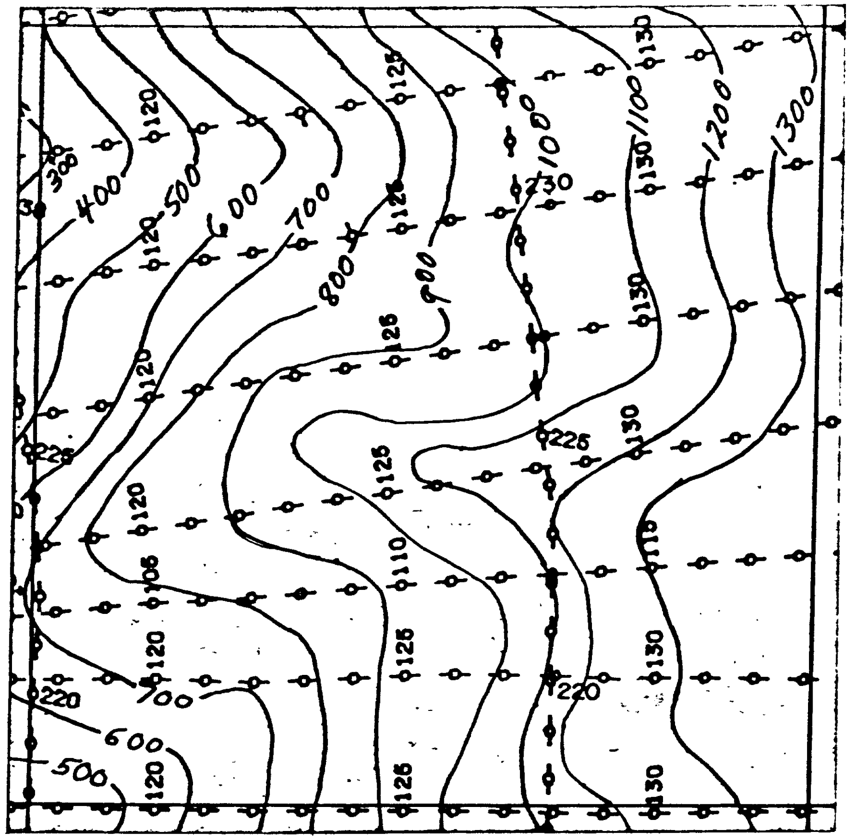
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 700m , min. 76m
Slope Gradient: 125 m/km, Direction: E
Surface Sediment Type: Clay/Silt

Proposed
Lease Sale 56

Block
NI 18-2-335



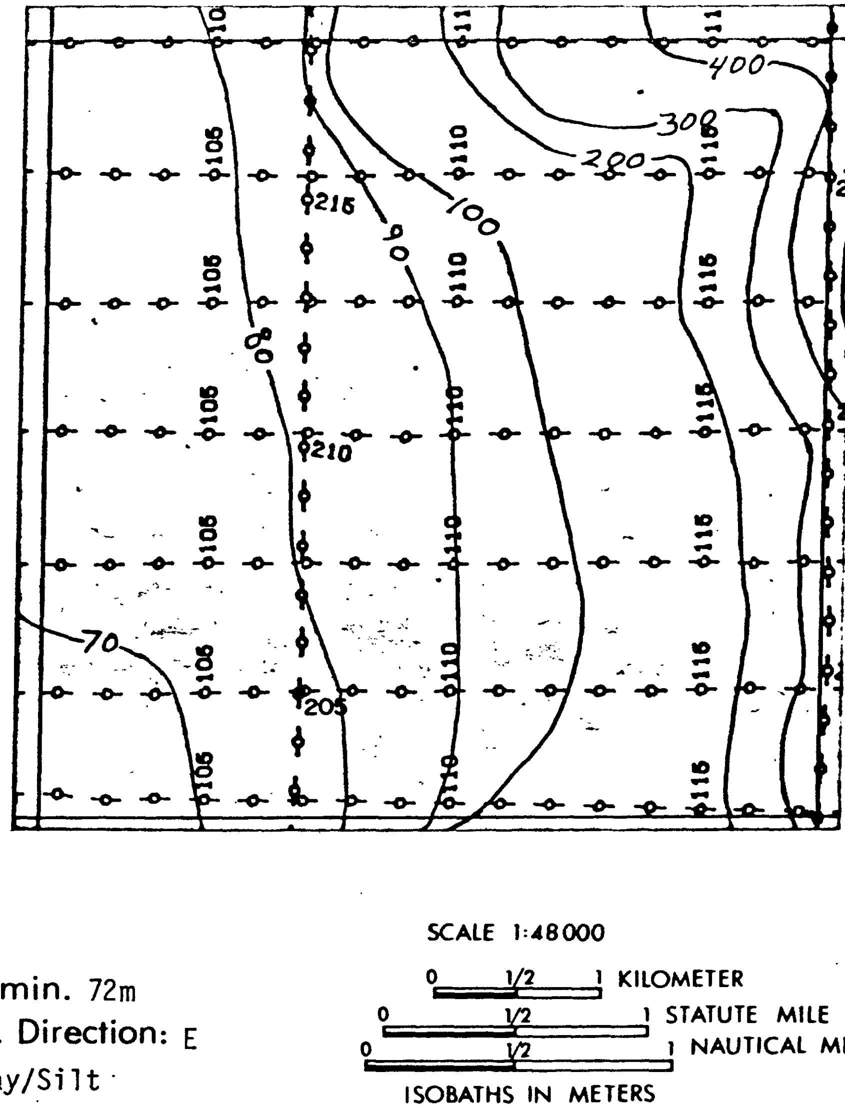
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 1395m , min. 320m
Slope Gradient: 215 m/km, Direction: E
Surface Sediment Type: Clay/Silt

Proposed
Lease Sale 56

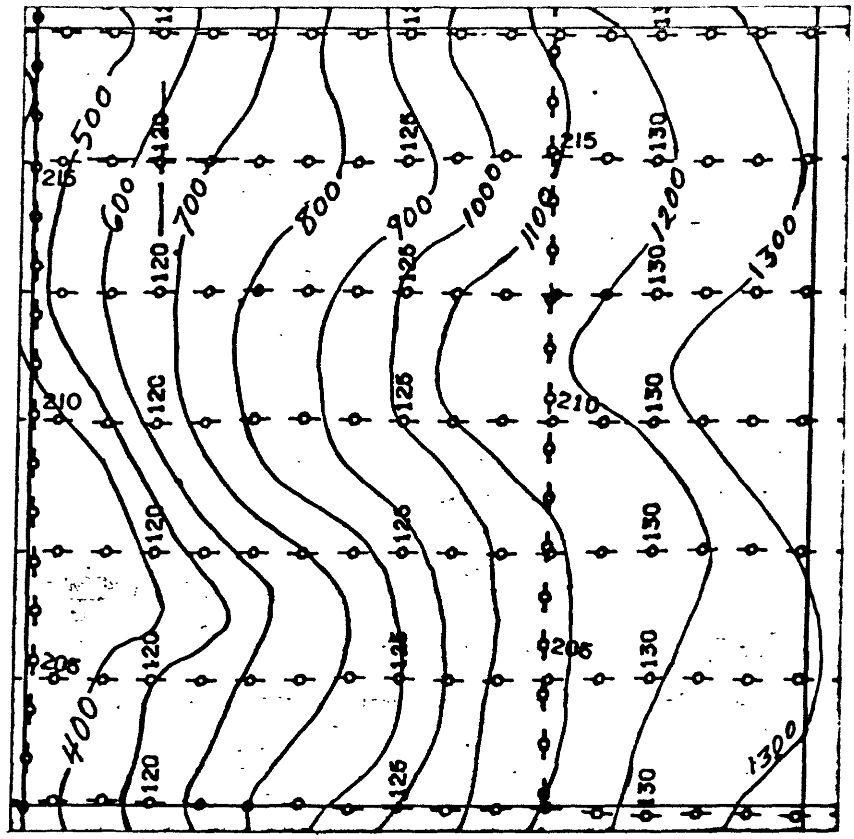
Block
NI 18-2-378



Water Depth: max. 412m , min. 72m
Slope Gradient: 68 m/km, Direction: E
Surface Sediment Type: Clay/Silt

Proposed
Lease Sale 56

Block
NI 18-2-379



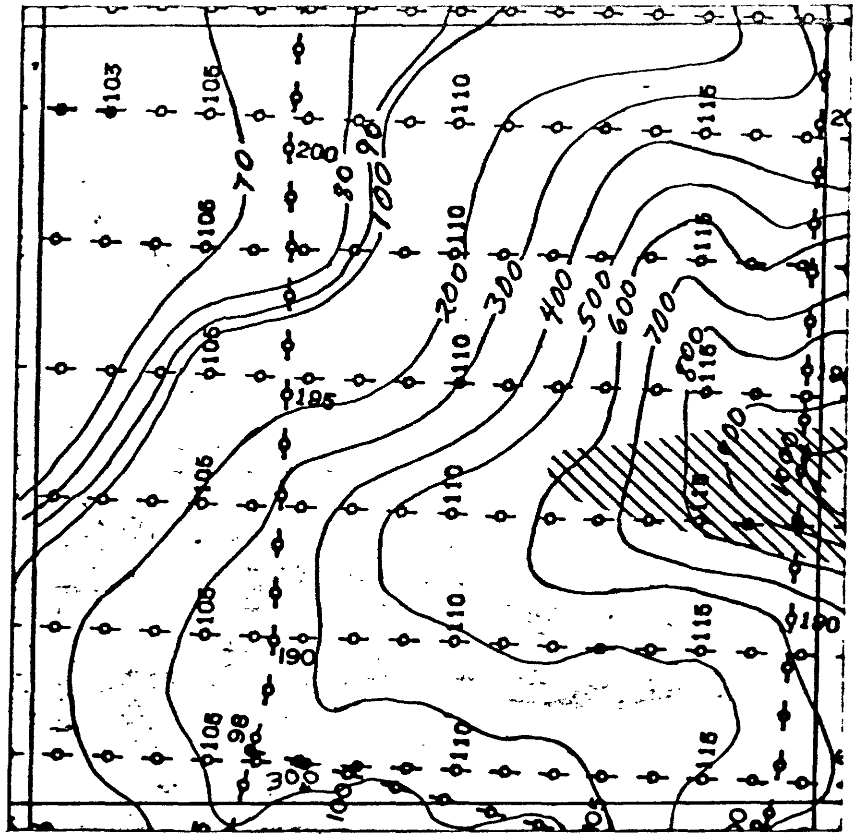
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 1372m, min. 335m
Slope Gradient: 207 m/km, Direction: E
Surface Sediment Type: Clay/Silt

Proposed
Lease Sale 56



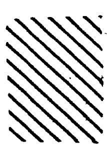
Block
NI 18-2-422

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 1005m , min. 61m
Slope Gradient: 190 m/km, Direction: E
Surface Sediment Type: Clay/Silt

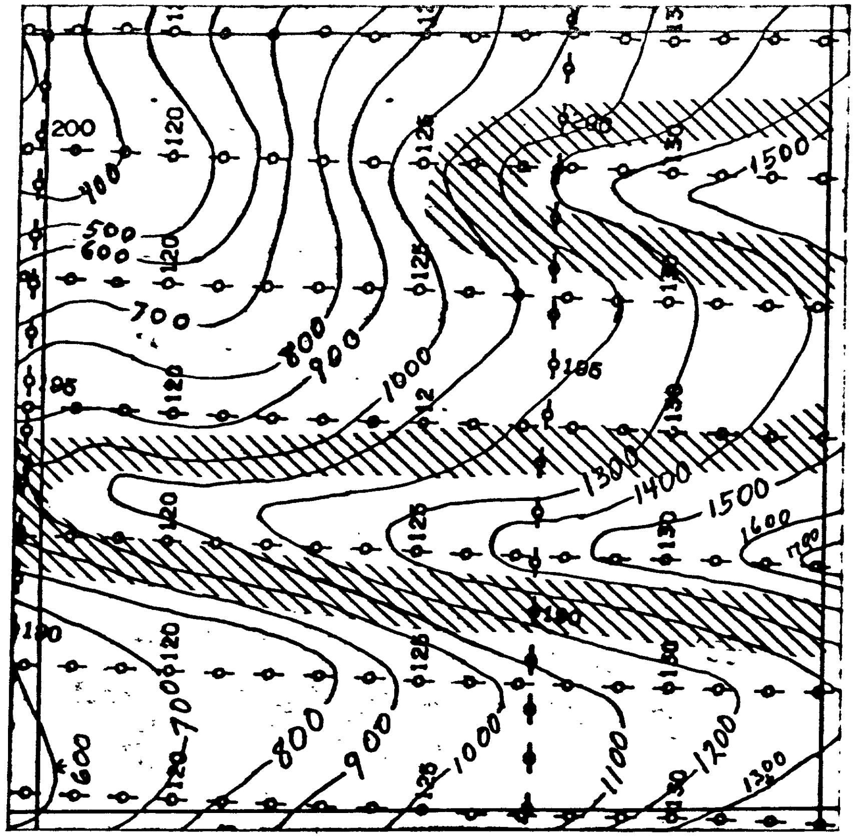
HAZARD



Slump or Slide

Proposed
Lease Sale 56

Block
NI 18-2-423



SCALE 1:48000

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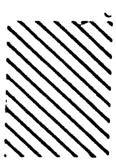
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 1730m , min. 375m
Slope Gradient: 217 m/km, Direction: E
Surface Sediment Type: Clay/Silt

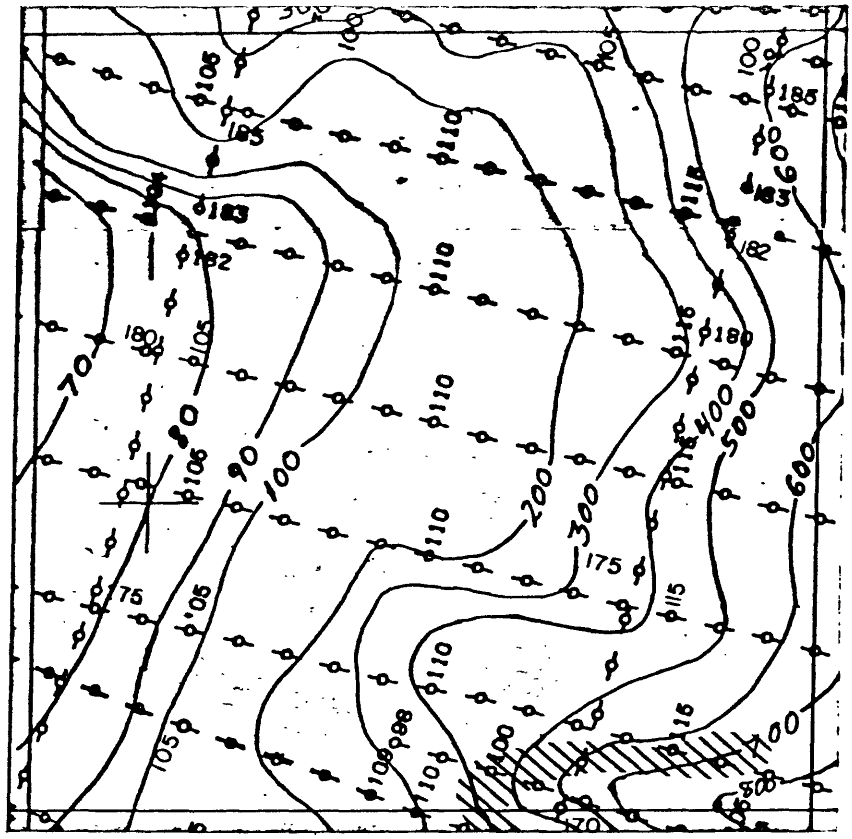
HAZARD



Slump or Slide

Proposed
Lease Sale 56

Block
NI 18-2-466



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

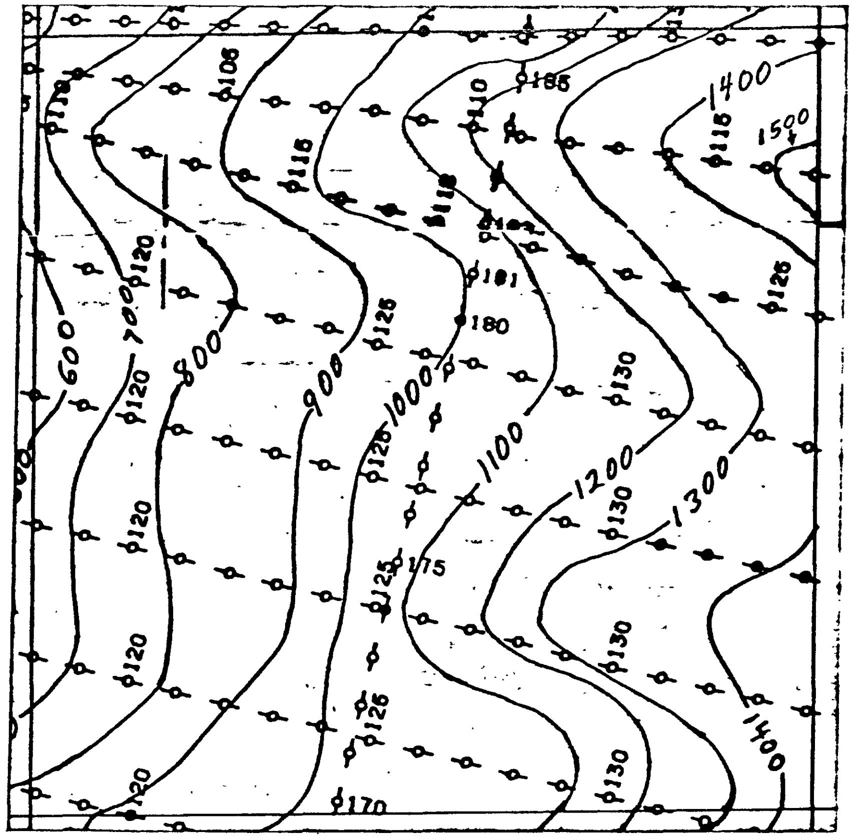
Water Depth: max. 810m , min. 67m
Slope Gradient: 148 m/km, Direction: E
Surface Sediment Type: Clay/Silt

HAZARD

Slump or Slide

Proposed
Lease Sale 56

Block
NI 18-2-467



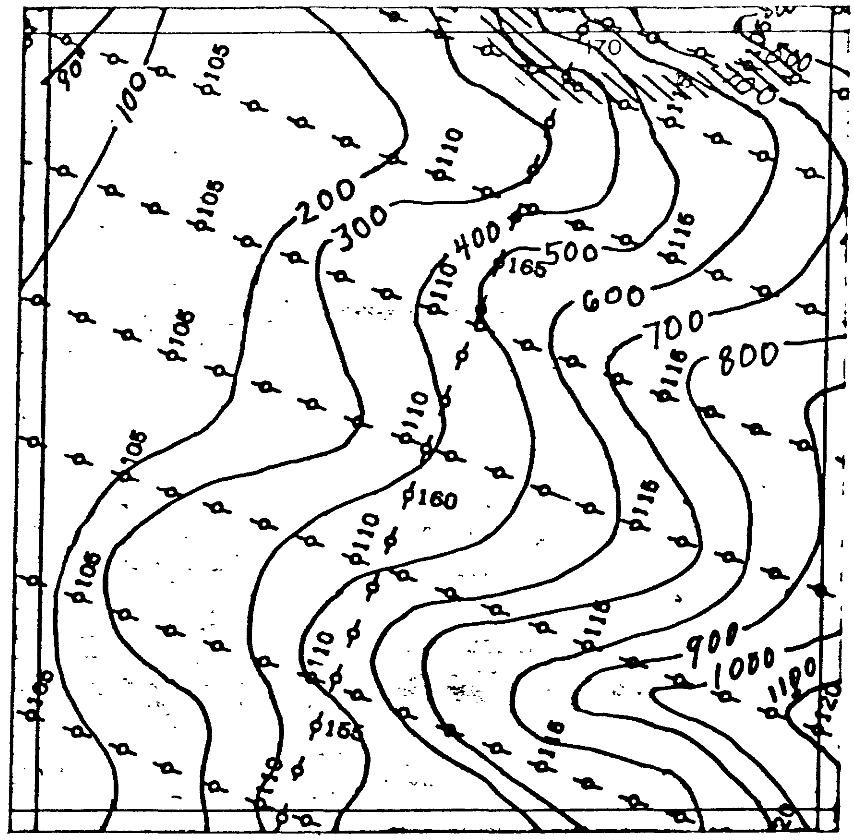
Water Depth: max. 1505m , min. 540m
Slope Gradient: 193 m/km, Direction: SE
Surface Sediment Type: Clay/Silt

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

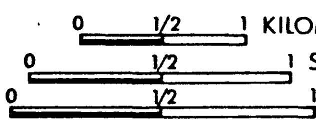
ISOBATHS IN METERS

Proposed
Lease Sale 56



Block
NI 18-2-510

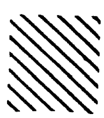
SCALE 1:48000



ISOBATHS IN METERS

Water Depth: max. 1112m , min. 88m
Slope Gradient: 205 m/km, Direction: SE
Surface Sediment Type: Clay/Silt

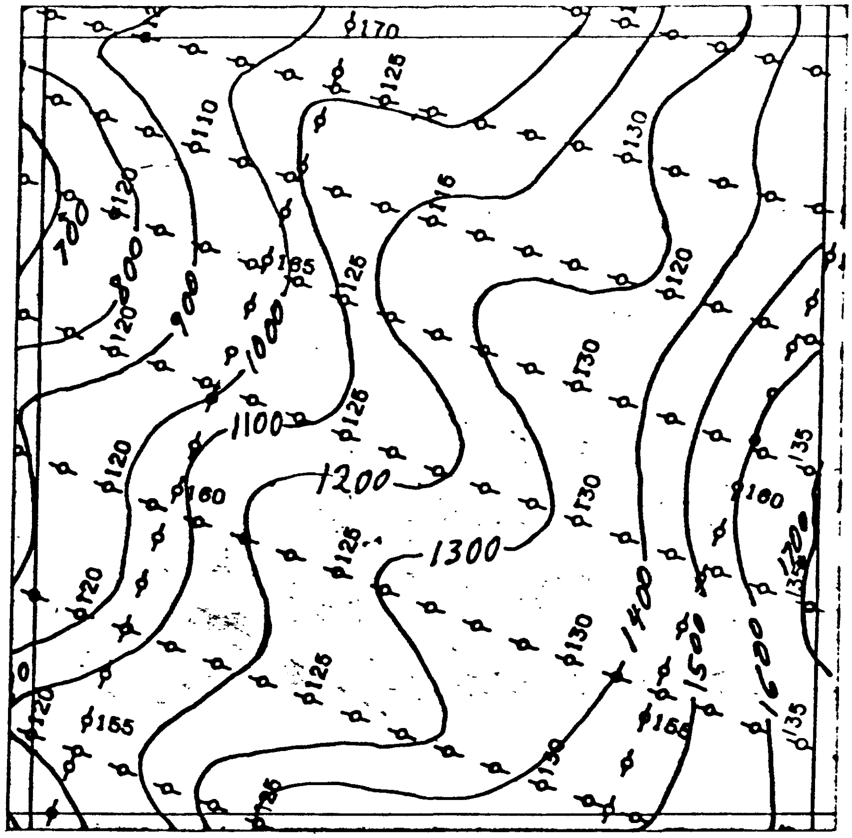
HAZARD



Slump or Slide

Proposed
Lease Sale 56

Block
NI 18-2-511



Water Depth: max. 1742m , min.690m
Slope Gradient: 210 m/km, Direction:SE
Surface Sediment Type: Clay/Silt

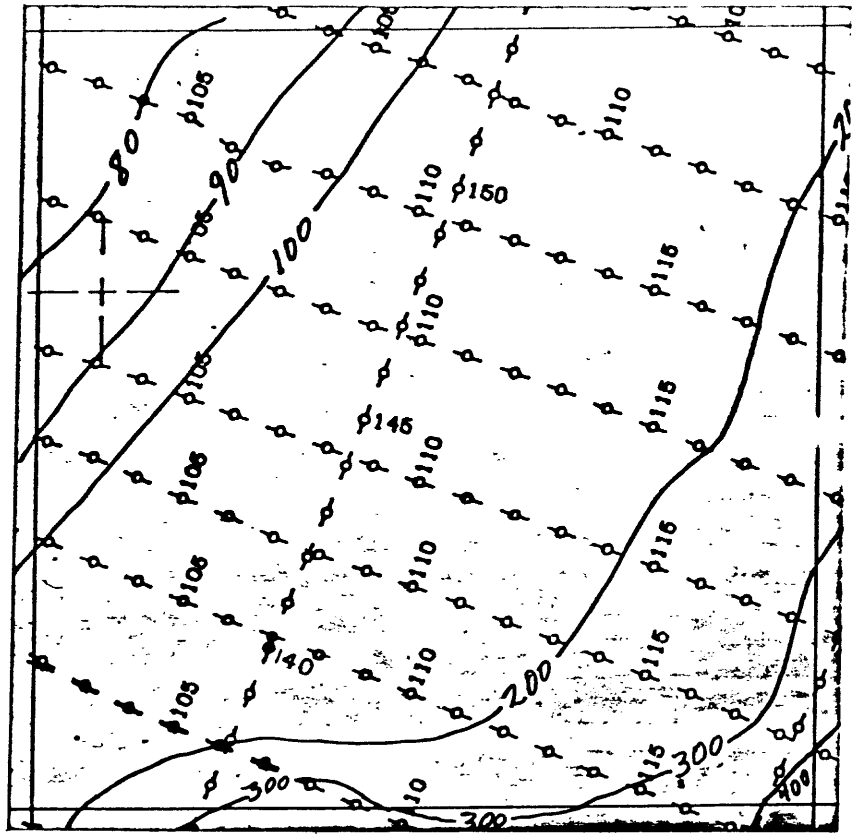
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NI 18-2-553



Water Depth: max. 410m , min. 71m
Slope Gradient: 68 m/km, Direction: SE
Surface Sediment Type: Clay/Silt

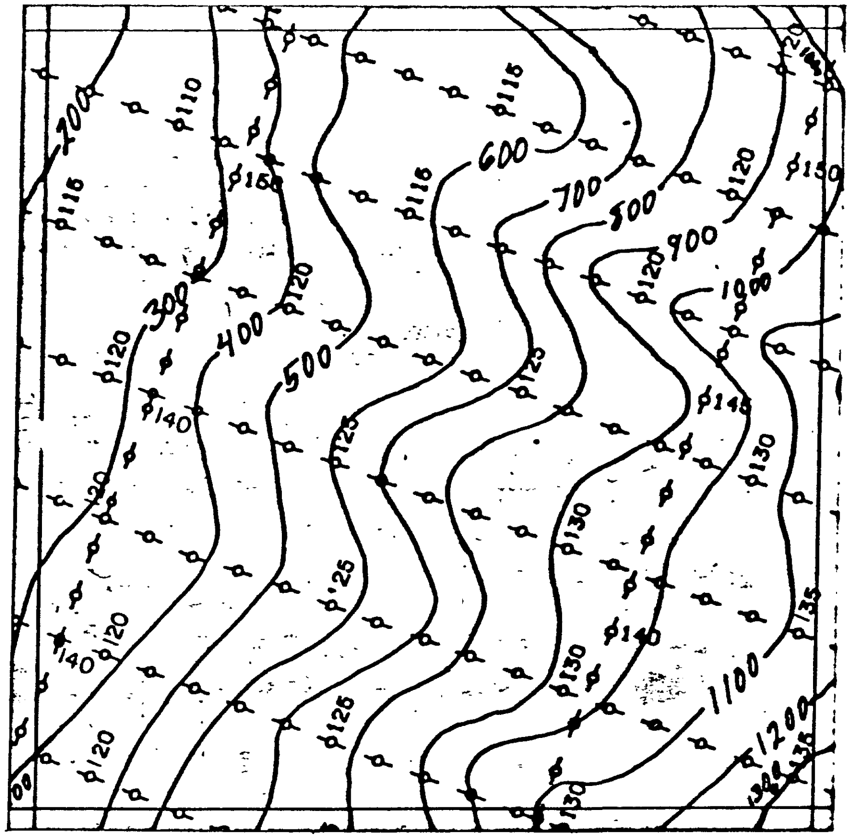
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NI 18-2-554

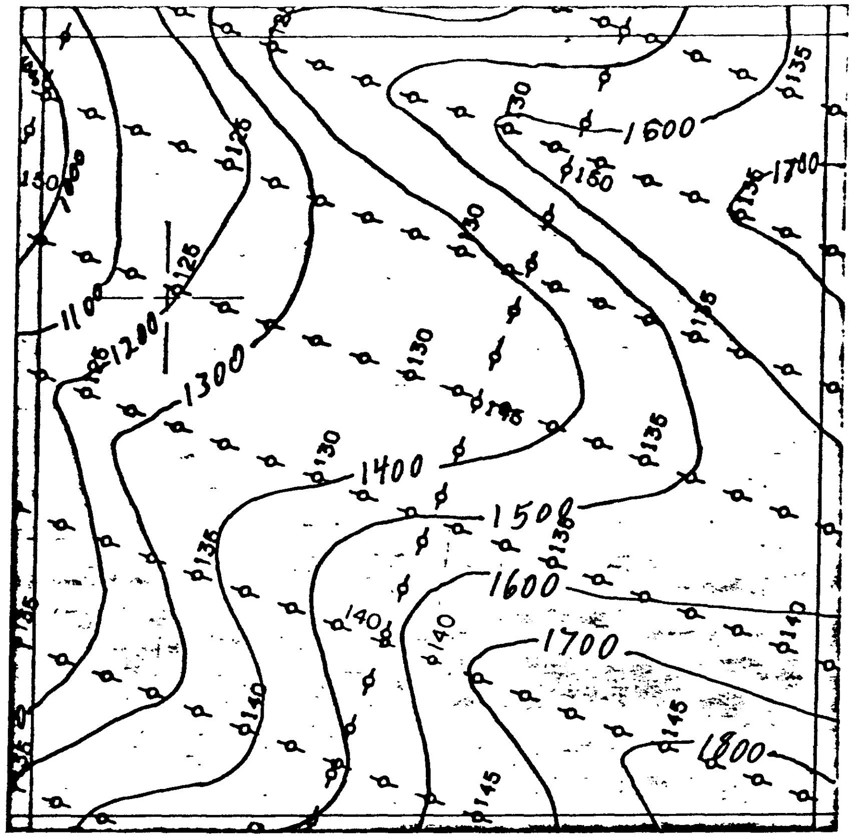


Water Depth: max. 1315m , min. 185m
Slope Gradient: 226 m/km, Direction: SE
Surface Sediment Type: Clay/Silt

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NI 18-2-555



SCALE 1:48000

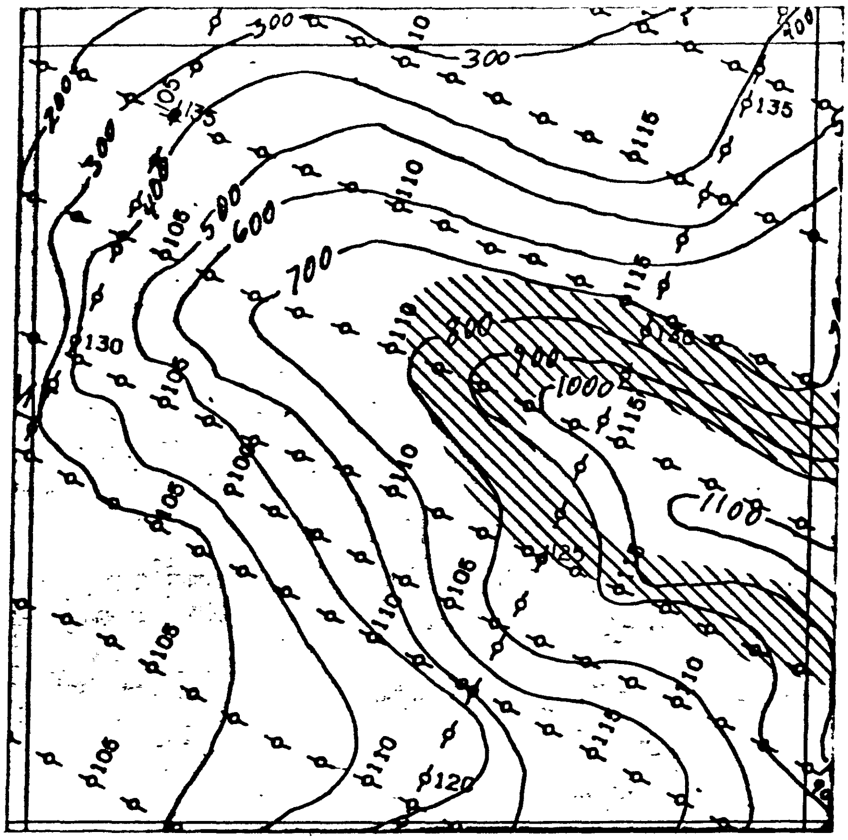
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 1830m , min. 980m
Slope Gradient: 170 m/km, Direction: SE
Surface Sediment Type: Clay/Silt

Proposed
Lease Sale 56

Block
NI 18-2-597



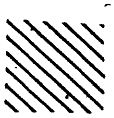
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 1120m , min. 180m
Slope Gradient: 188 m/km, Direction: SE
Surface Sediment Type: Clay/Silt

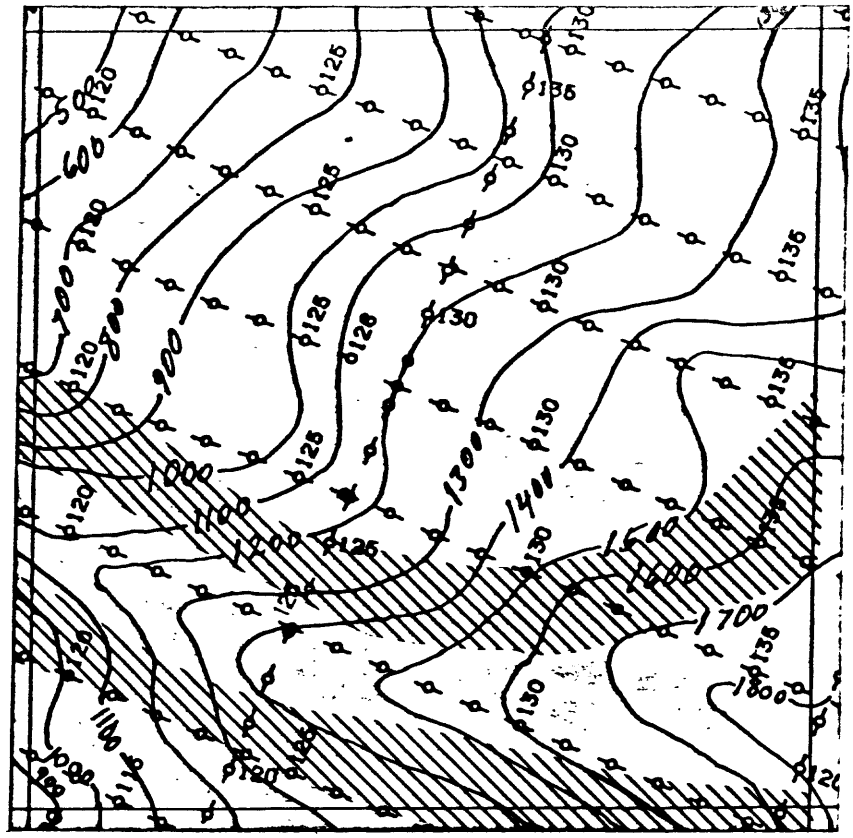
HAZARD



Slump or Slide

Proposed
Lease Sale 56

Block
NI 18-2-598



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

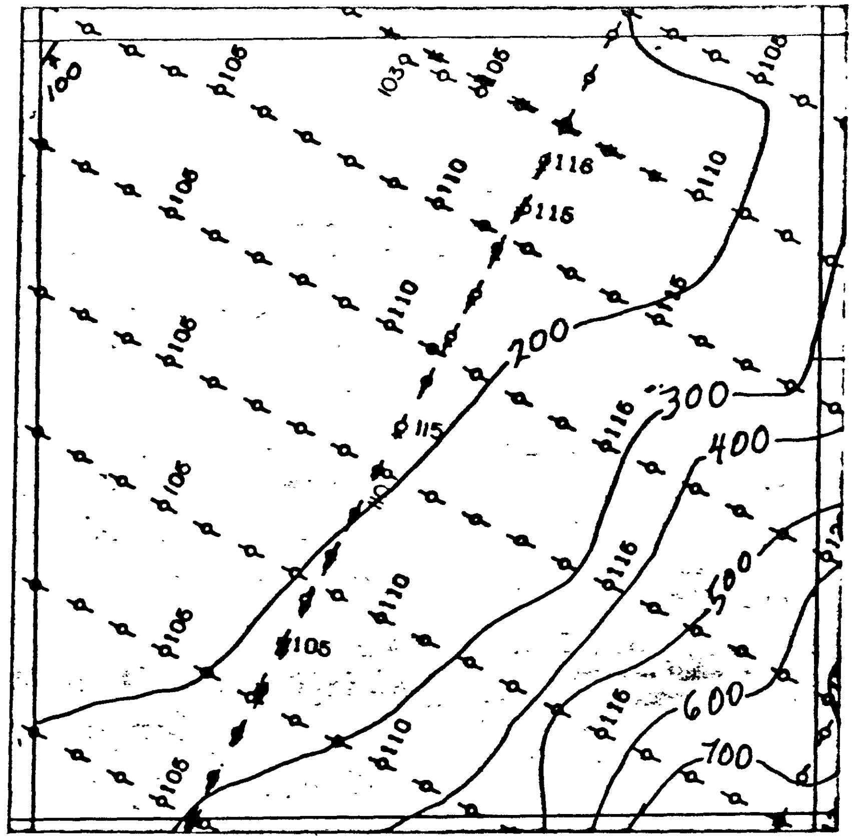
Water Depth: max. 1820m , min. 465m
Slope Gradient: 271m m/km, Direction: SE
Surface Sediment Type: Clay/Silt

HAZARD

Slump or Slide

Proposed
Lease Sale 56

Block
NI 18-2-640



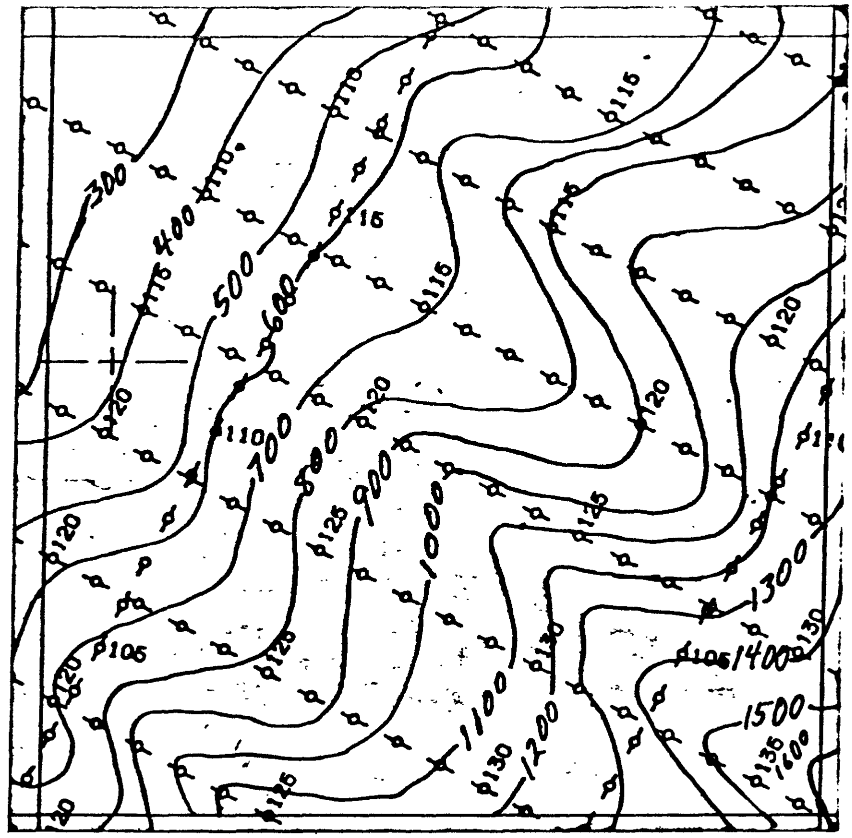
Water Depth: max. 735m , min.100m
Slope Gradient: 127 m/km, Direction:SE
Surface Sediment Type: Clay/Silt

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NI 18-2-641

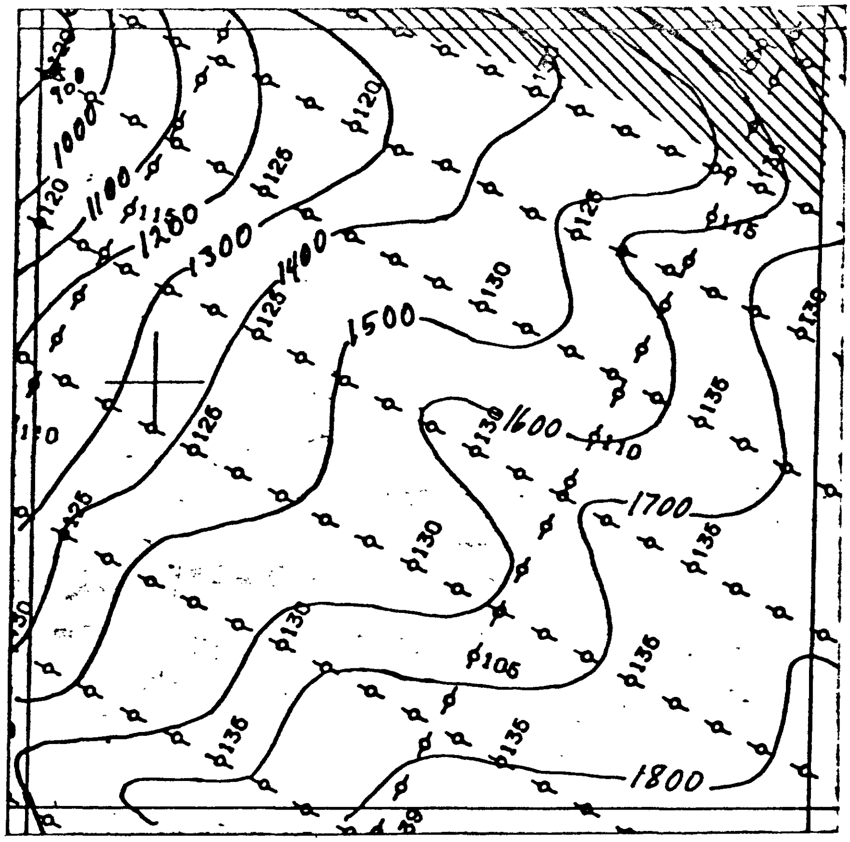


Water Depth: max. 1610m, min. 230m
Slope Gradient: 276 m/km, Direction: SE
Surface Sediment Type: Clay/Silt

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NI 18-2-642

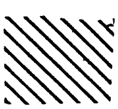


Water Depth: max. 1890m , min. 905m
Slope Gradient: 197 m/km, Direction: SE
Surface Sediment Type: Clay/Silt

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

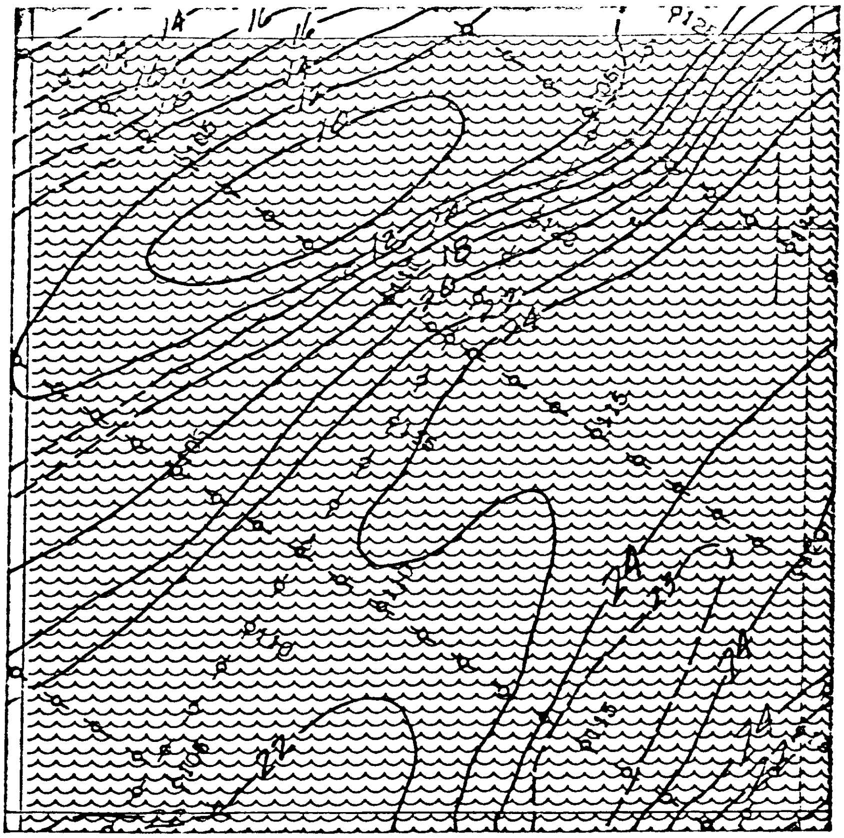
HAZARD



Slump or Slide

Proposed
Lease Sale 56

Block
NI 18-4-566



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

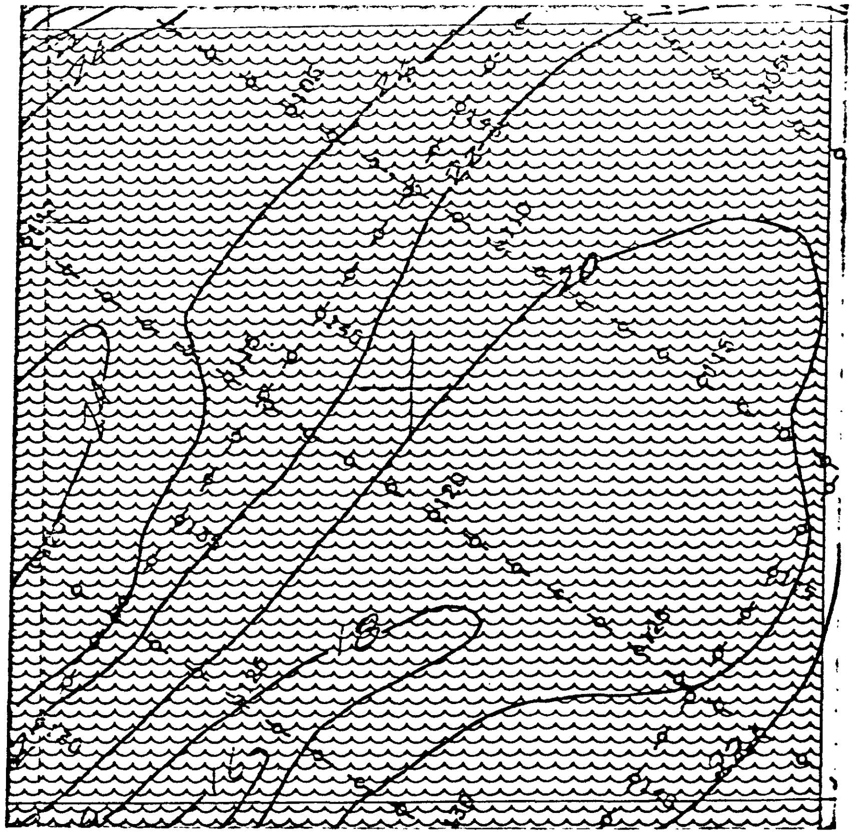
ISOBATHS IN METERS

Water Depth: max. 24m , min. 9m
Slope Gradient: 2 m/km, Direction:Variable
Surface Sediment Type: Sand

CONSTRAINT

Sand Wave Field

Proposed
Lease Sale 56



Block
NI 18-4-567

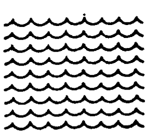
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max.25m , min.15m
Slope Gradient: 2 m/km, Direction: Variable
Surface Sediment Type: Sand

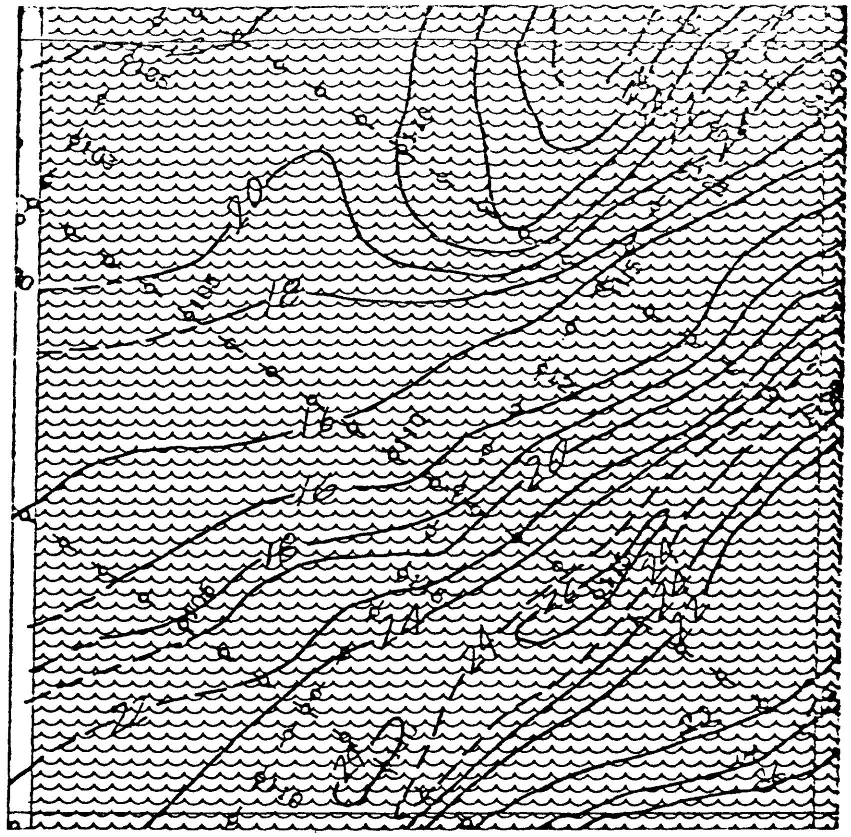
CONSTRAINT



Sand Wave Field

Proposed
Lease Sale 56

Block
NI 18-4-610



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

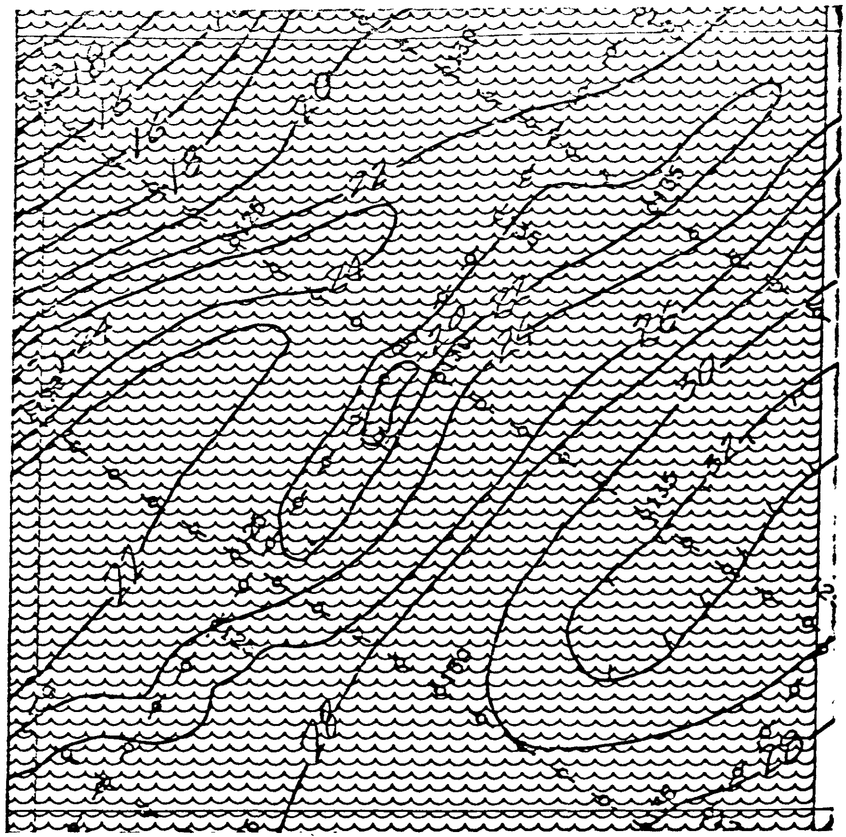
Water Depth: max. 27m , min.15m
Slope Gradient: 2 m/km, Direction:Variable
Surface Sediment Type: Sand

CONSTRAINT

Sand Wave Field

Proposed
Lease Sale 56

Block
NI 18-4-611



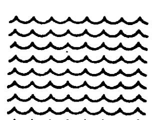
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 33m , min. 15m
Slope Gradient: 3 m/km, Direction: Variable
Surface Sediment Type: Sand

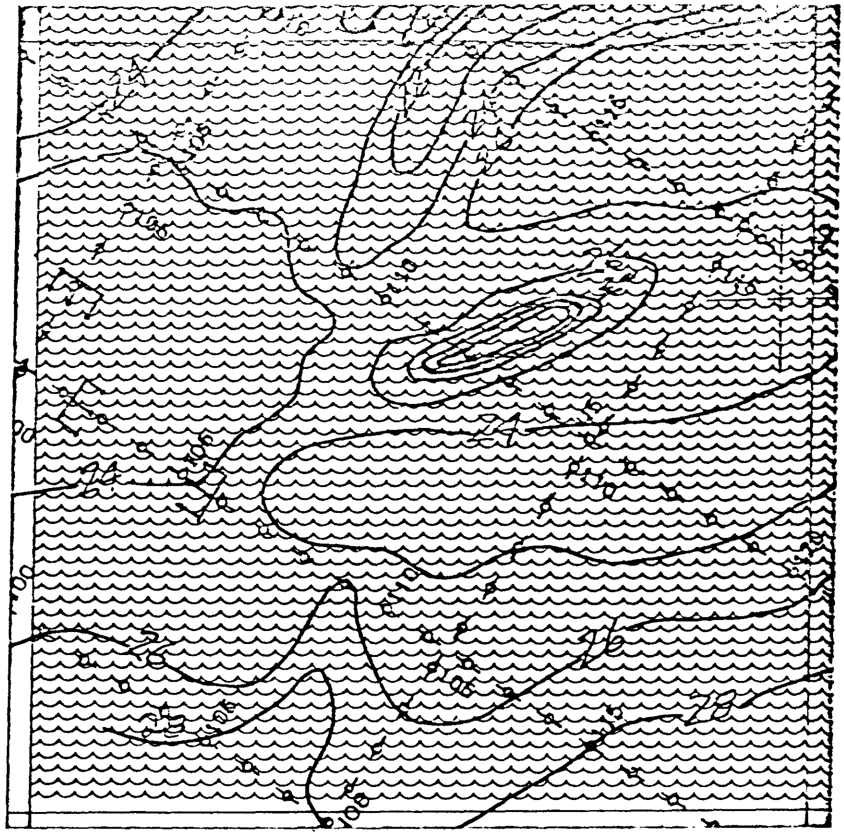
CONSTRAINT



Sand Wave Field

Proposed
Lease Sale 56

Block
NI 18-4-654



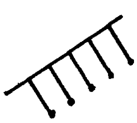
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

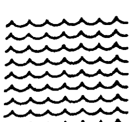
ISOBATHS IN METERS

Water Depth: max. 29m , min.20m
Slope Gradient: 2 m/km, Direction:Variable
Surface Sediment Type:Sand

CONSTRAINTS



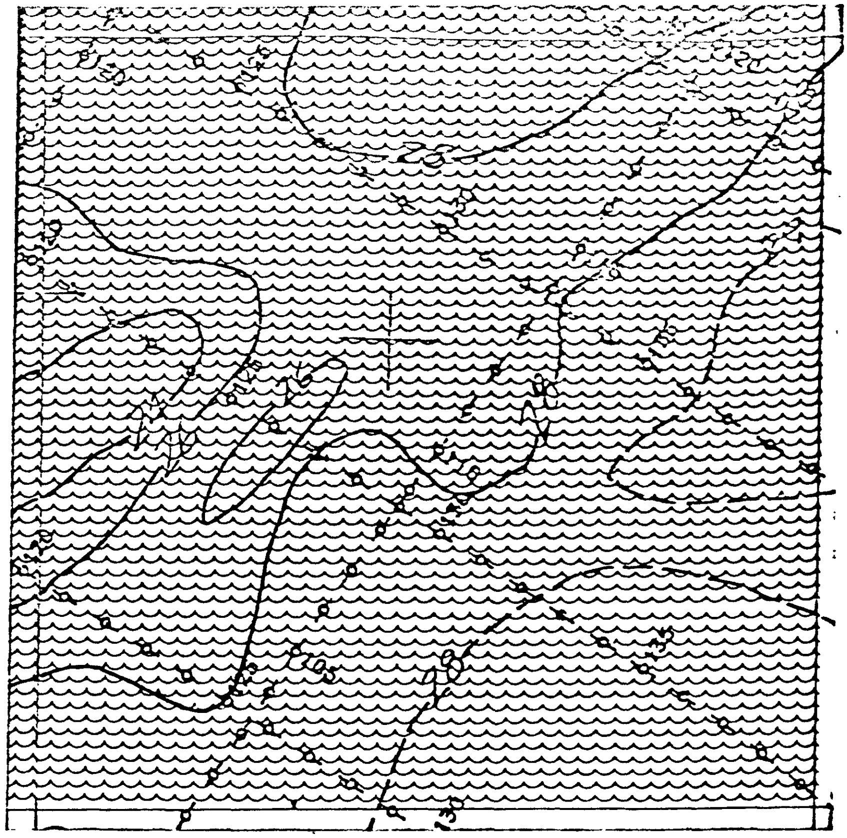
Fault



Sand Wave Field

Proposed
Lease Sale 56

Block
NI 18-4-655



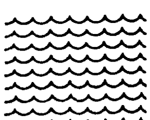
Water Depth: max. 29m , min.23m
Slope Gradient: 1 m/km, Direction:Variable
Surface Sediment Type:Sand

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

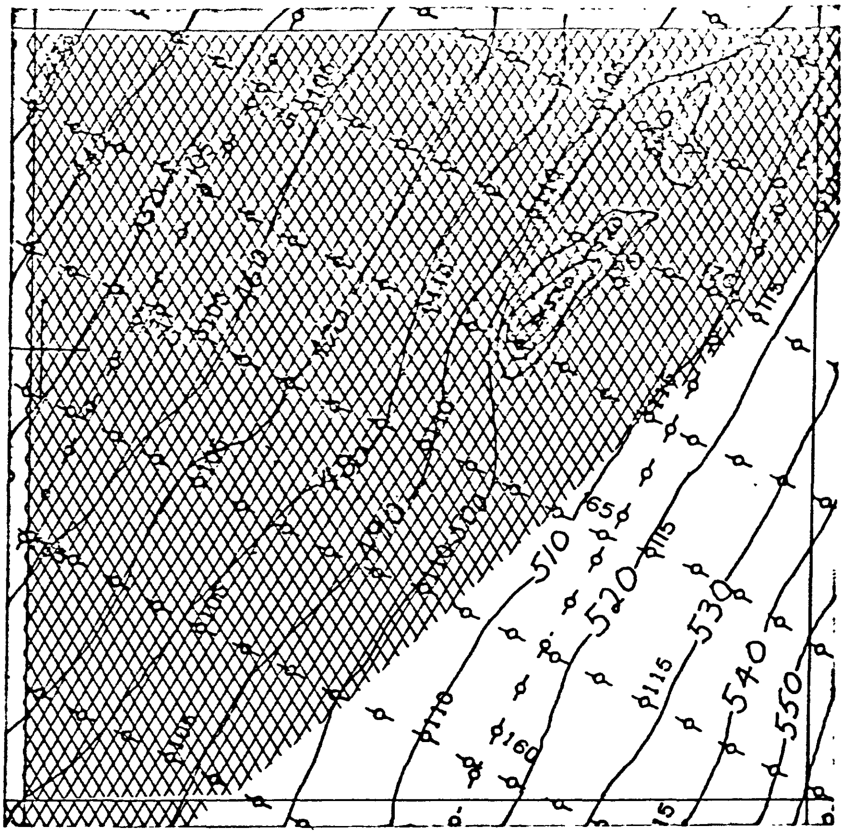
CONSTRAINT



Sand Wave Field

Proposed
Lease Sale 56

Block
NI 18-5-709



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

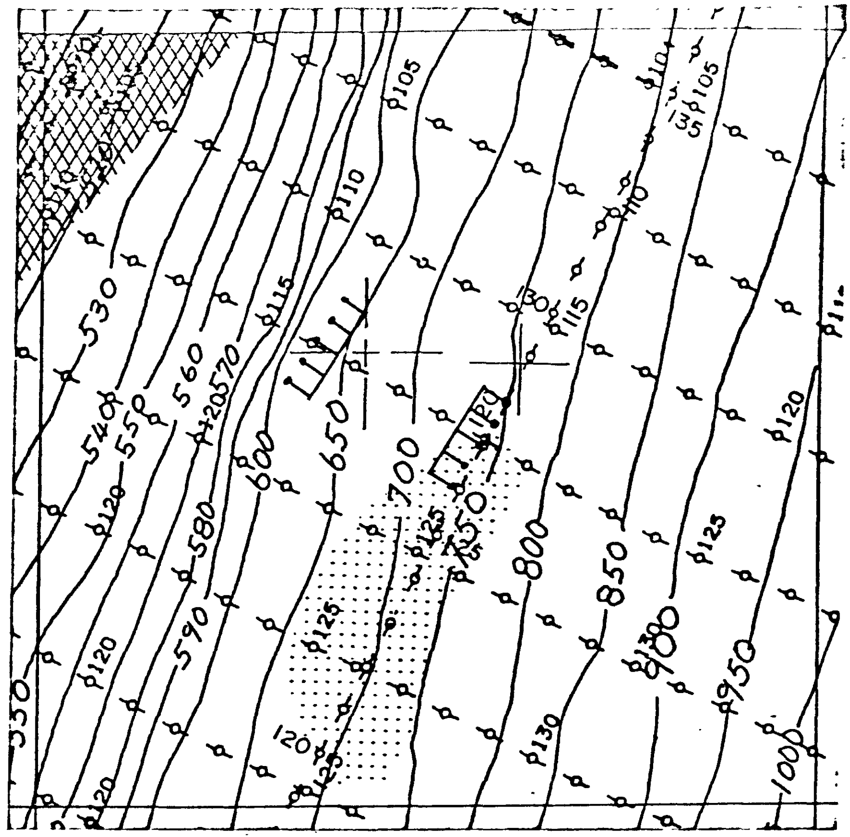
Water Depth: max. 555m , min.428m
Slope Gradient: 19 m/km, Direction:SE
Surface Sediment Type: Silt/Sand

CONSTRAINT

Erosion/Scour

Proposed
Lease Sale 56

Block
NI 18-5-710



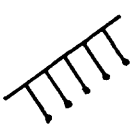
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

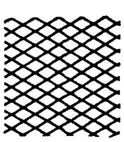
ISOBATHS IN METERS

Water Depth: max. 1005m, min. 507m
Slope Gradient: 74 m/km, Direction: SE
Surface Sediment Type: Silt/Sand

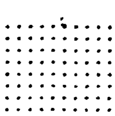
CONSTRAINTS



Fault



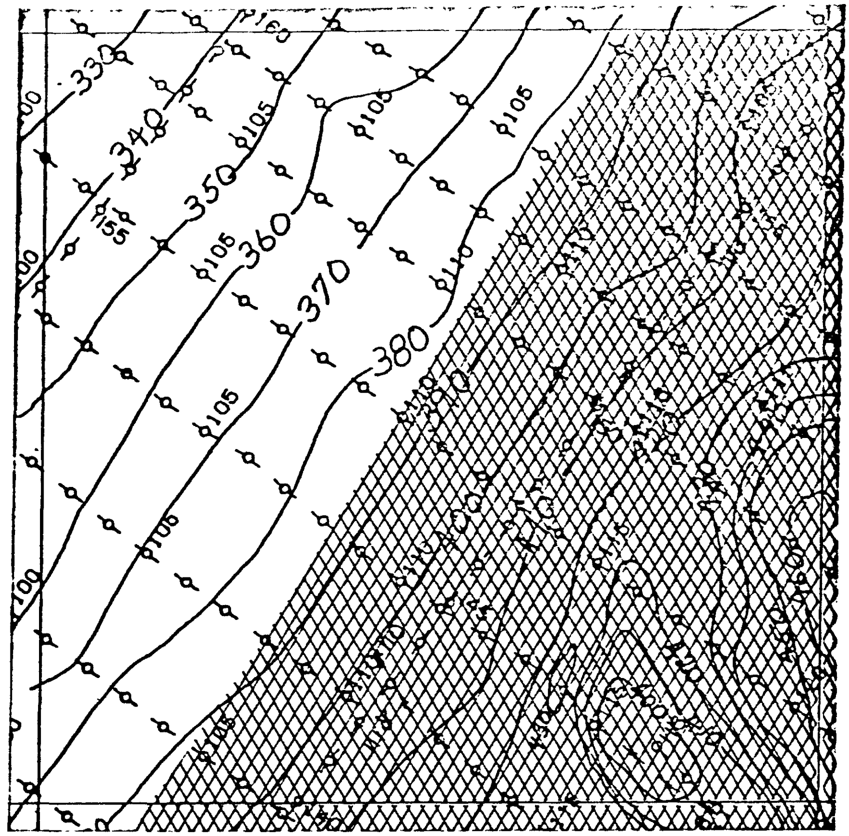
Erosion/Scour



Gassy Sediments

Proposed
Lease Sale 56

Block
NI 18-5-751



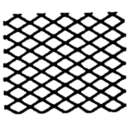
Water Depth: max. 460m , min. 320m
Slope Gradient: 21 m/km, Direction: SE
Surface Sediment Type: Silt/Sand

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

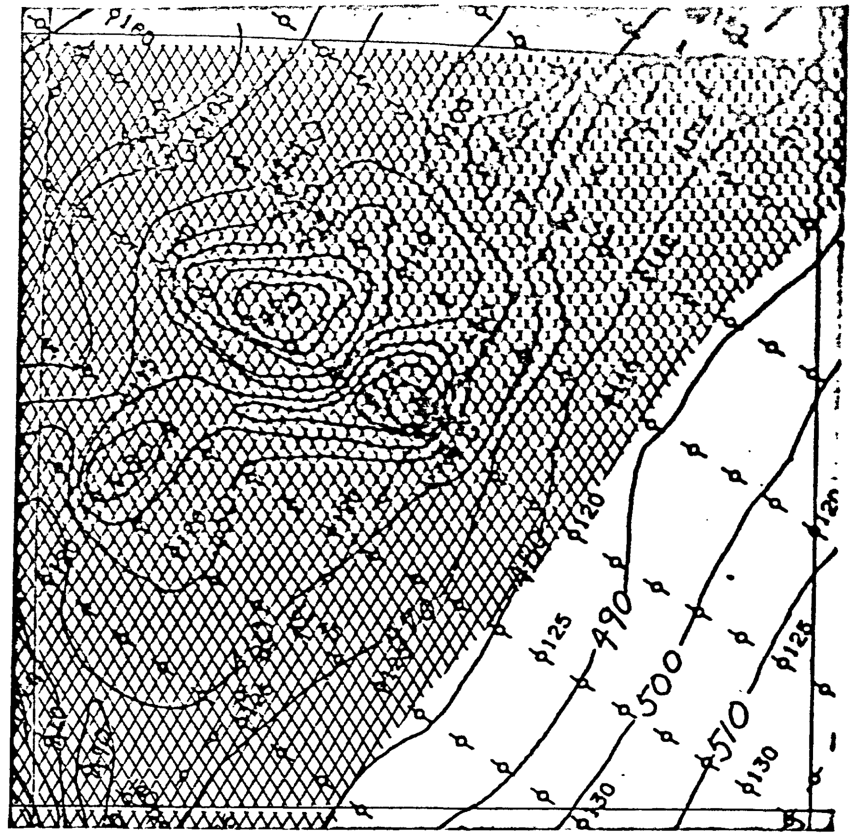
CONSTRAINT



Erosion/Scour

Proposed
Lease Sale 56

Block
NI 18-5-752

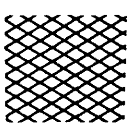


SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 515m , min.412m
Slope Gradient: 15 m/km, Direction:SE
Surface Sediment Type: Silt/Sand

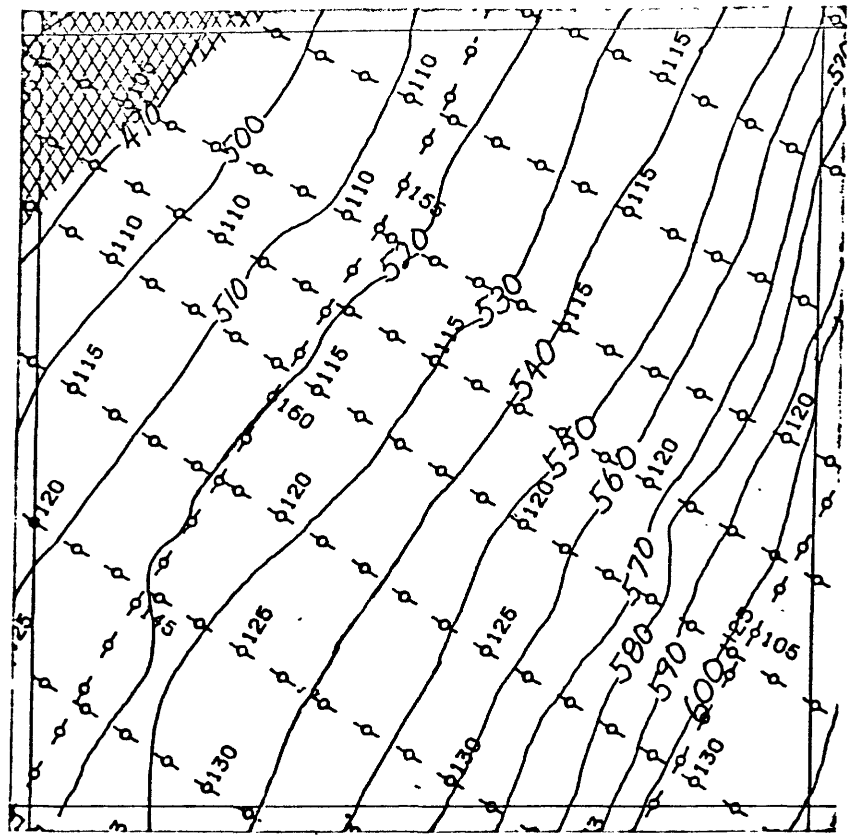
CONSTRAINT



Erosion/Scour

Proposed
Lease Sale 56

Block
NI 18-5-753



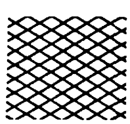
Water Depth: max. 650m , min. 480m.
Slope Gradient: 25 m/km, Direction: SE
Surface Sediment Type: Silt/Sand

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

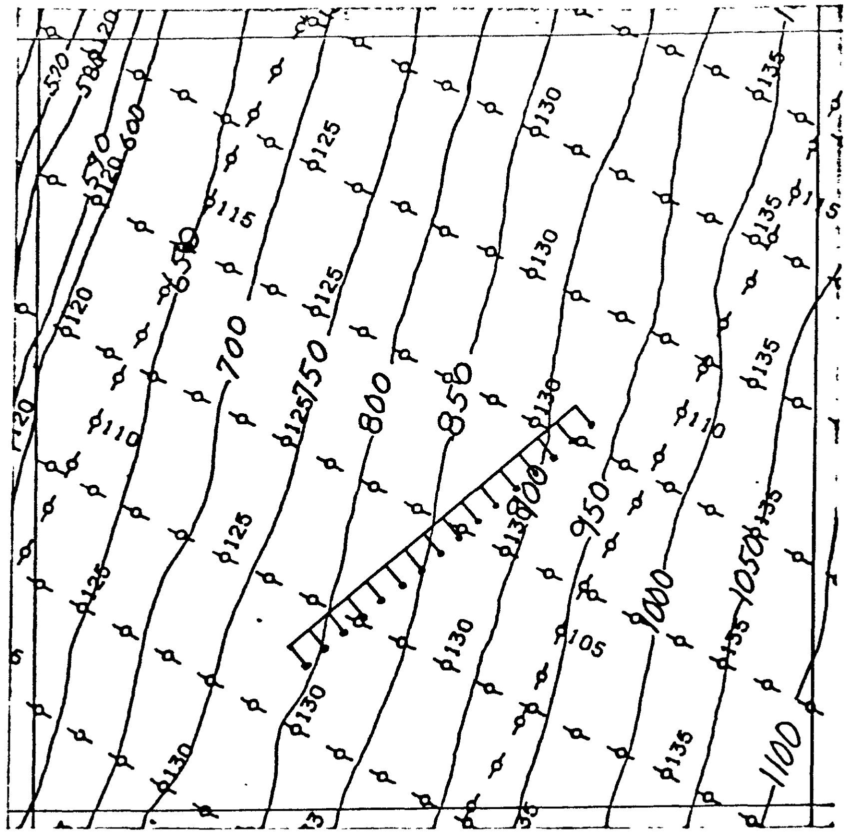
CONSTRAINT



Erosion/Scour

Proposed
Lease Sale 56

Block
NI 18-5-754



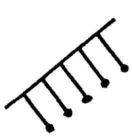
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

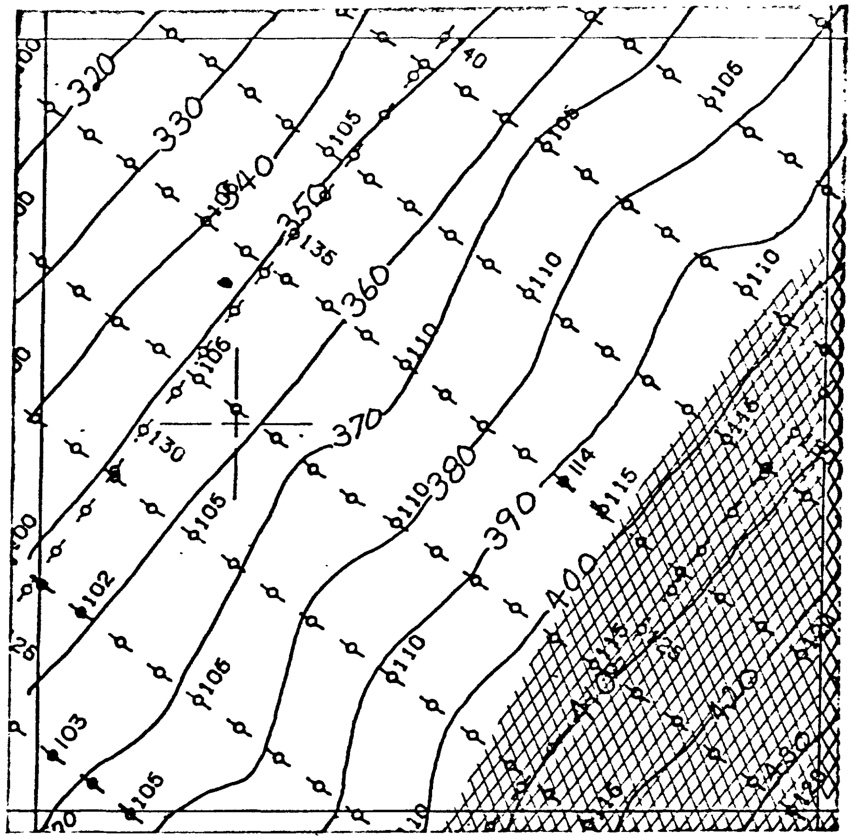
ISOBATHS IN METERS

Water Depth: max. 1112m , min. 560m
Slope Gradient: 81 m/km, Direction: SE
Surface Sediment Type: Silt/Sand

CONSTRAINT


Fault

Proposed
Lease Sale 56



Block
NI 18-5-794

Water Depth: max. 432m , min. 316m
Slope Gradient: 17 m/km, Direction: SE
Surface Sediment Type: Silt/Sand

SCALE 1:48000

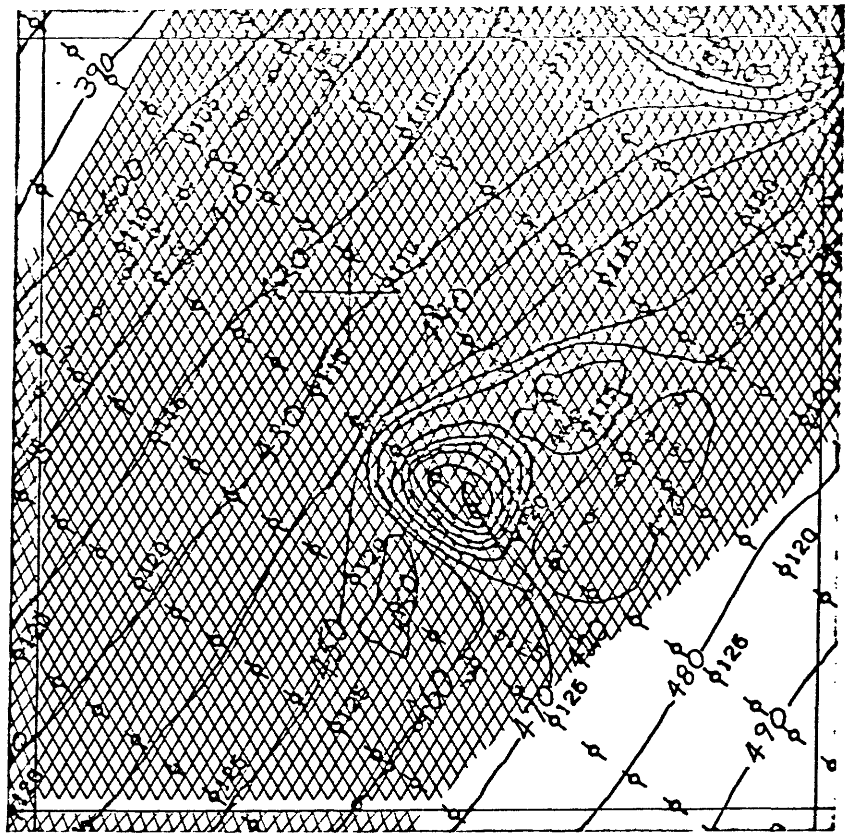
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

CONSTRAINT

Erosion/Scour

Proposed
Lease Sale 56

Block
NI 18-5-795



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

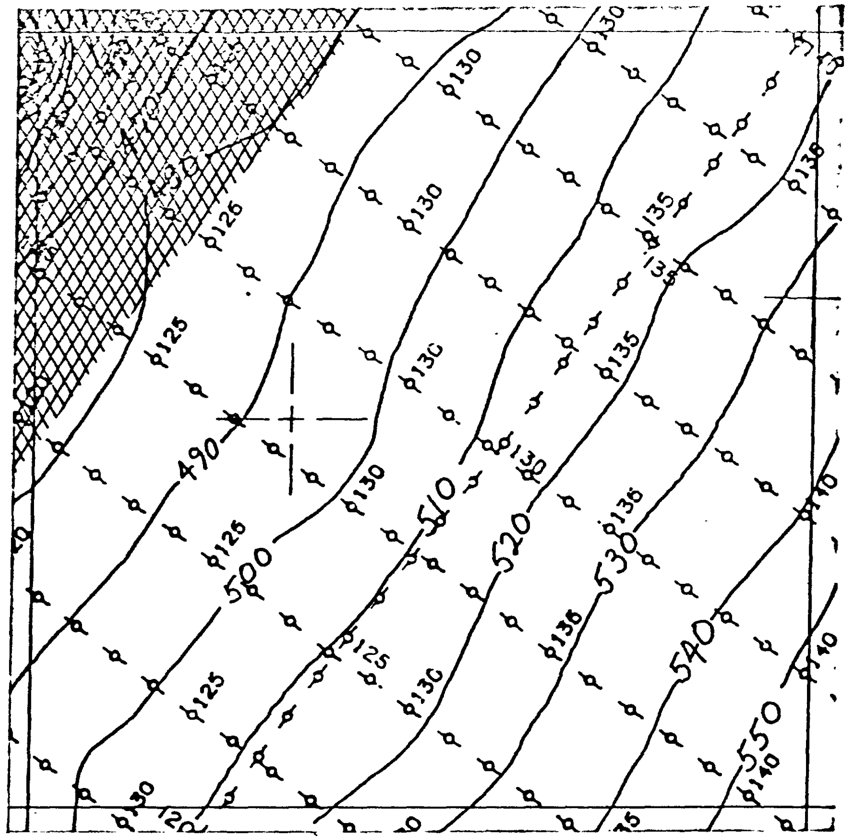
Water Depth: max. 492m , min. 380m
Slope Gradient: 17 m/km, Direction: SE
Surface Sediment Type: Silt/Sand

CONSTRAINT

Erosion/Scour

Proposed
Lease Sale 56

Block
NI 18-5-796



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

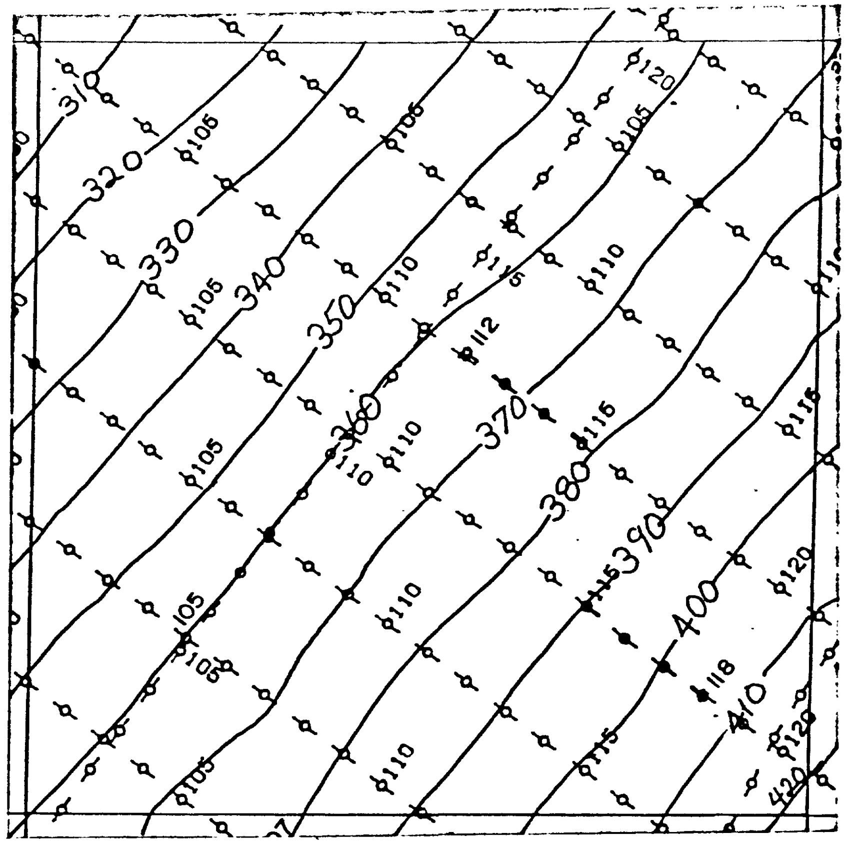
Water Depth: max. 555m , min 420m
Slope Gradient: 20 m/km, Direction: SE
Surface Sediment Type: Silt/Sand

CONSTRAINT

Erosion/Scour

Proposed
Lease Sale 56

Block
NI 18-5-837



SCALE 1:48000

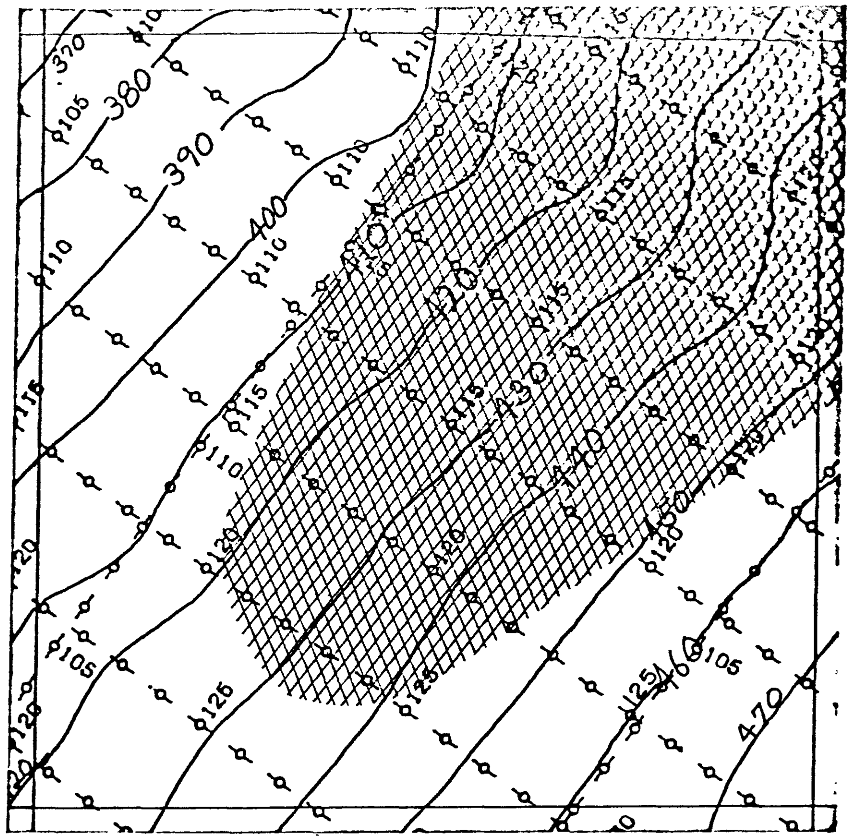
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 422m , min. 308m
Slope Gradient: 17 m/km, Direction SE
Surface Sediment Type: Silt/Sand

Proposed
Lease Sale 56

Block
NI 18-5-838

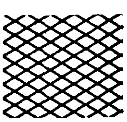


SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 477m , min.369m
Slope Gradient: 16 m/km, Direction: SE
Surface Sediment Type: Silt/Sand

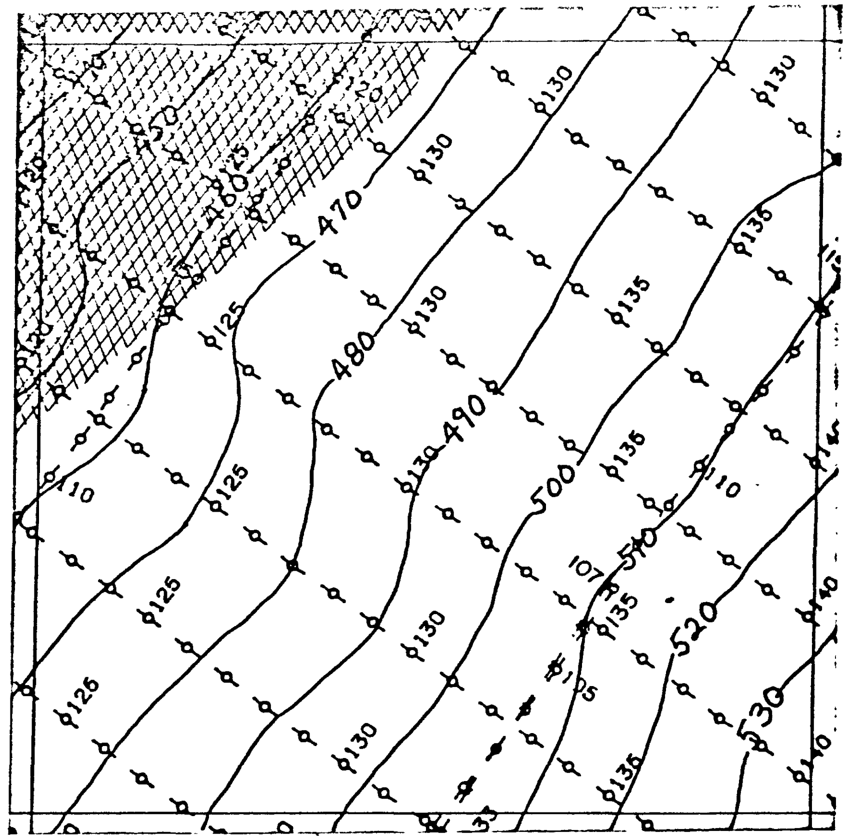
CONSTRAINT



Erosion/Scour

Proposed
Lease Sale 56

Block
NI 18-5-839



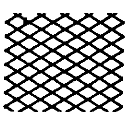
Water Depth: max. 534m , min. 432m
Slope Gradient: 15 m/km, Direction: SE
Surface Sediment Type: Silt/Sand

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

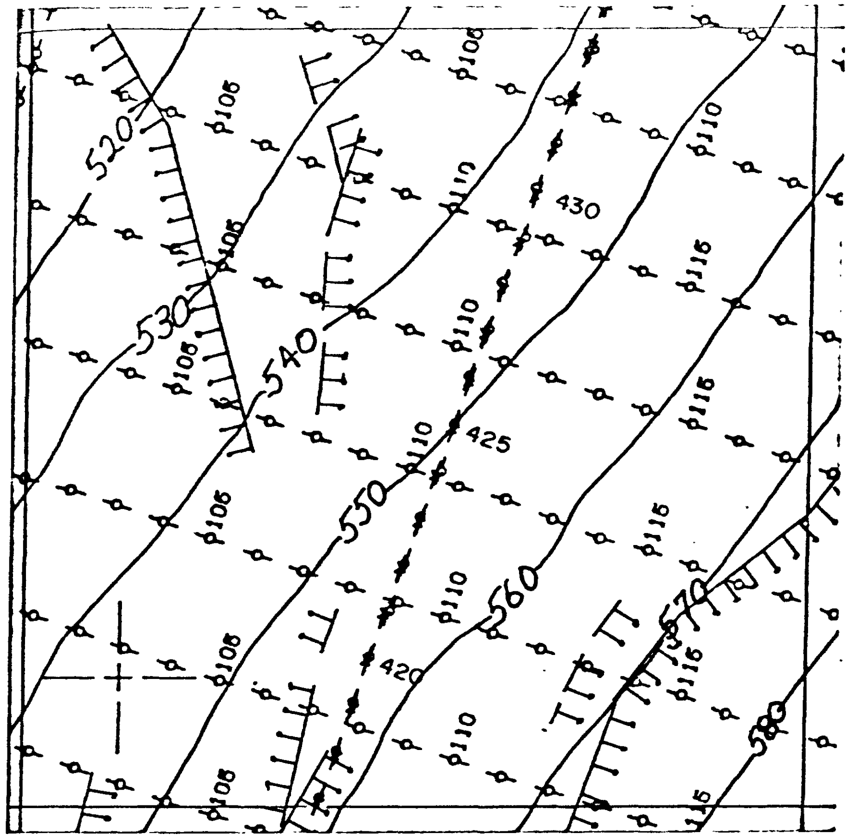
CONSTRAINT



Erosion/Scour

Proposed
Lease Sale 56

Block
NI 18-7-175



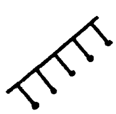
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 582m , min. 511m
Slope Gradient: 10 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

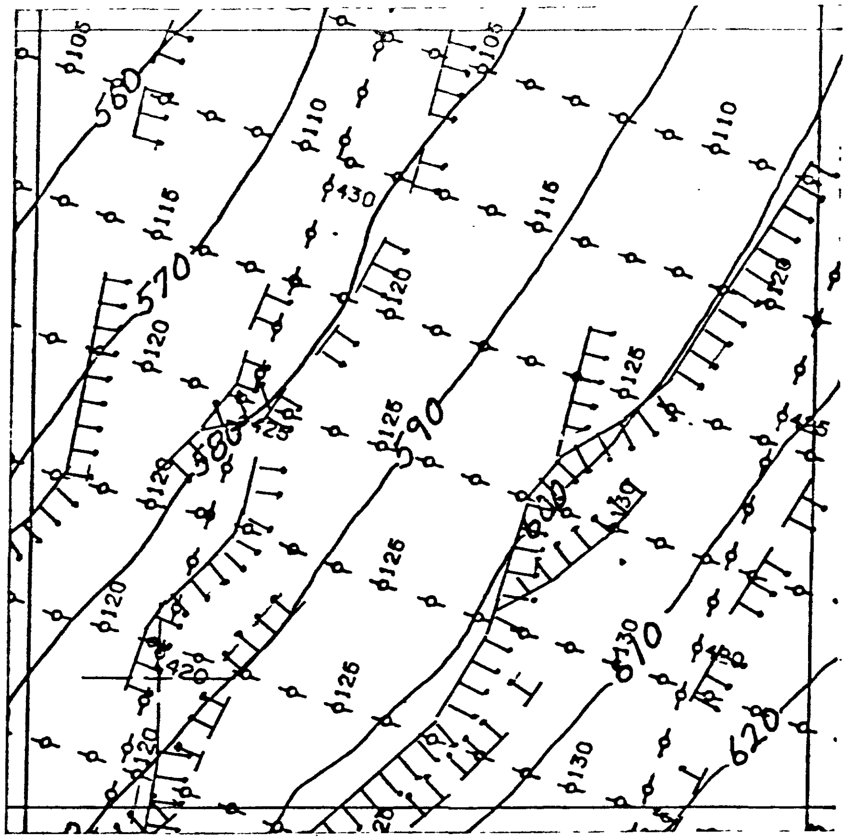
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NI 18-7-176



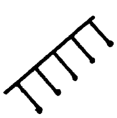
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 625m , min. 552m
Slope Gradient: 11 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

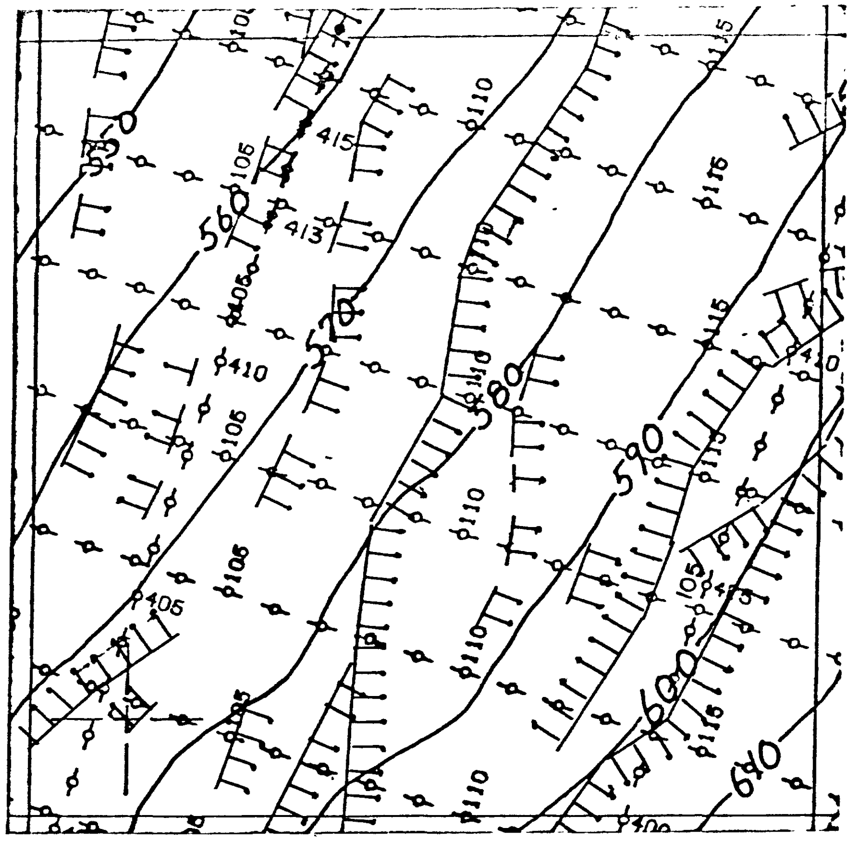
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NI 18-7-219



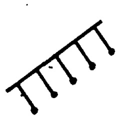
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 615m , min.542m
Slope Gradient: 11 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

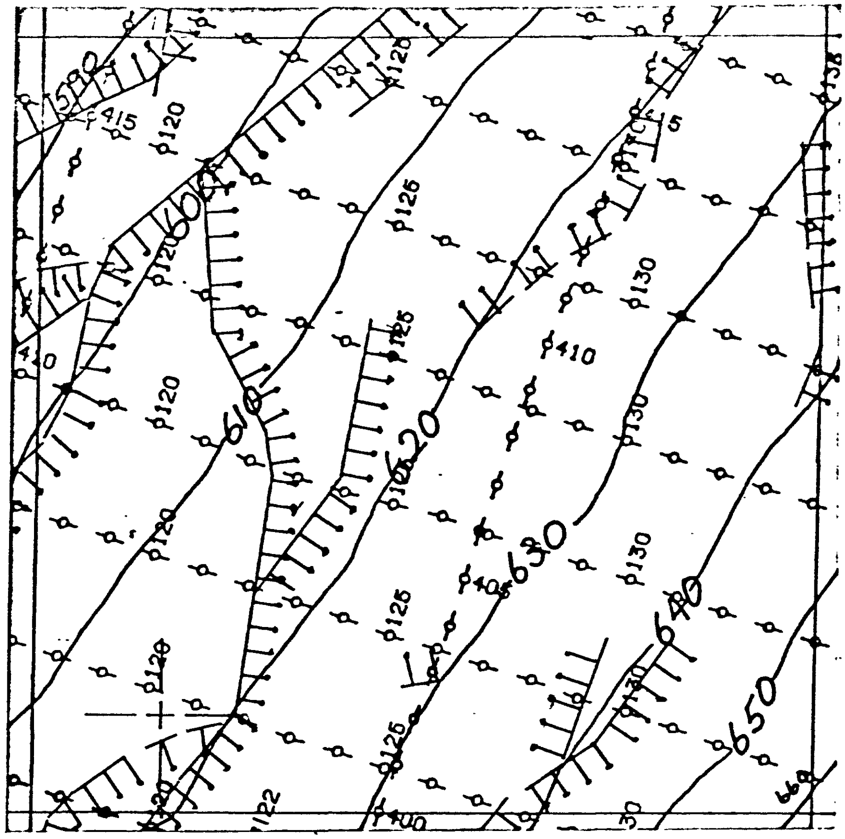
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NI 18-7-220



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

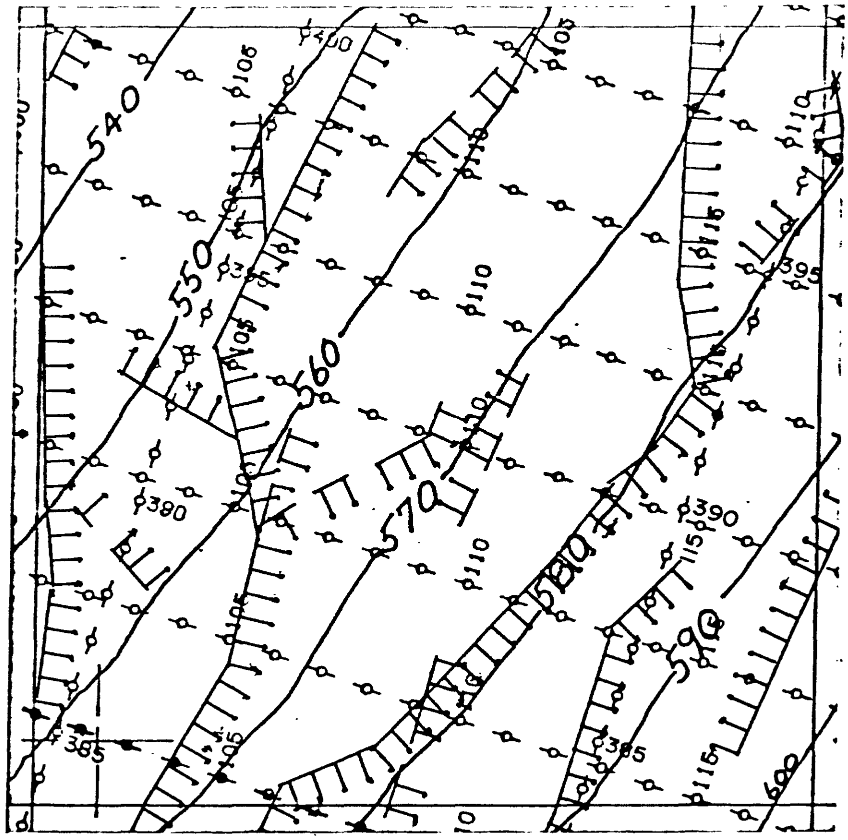
Water Depth: max.661m , min.582m
Slope Gradient: 12 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

CONSTRAINT


Fault

Proposed
Lease Sale 56

Block
NI 18-7-262



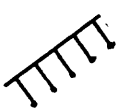
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max.601m , min.532m
Slope Gradient: 10 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

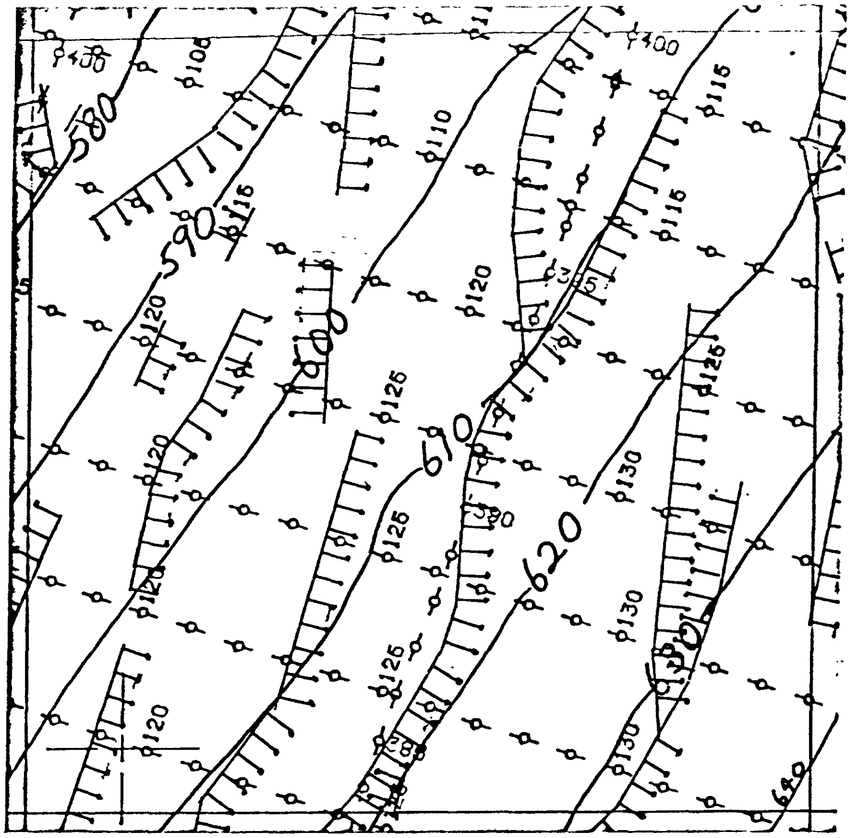
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NI 18-7-263



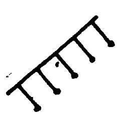
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

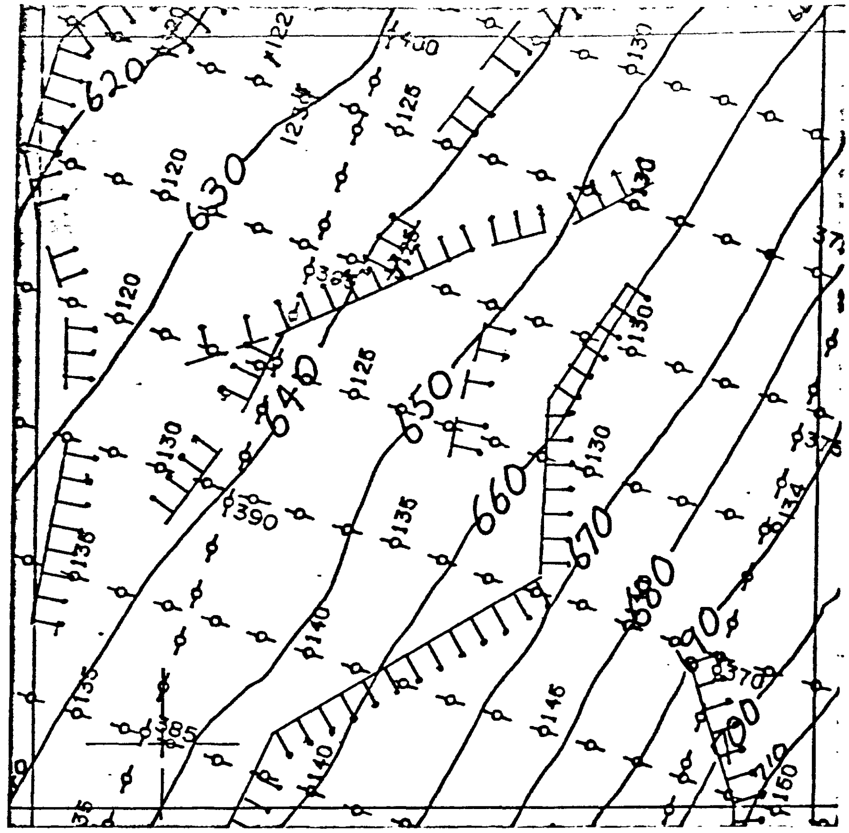
Water Depth: max. 642m , min.574m
Slope Gradient: 10 m/km, Direction:SE
Surface Sediment Type: Silt/Clay

CONSTRAINT



Fault

Proposed
Lease Sale 56



Block
NI 18-7-264

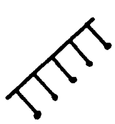
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 715m , min. 615m
Slope Gradient: 15 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

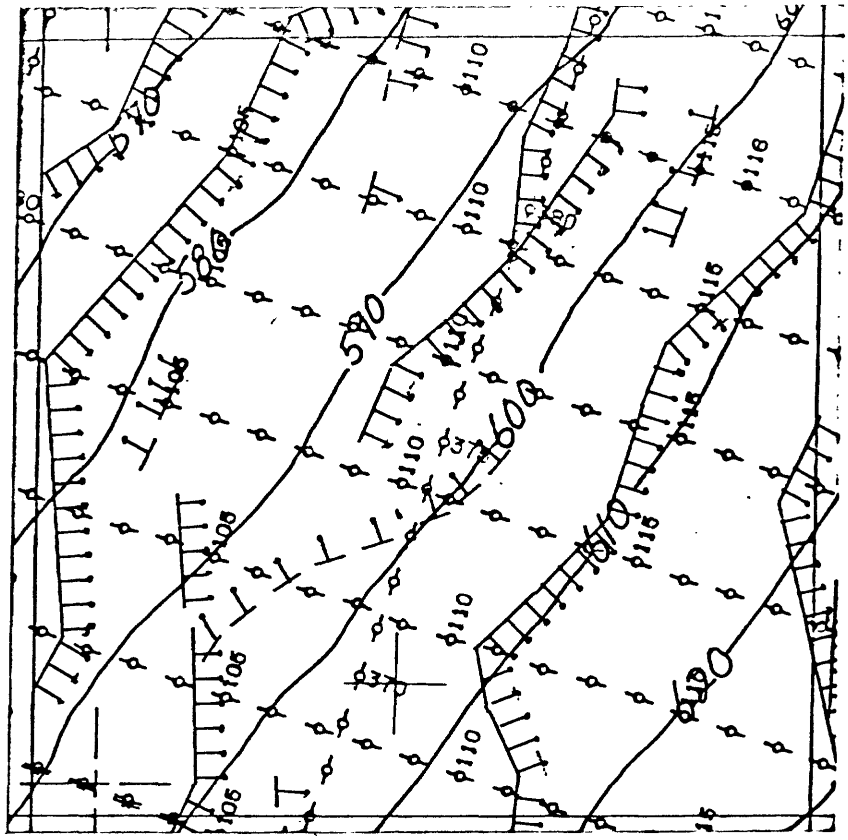
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NI 18-7-306

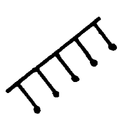


SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 630m , min. 562m
Slope Gradient: 10 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

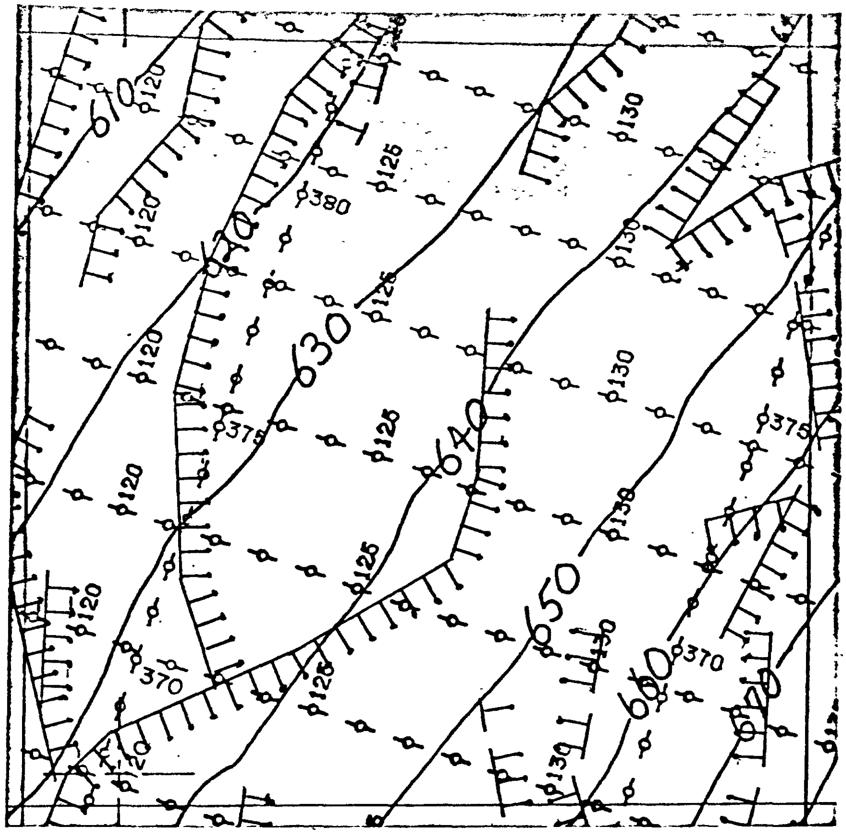
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NI 18-7-307



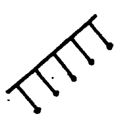
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 680m , min. 601m
Slope Gradient: 12 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

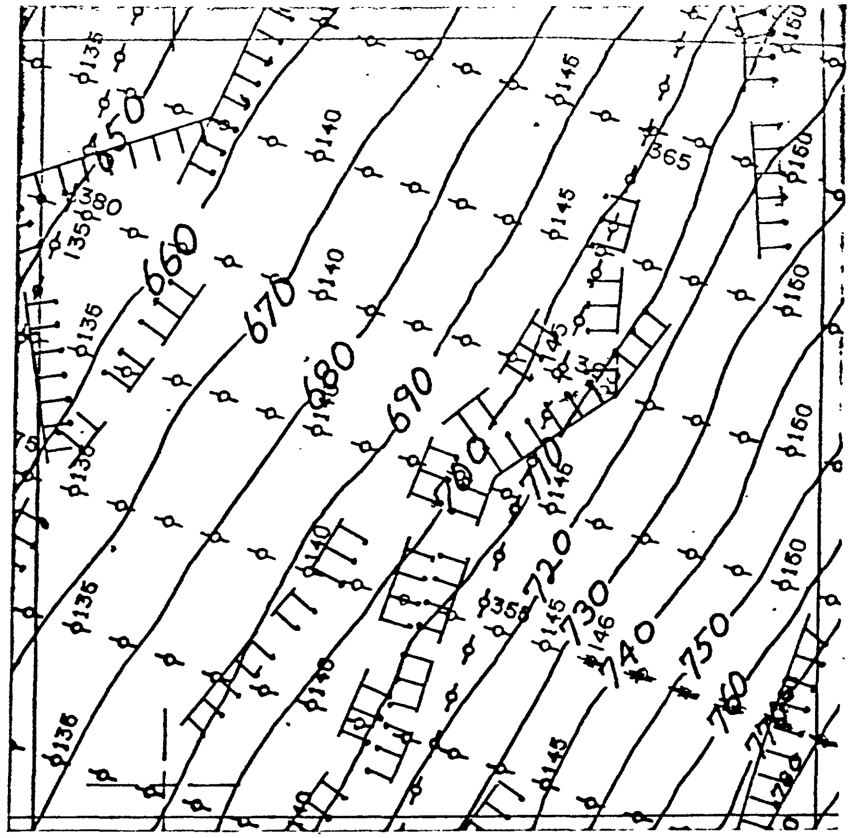
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NI 18-7-308



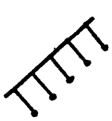
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

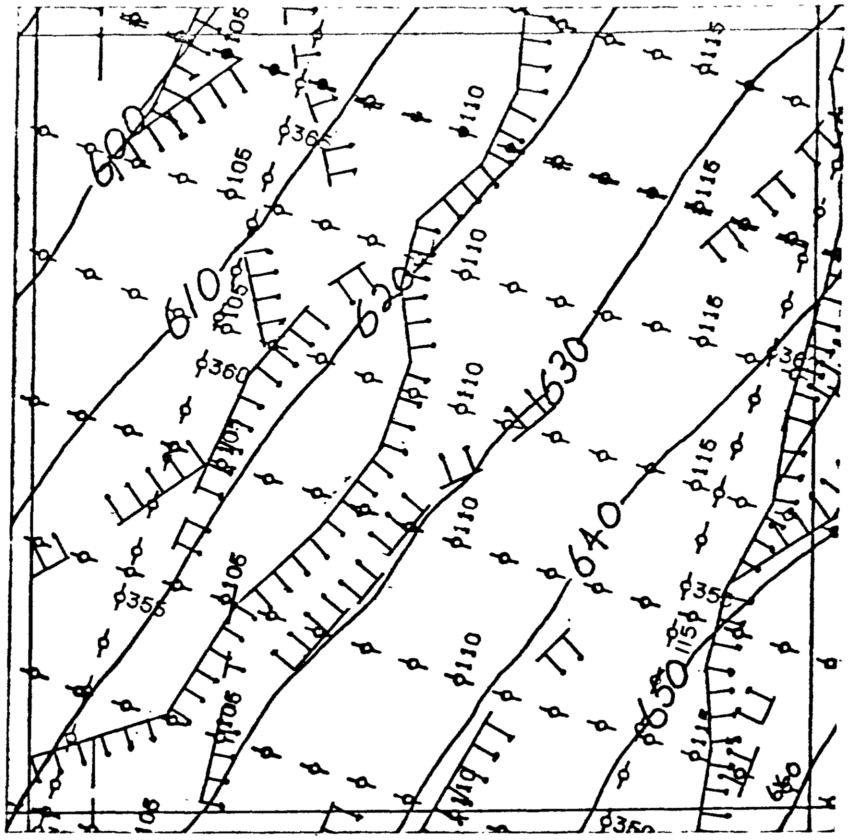
Water Depth: max.770m , min.642m
Slope Gradient: 19 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

CONSTRAINT



Fault

Proposed
Lease Sale 56



Block
NI 18-7-350

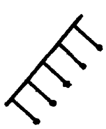
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 660m , min. 590m
Slope Gradient: 10 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

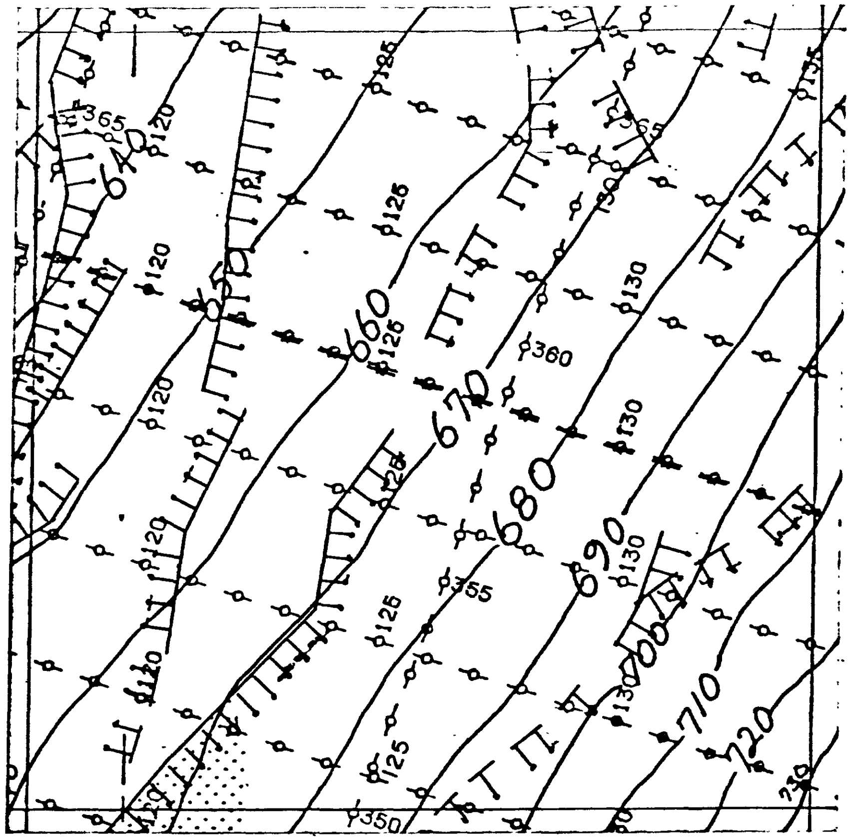
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NI 18-7-351



SCALE 1:48000

0 1/2 1 KILOMETER

0 1/2 1 STATUTE MILE

0 1/2 1 NAUTICAL MILE

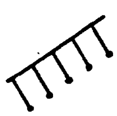
ISOBATHS IN METERS

Water Depth: max. 730m , min. 630m

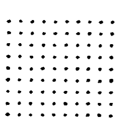
Slope Gradient: 15 m/km, Direction: SE

Surface Sediment Type: Silt/Clay

CONSTRAINTS



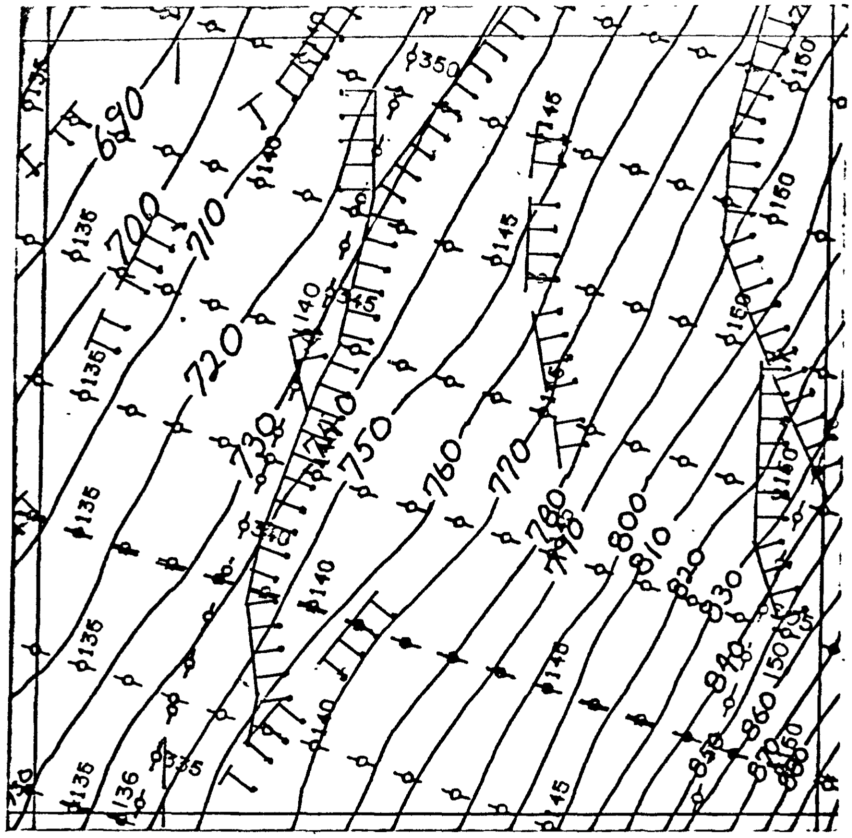
Fault



Gassy Sediments

Proposed
Lease Sale 56

Block
NI 18-7-352



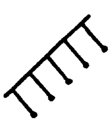
Water Depth: max. 890m , min. 680m
Slope Gradient: 31 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

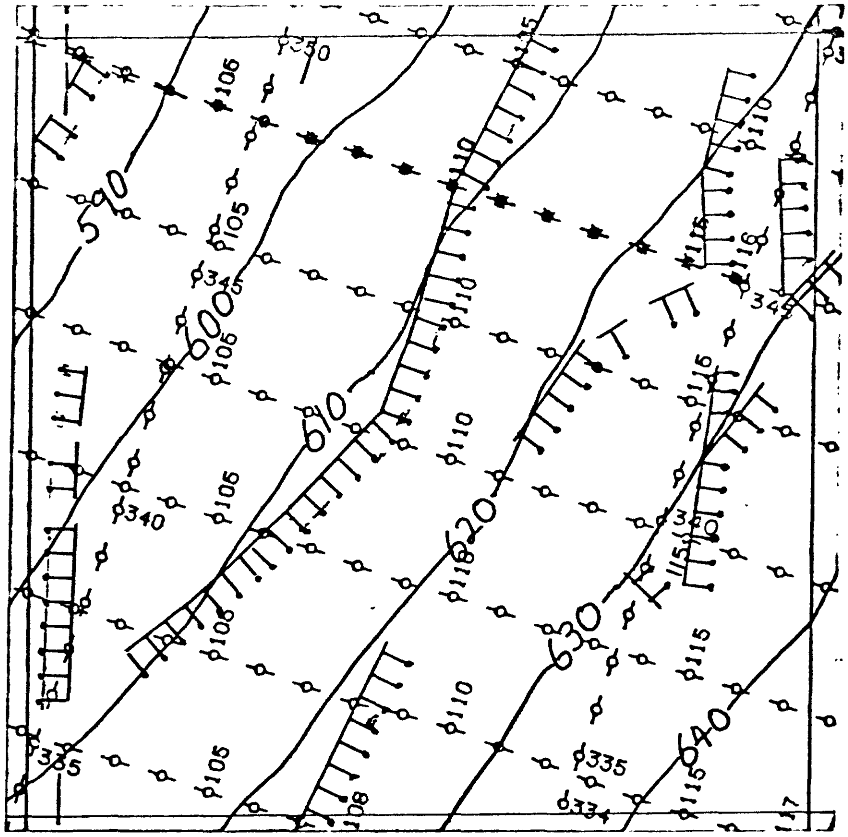
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NI 18-7-393



SCALE 1:48000

0 1/2 1 KILOMETER

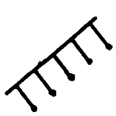
0 1/2 1 STATUTE MILE

0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 647m , min. 582m
Slope Gradient: 9 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

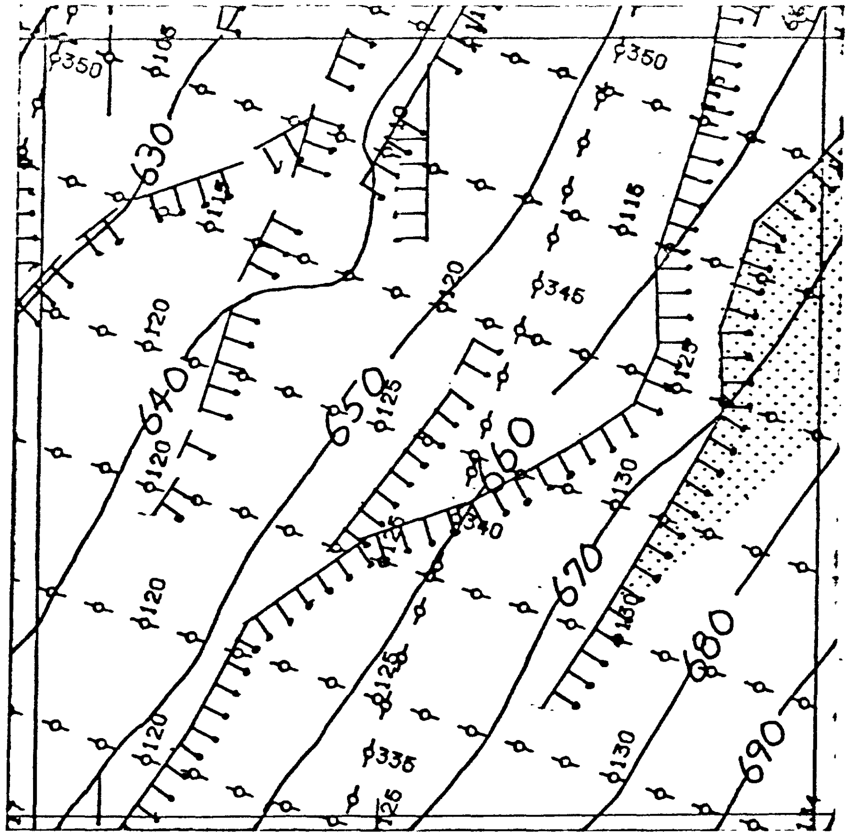
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NI 18-7-394



SCALE 1:48000

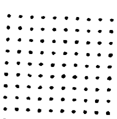
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 695m , min.620m
Slope Gradient: 11 m/km, Direction:SE
Surface Sediment Type: Silt/Clay

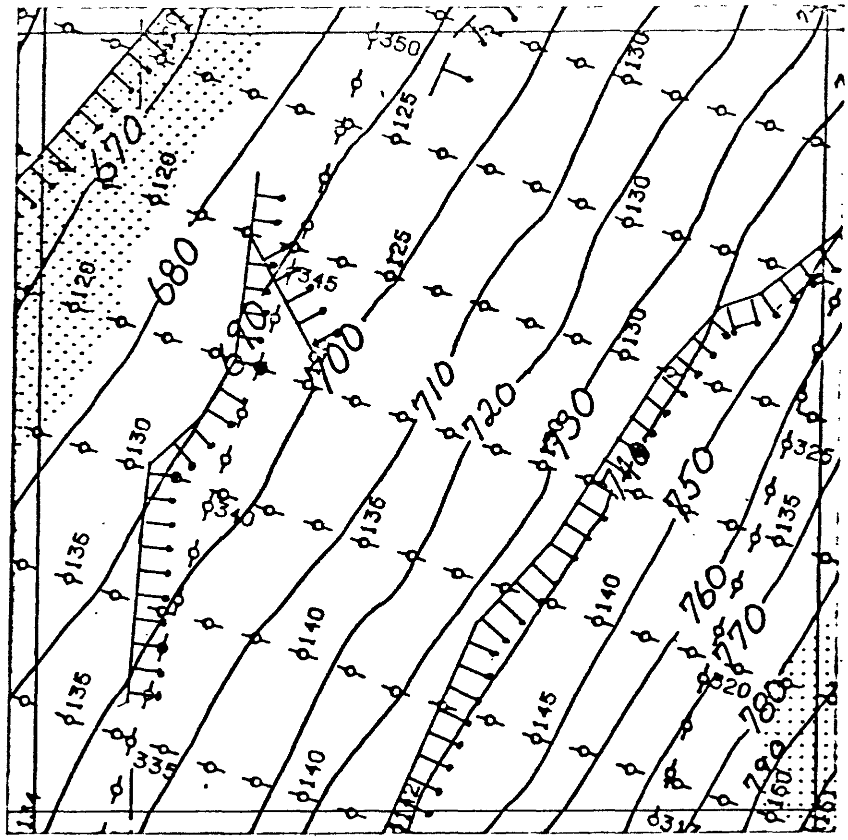
CONSTRAINTS

Fault



Gassy Sediments

Proposed
Lease Sale 56



Block
NI 18-7-395

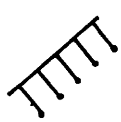
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

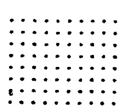
ISOBATHS IN METERS

Water Depth: max. 800m , min. 660m
Slope Gradient: 21 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

CONSTRAINTS



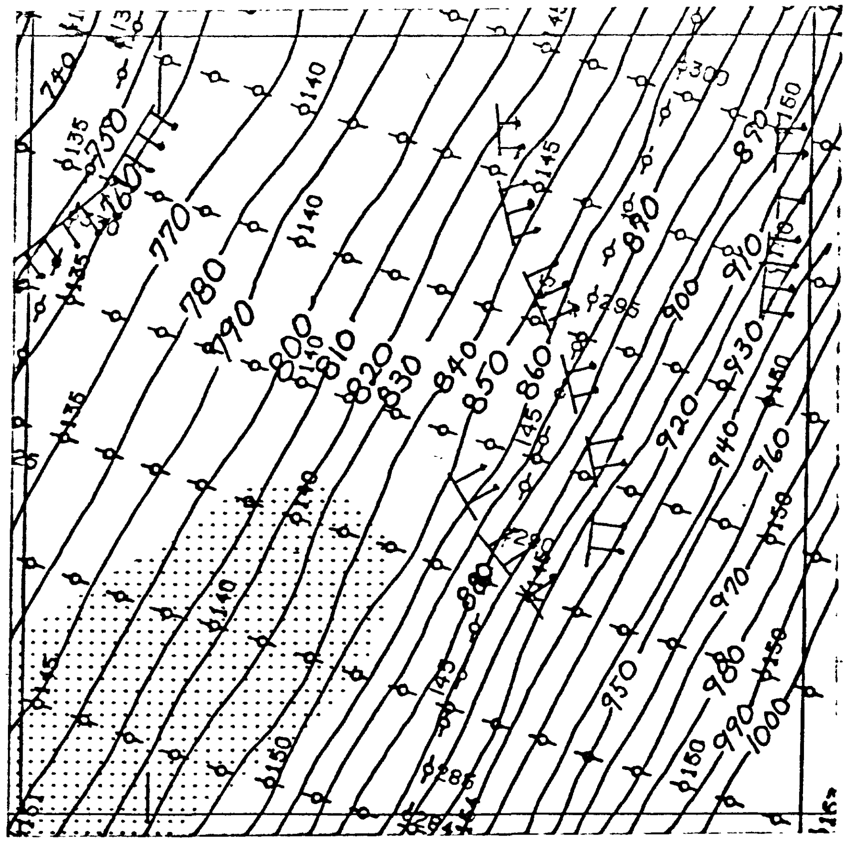
Fault



Gassy Sediments

Proposed
Lease Sale 56

Block
NI 18-7-396



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 1030m , min. 730m
Slope Gradient: 44 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

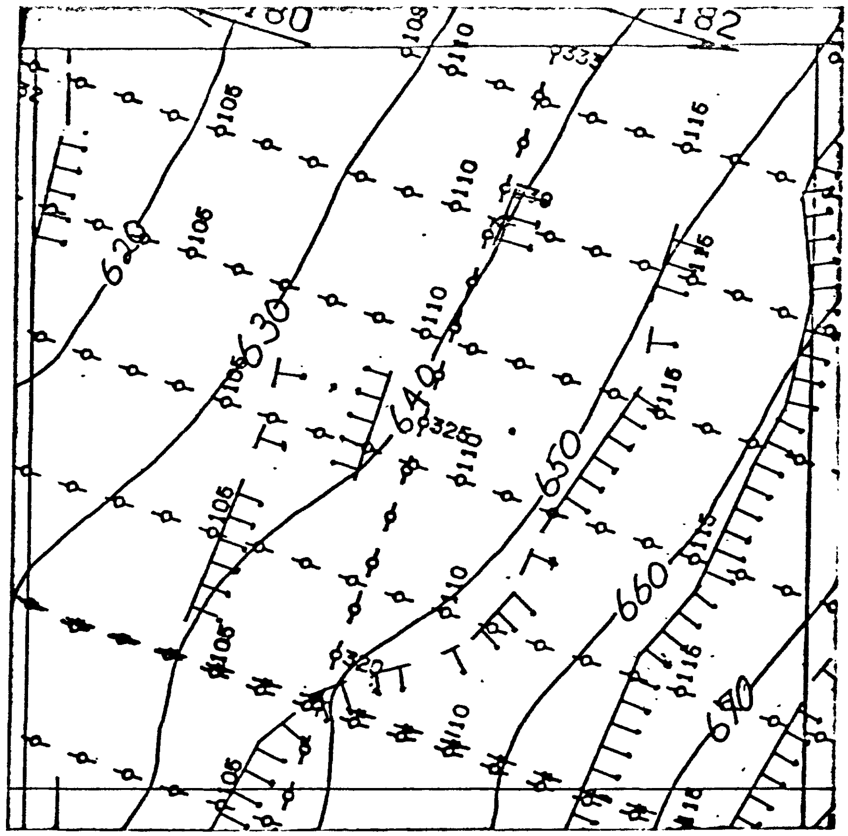
CONSTRAINTS

Fault

Gassy Sediments

Proposed
Lease Sale 56

Block
NI 18-7-437

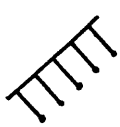


Water Depth: max. 676m , min 605m
Slope Gradient: 10 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

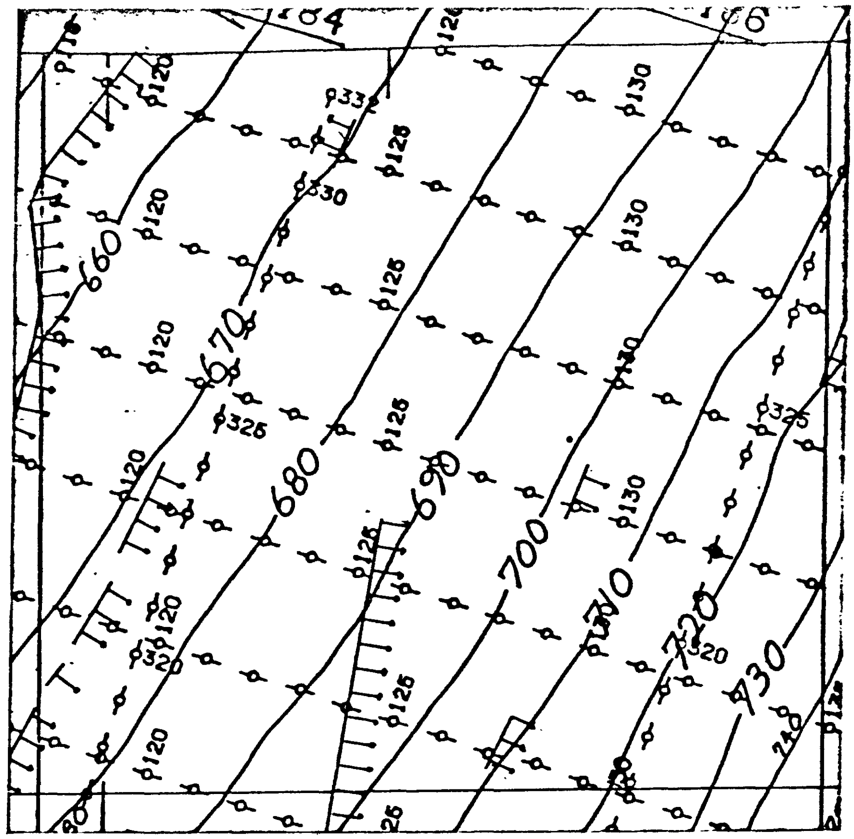
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NI 18-7-438



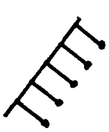
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 742m , min.647m
Slope Gradient: 14 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

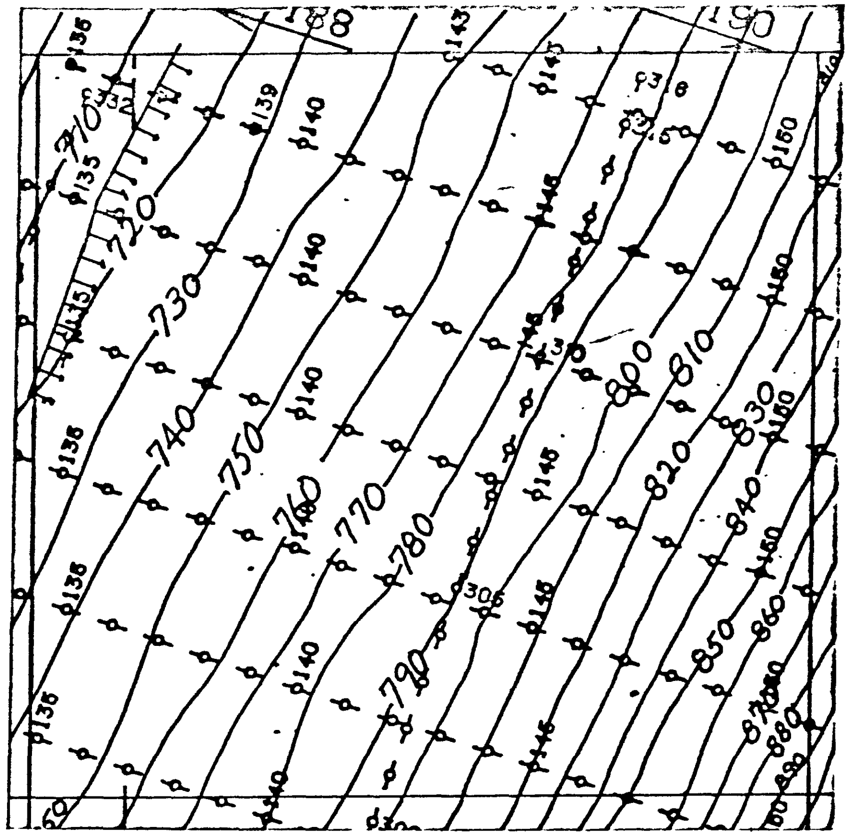
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NI 18-7-439



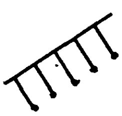
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 895m , min.695m
Slope Gradient: 30 m/km, Direction:SE
Surface Sediment Type: Silt/Clay

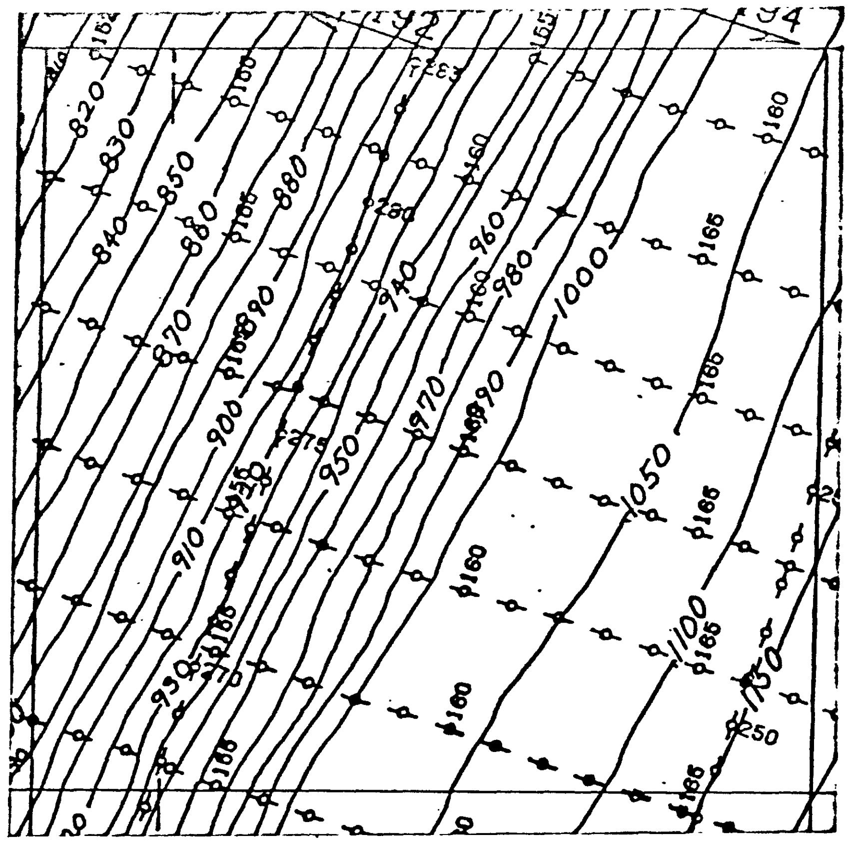
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NI 18-7-440



Water Depth: max. 1200m , min. 800m
Slope Gradient: 59 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

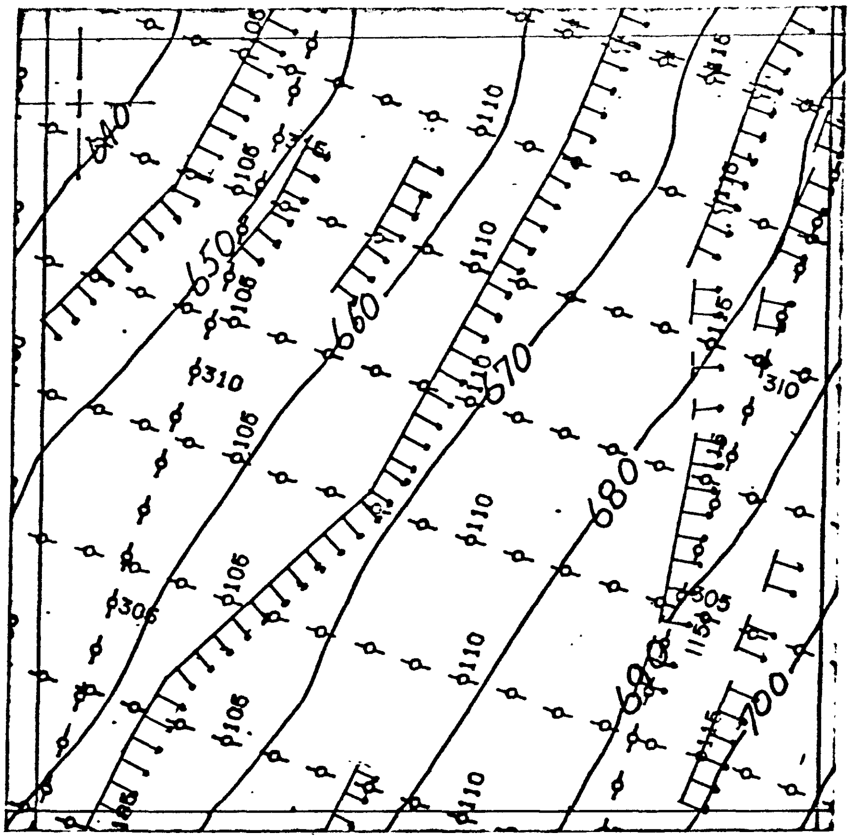
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NI 18-7-481

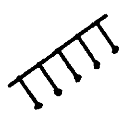


SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 710m , min. 635m
Slope Gradient: 11 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

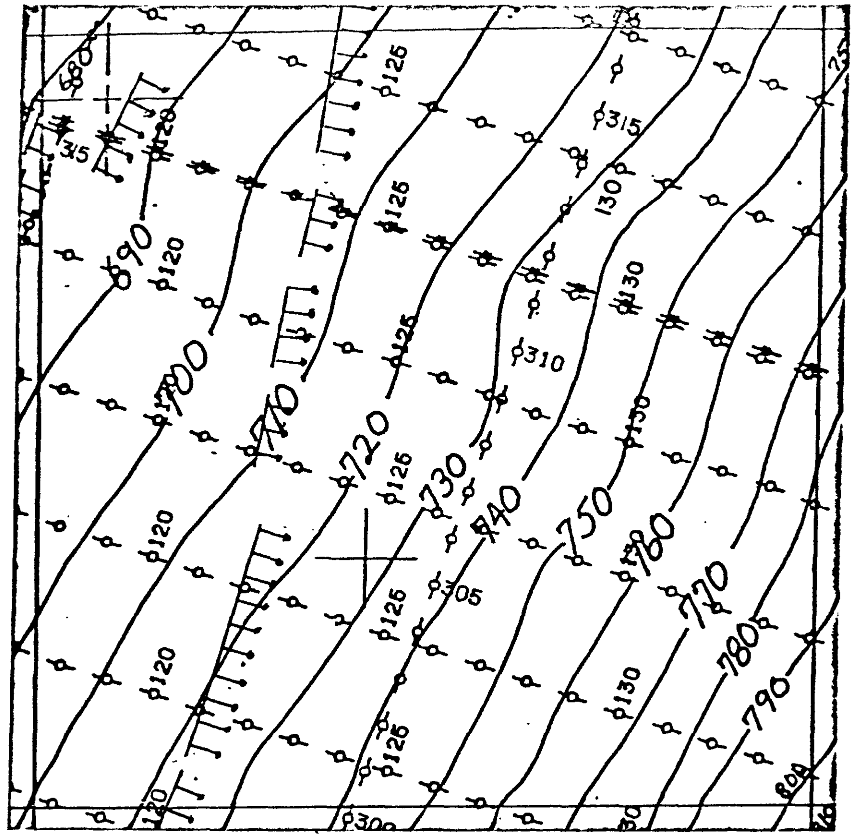
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NI 18-7-482



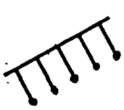
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 805m , min.676m
Slope Gradient: 19° m/km, Direction: SE
Surface Sediment Type: Silt/Clay

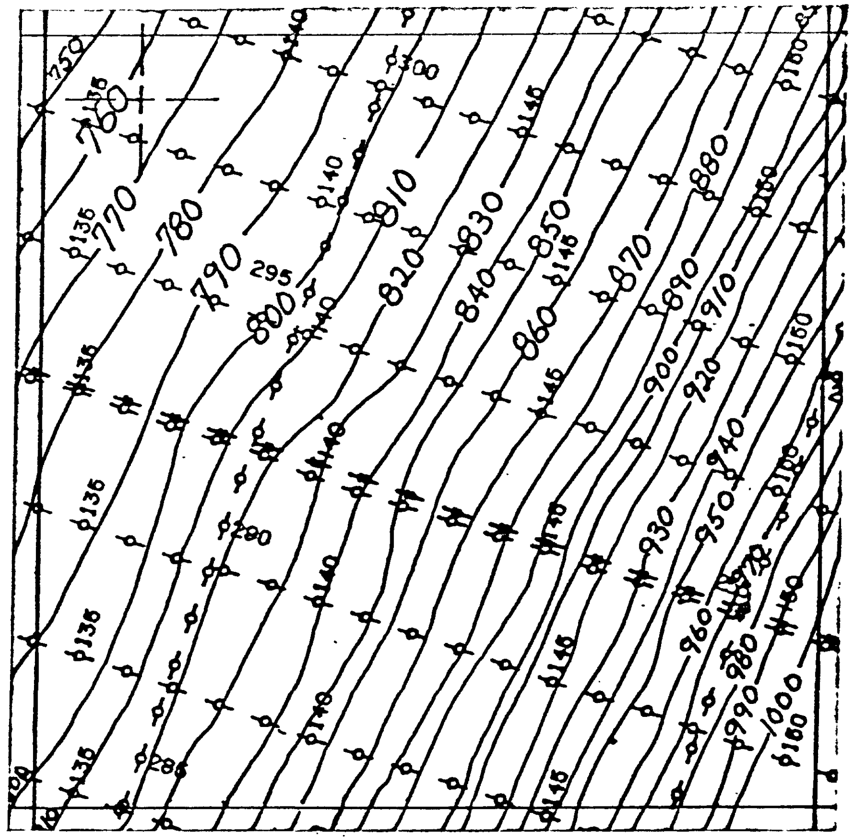
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NI 18-7-483



Water Depth: max. 1030m , min. 742m
Slope Gradient: 43 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

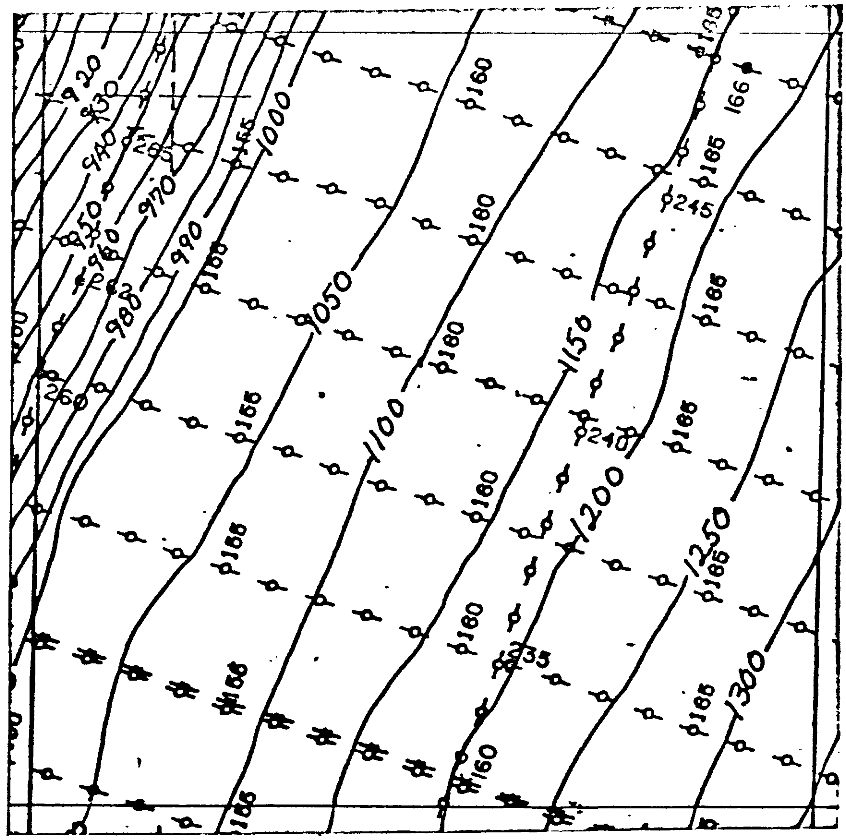
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NI 18-7-484



SCALE 1:48000

0 1/2 1 KILOMETER

0 1/2 1 STATUTE MILE

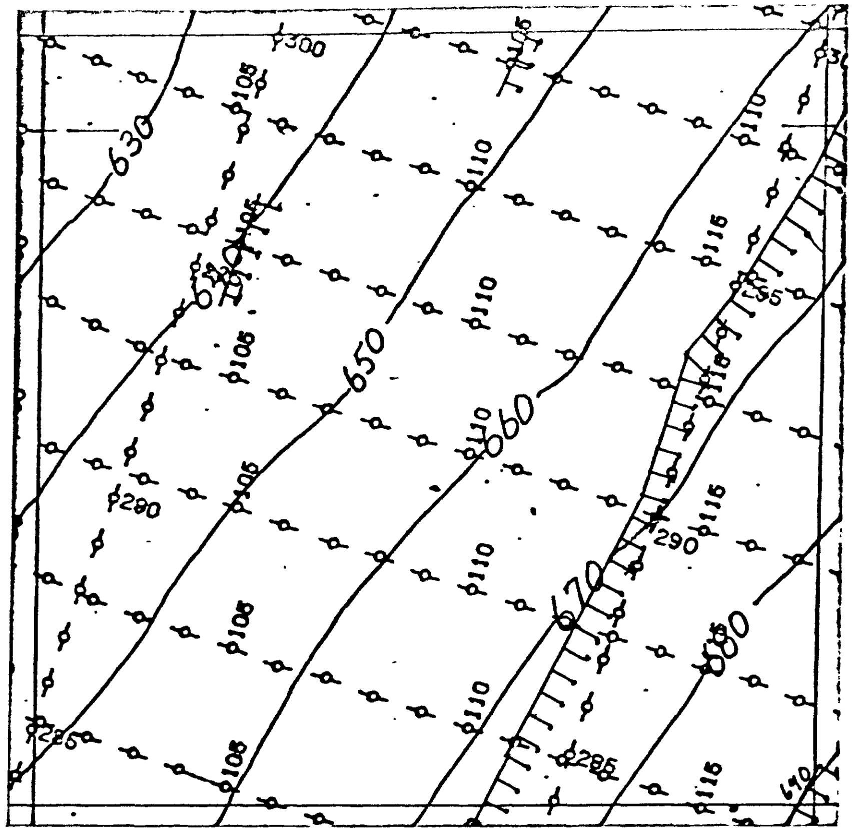
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max.1350m , min.895m
Slope Gradient: 67 m/km, Direction:SE
Surface Sediment Type: Silt/Clay

Proposed
Lease Sale 56

Block
NI 18-7-524



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

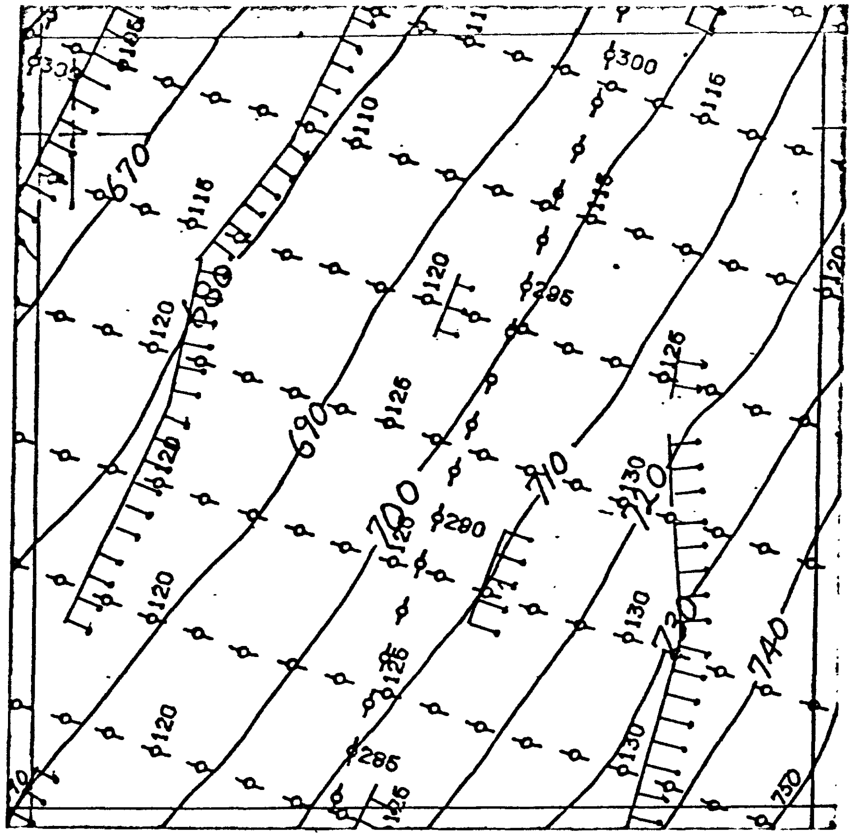
Water Depth: max. 690m , min. 620m
Slope Gradient: 20 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

CONSTRAINT

Fault

Proposed
Lease Sale 56

Block
NI 18-7-525



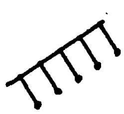
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 752m , min. 660m
Slope Gradient: 14 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

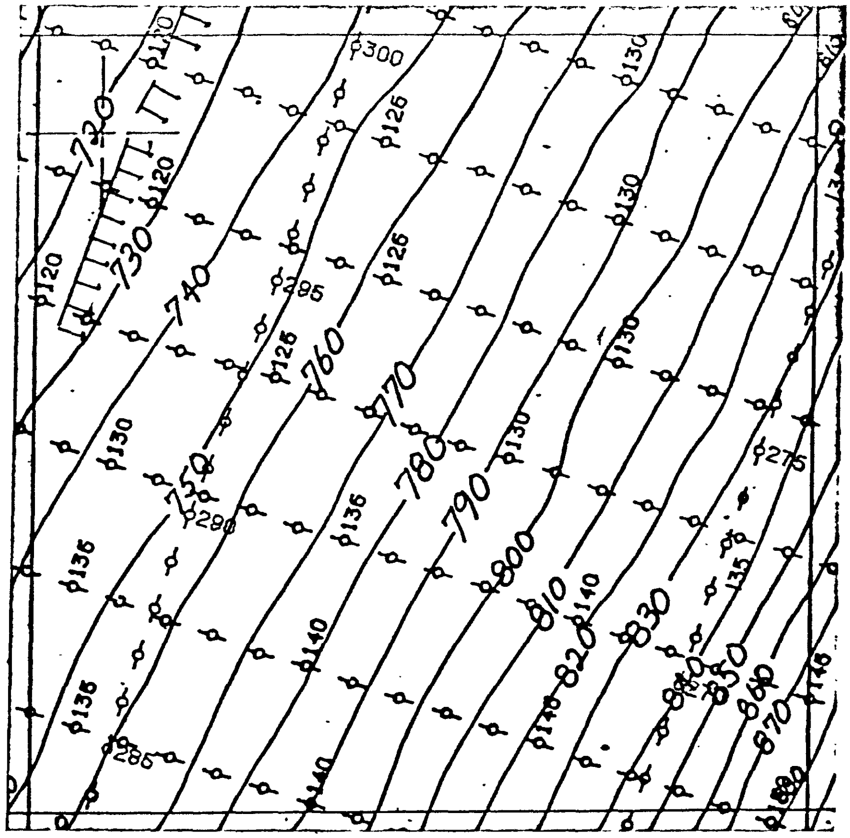
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NI 18-7-526



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

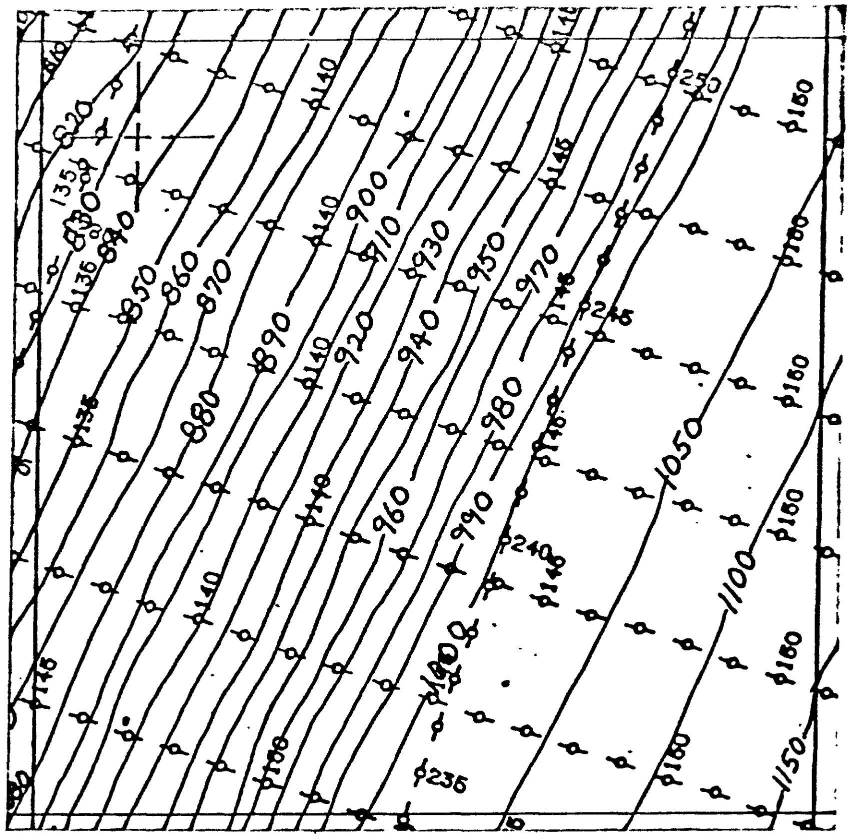
Water Depth: max. 885m , min.710m
Slope Gradient: 26 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

CONSTRAINT

Fault

Proposed
Lease Sale 56

Block
NI 18-7-527



Water Depth: max. 1170m , min. 805m
Slope Gradient: 54` m/km, Direction: SE
Surface Sediment Type: Silt/Clay

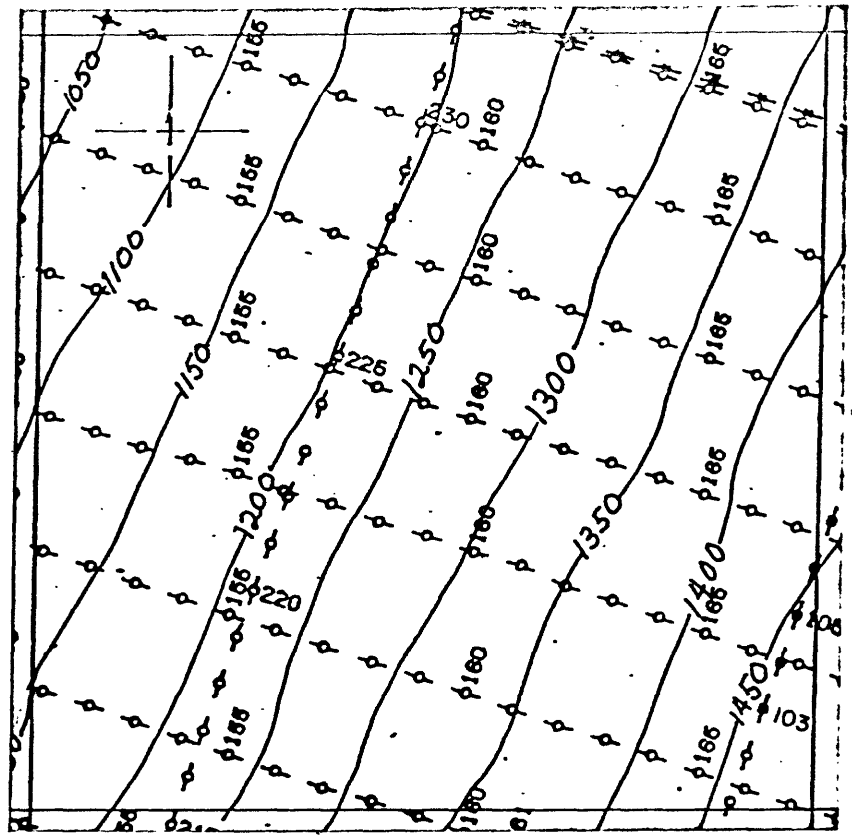
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NI 18-7-528



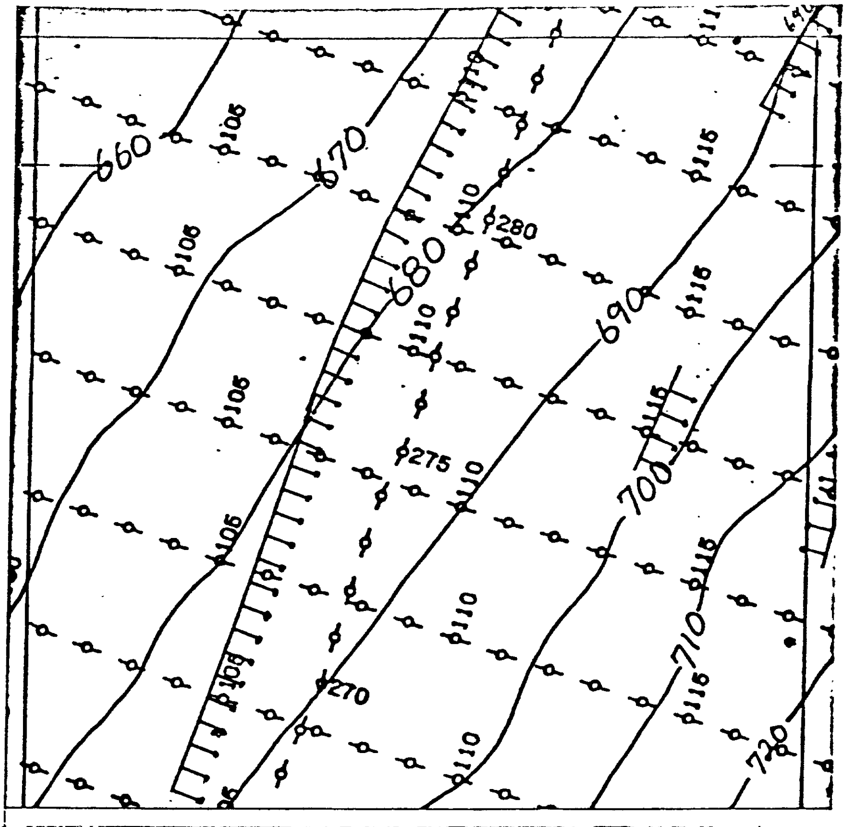
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max.1480m , min.1030m
Slope Gradient: 67 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

Proposed
Lease Sale 56

Block
NI 18-7-568



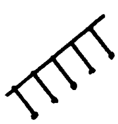
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 725m , min. 652m
Slope Gradient: 11 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

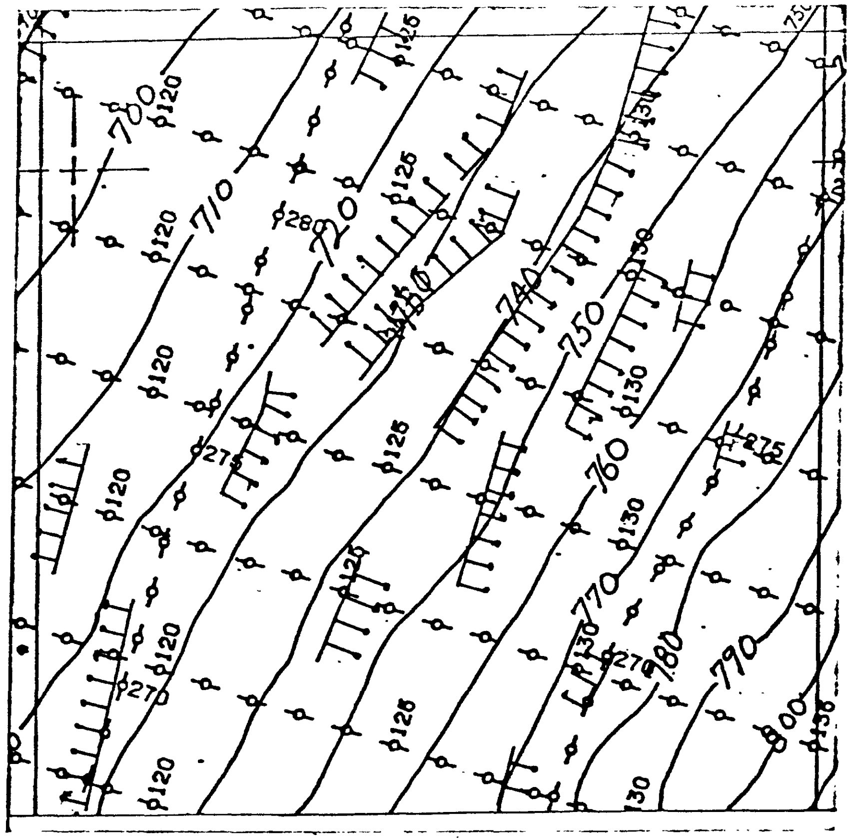
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NI 18-7-569



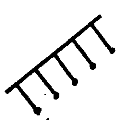
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 810m , min. 690m
Slope Gradient: 18 m/km, Direction:SE
Surface Sediment Type: Silt/Clay

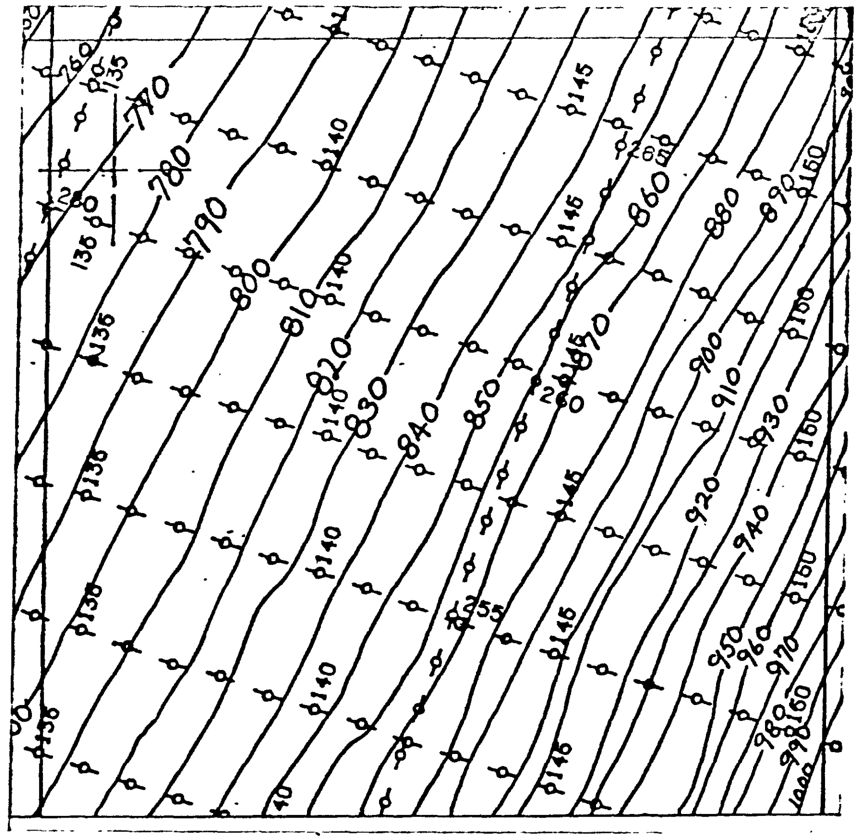
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NI 18-7-570



Water Depth: max. 1010m , min. 752m
Slope Gradient: 38 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

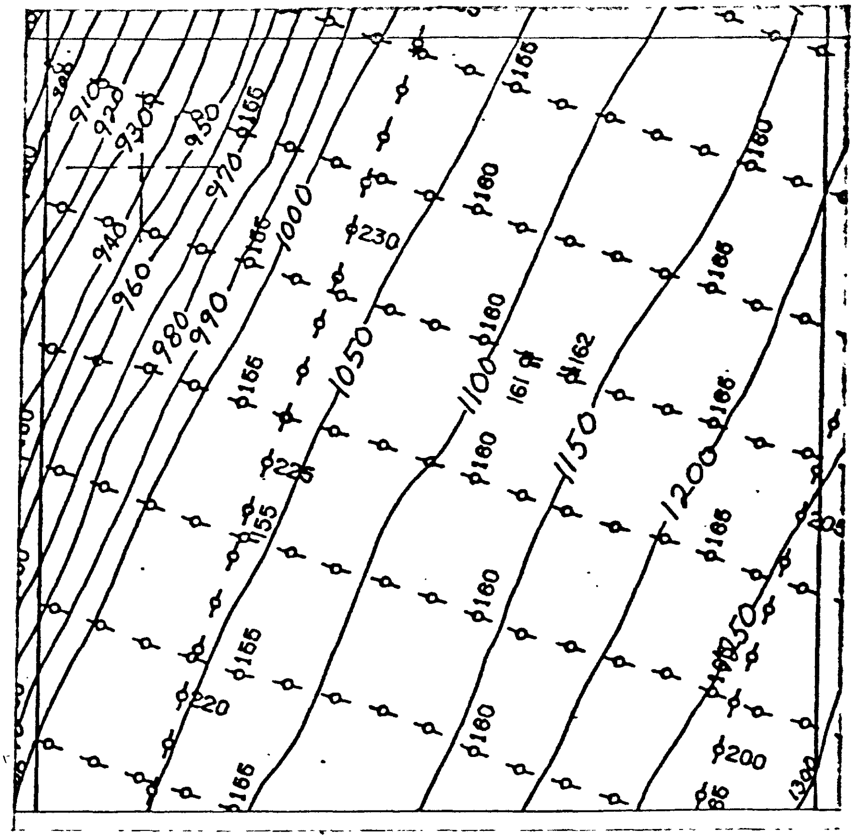
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NI 18-7-571



Water Depth: max. 1310m, min. 885m
Slope Gradient: 63` m/km, Direction: SE
Surface Sediment Type: Silt/Clay

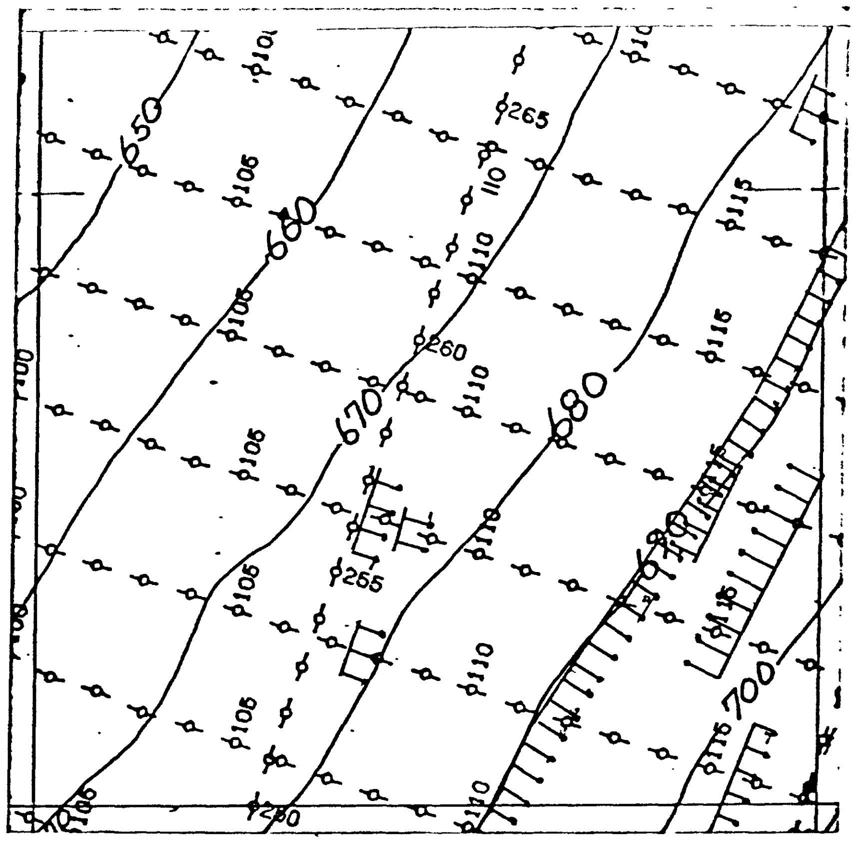
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NI 18-7-611



SCALE 1:48000

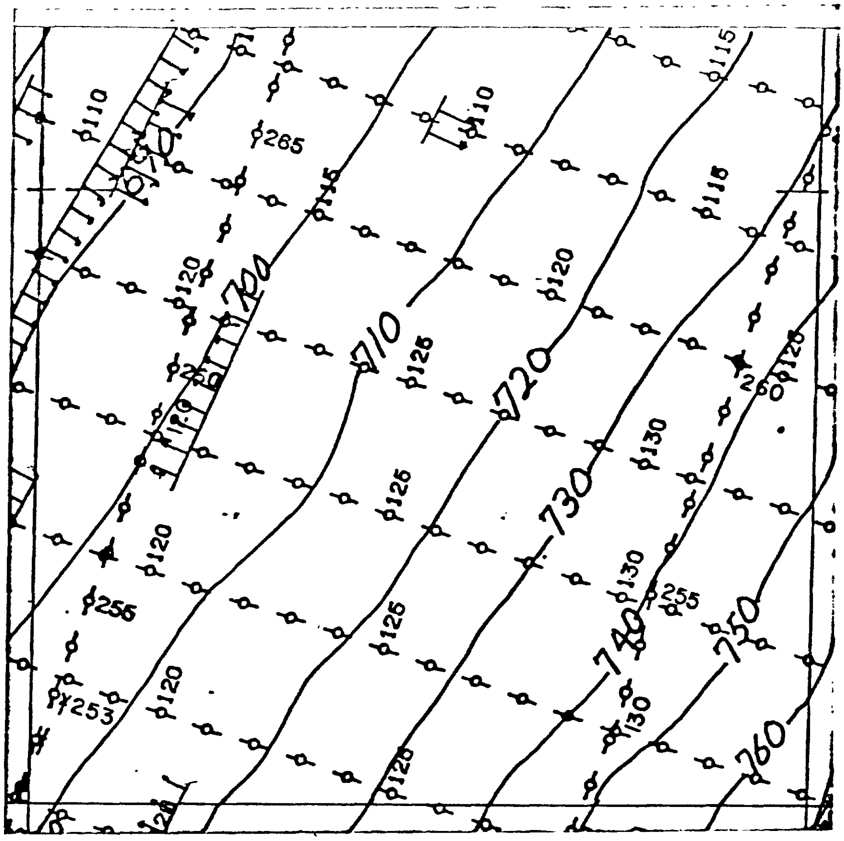
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 708m , min. 642m
Slope Gradient: 10 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

CONSTRAINT

Fault

Proposed
Lease Sale 56

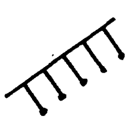


Block
NI 18-7-612

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 768m , min. 680m
Slope Gradient: 13 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

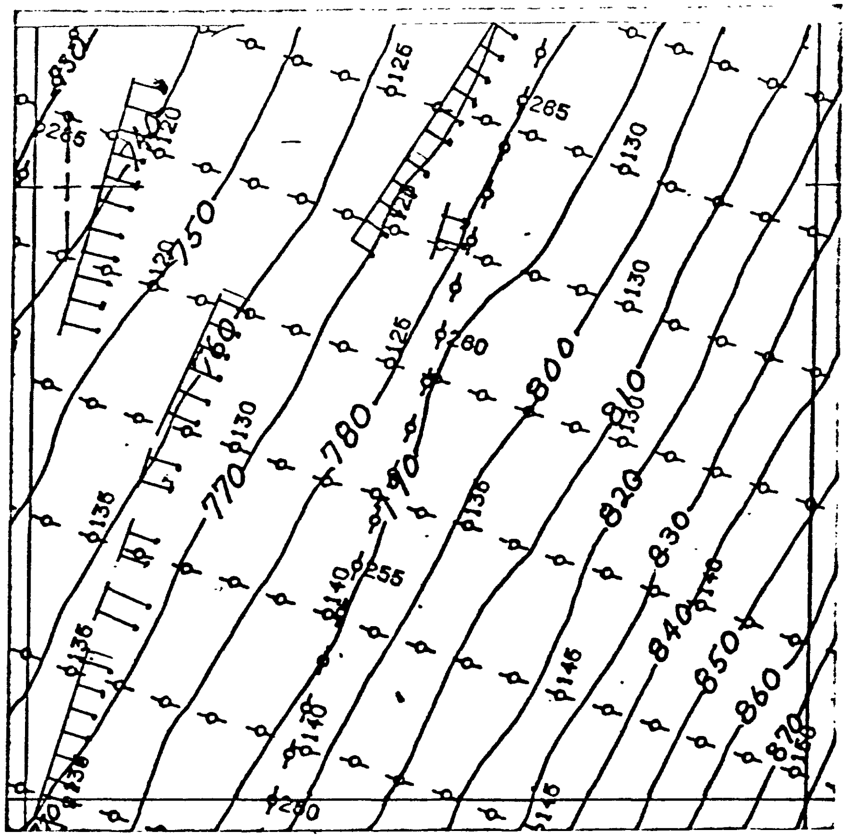
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NI 18-7-613



SCALE 1:48000

0 1/2 1 KILOMETER

0 1/2 1 STATUTE MILE

0 1/2 1 NAUTICAL MILE

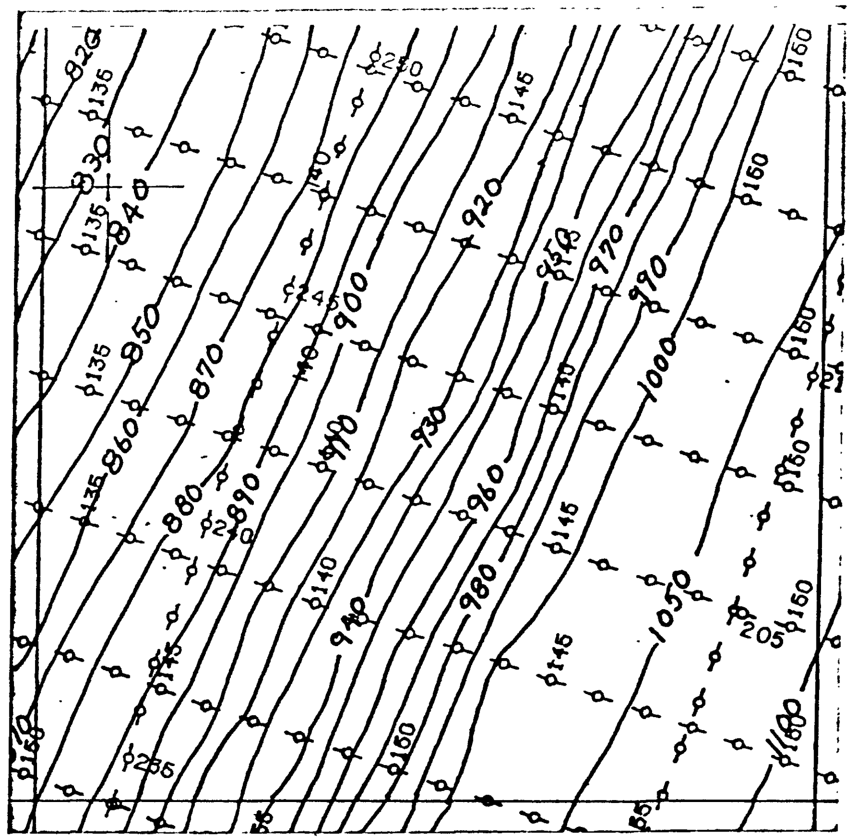
ISOBATHS IN METERS

Water Depth: max. 880m , min. 725m
Slope Gradient: 23 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

CONSTRAINT

Fault

Proposed
Lease Sale 56



Block
NI 18-7-614

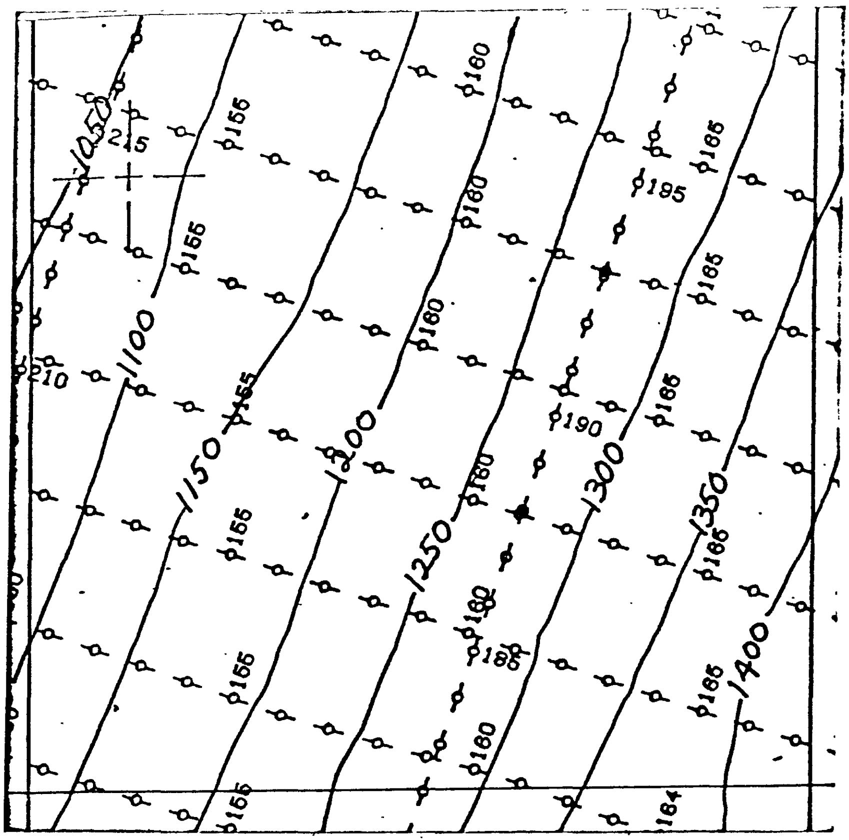
Water Depth: max.1130m , min. 810m
Slope Gradient: 41 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NI 18-7-615



Water Depth: max. 1445m , min. 1010m
Slope Gradient: 64 m/km, Direction:SE
Surface Sediment Type: Silt/Clay

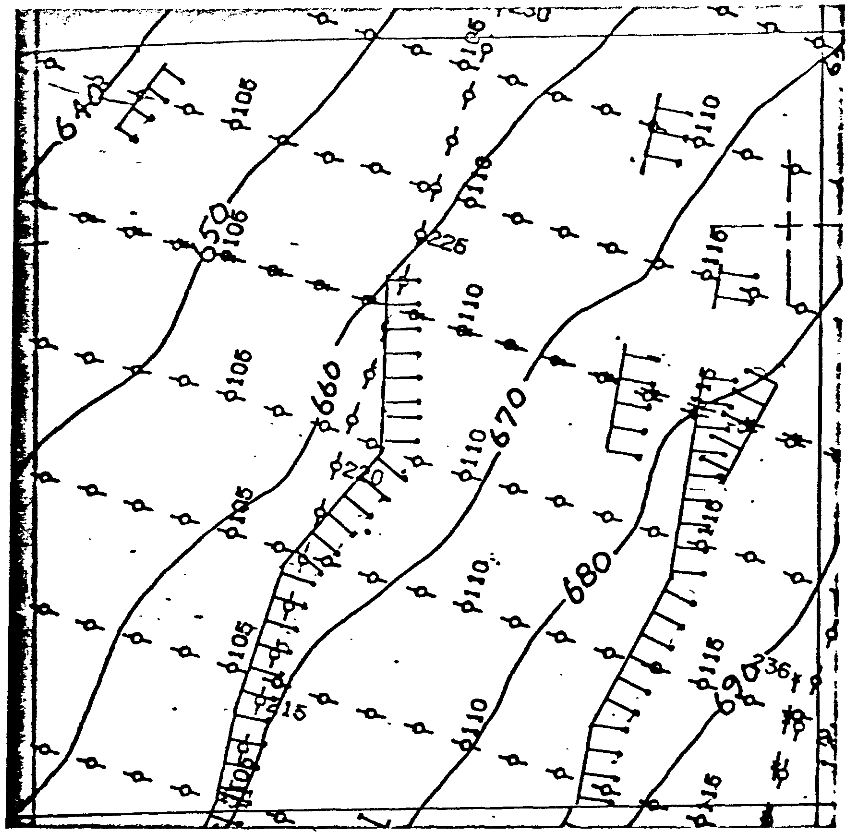
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Proposed
Lease Sale 56

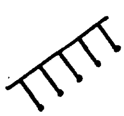
Block
NI 18-7-654



Water Depth: max. 695m , min. 633m
Slope Gradient: 9 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

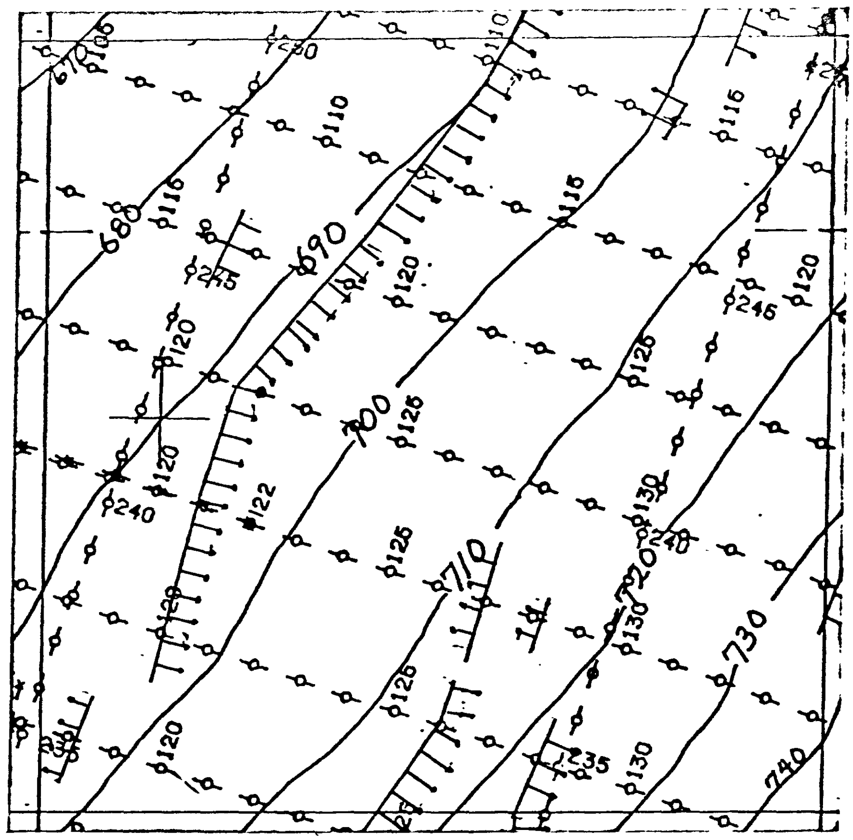
SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

CONSTRAINT


Fault

Proposed
Lease Sale 56

Block
NI 18-7-655



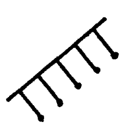
Water Depth: max. 742m , min. 608m
Slope Gradient: 20` m/km, Direction: SE
Surface Sediment Type: Silt/Clay

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

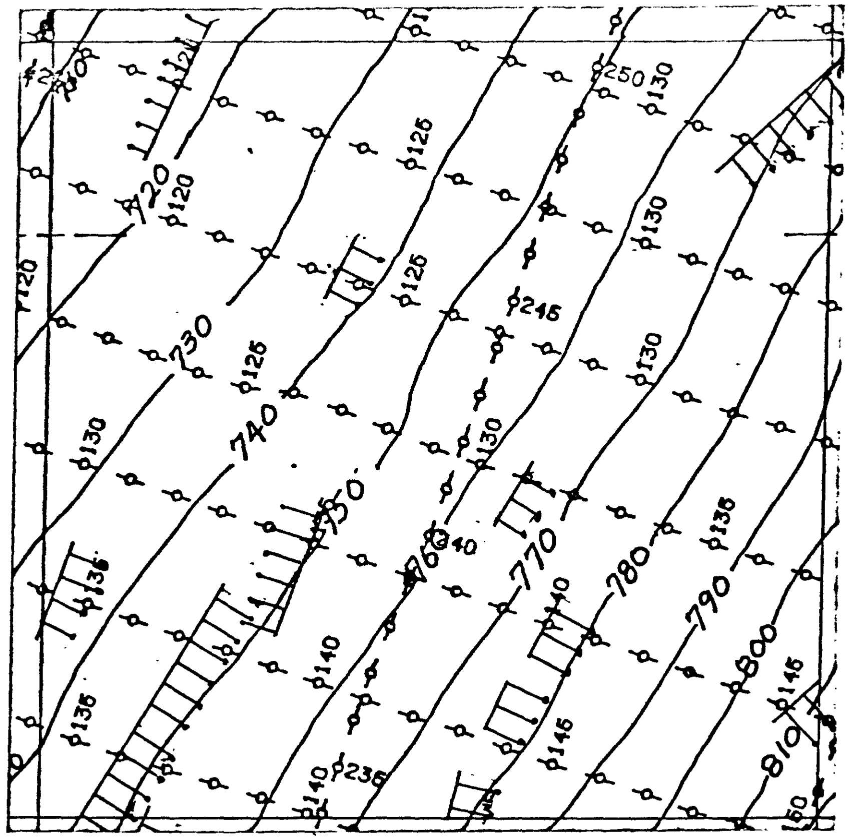
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NI 18-7-656

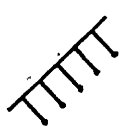


SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

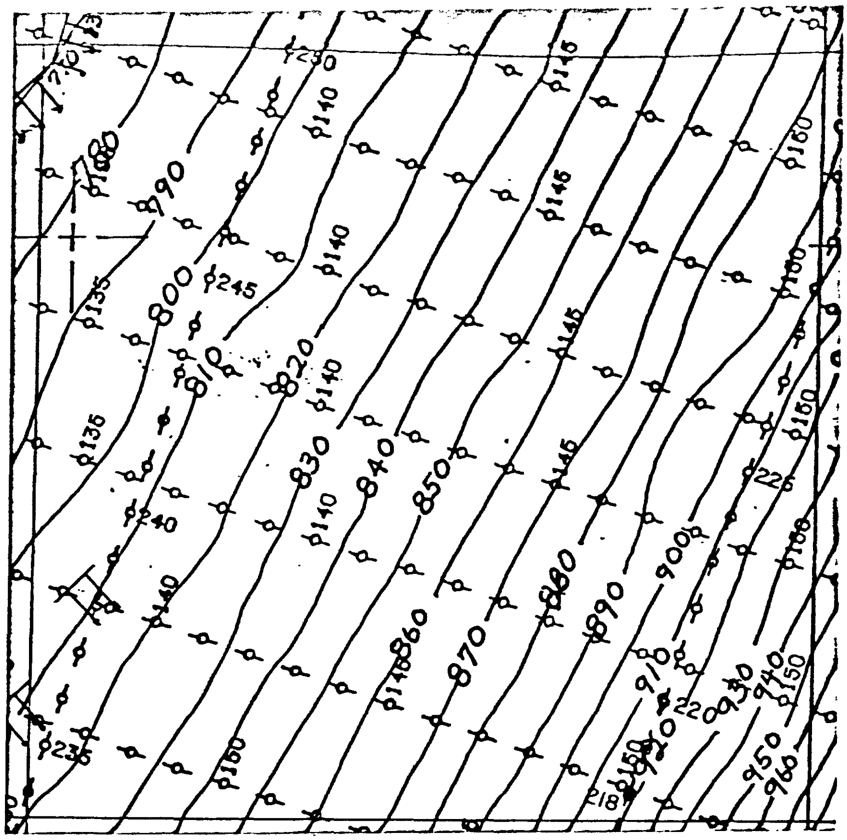
Water Depth: max.821m , min.708m
Slope Gradient: 17 m/km, Direction:SE
Surface Sediment Type: Silt/Clay

CONSTRAINT



Fault

Proposed
Lease Sale 56



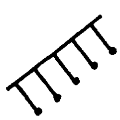
Block
NI 18-7-657

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 980m , min. 768m
Slope Gradient: 31 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

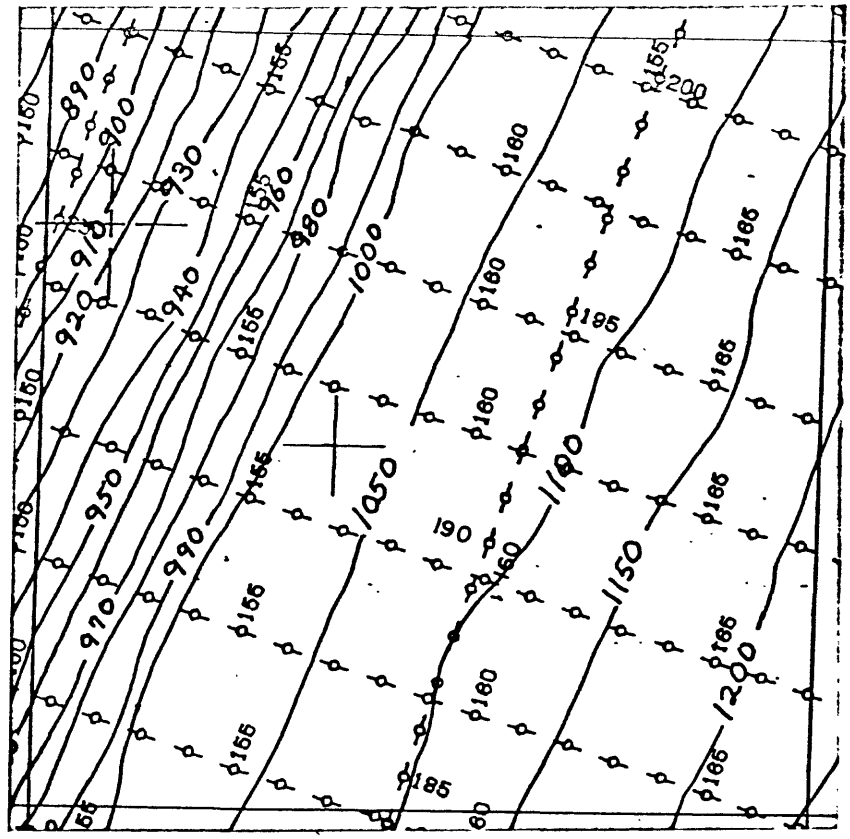
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NI 18-7-658



SCALE 1:48000

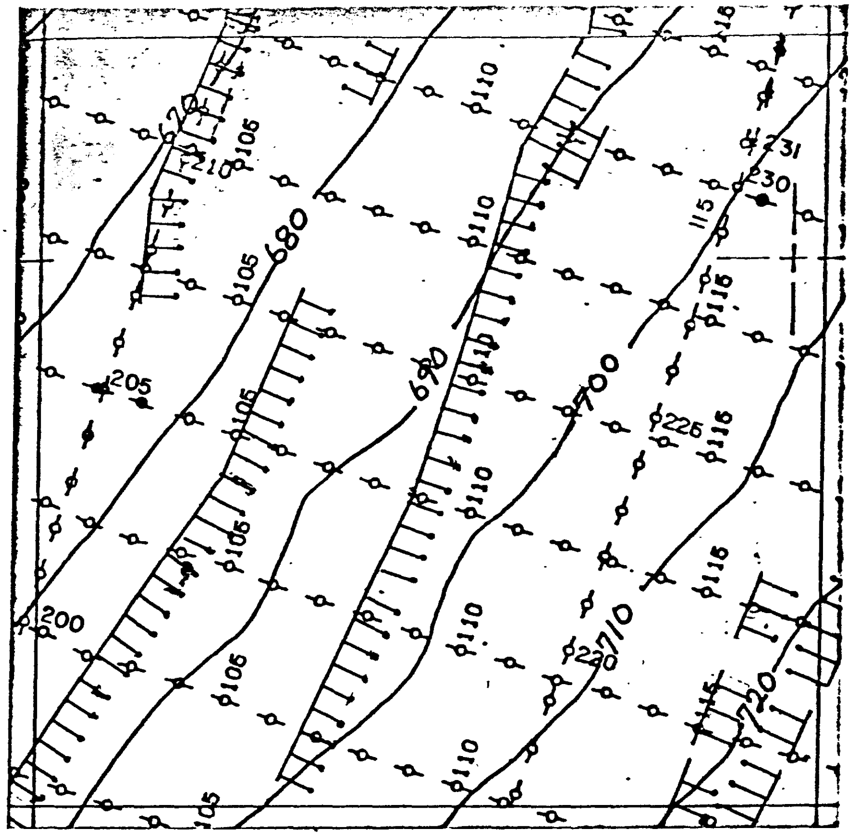
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 1255m , min. 888m
Slope Gradient: 54 m/km, Direction:SE
Surface Sediment Type: Silt/Clay

Proposed
Lease Sale 56

Block
NI 18-7-698



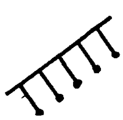
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 725m , min. 622m
Slope Gradient: 15` m/km, Direction: SE
Surface Sediment Type: Silt/Clay

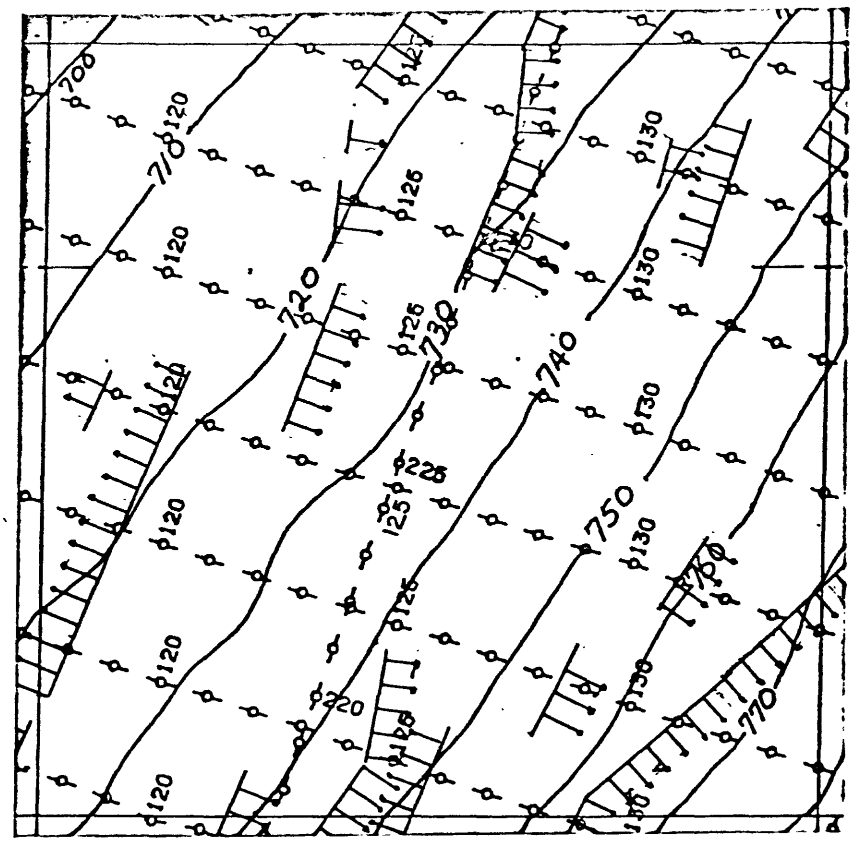
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NI 18-7-699



Water Depth: max. 781m , min. 695m
Slope Gradient: 12 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

SCALE 1:48000

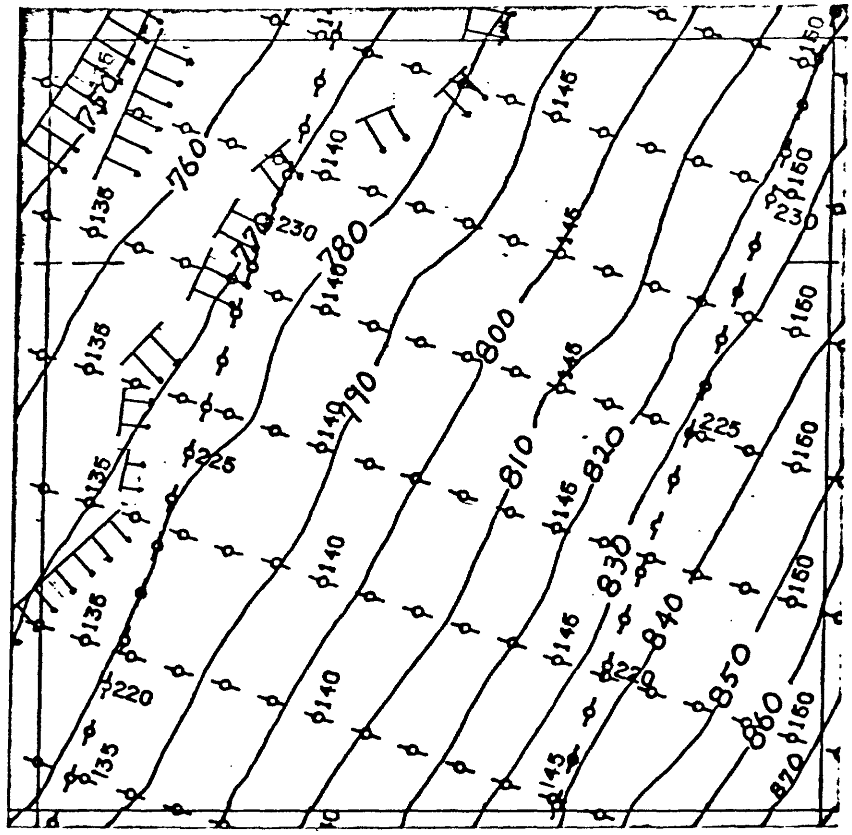
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

CONSTRAINT

Fault

Proposed
Lease Sale 56



Block
NI 18-7-700

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

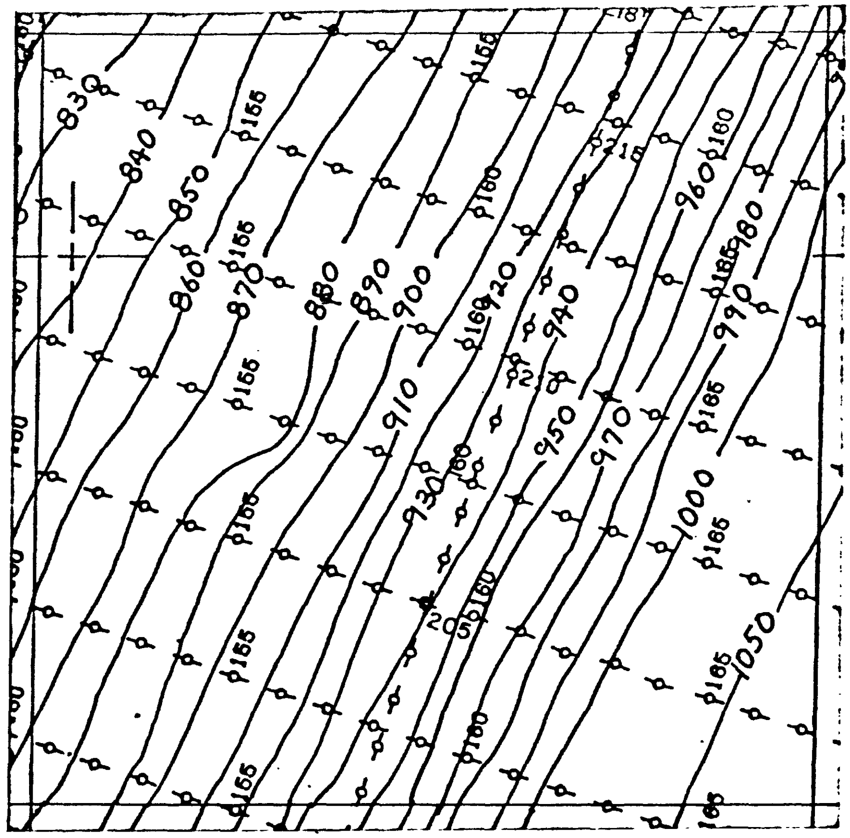
Water Depth: max.880m , min742m
Slope Gradient: 20` m/km, Direction: SE
Surface Sediment Type: Silt/Clay

CONSTRAINT

Fault

Proposed
Lease Sale 56

Block
NI 18-7-701



Water Depth: max. 1080m , min. 821m
Slope Gradient: 38` m/km, Direction: SE
Surface Sediment Type: Silt/Clay

SCALE 1:48000

0 1/2 1 KILOMETER

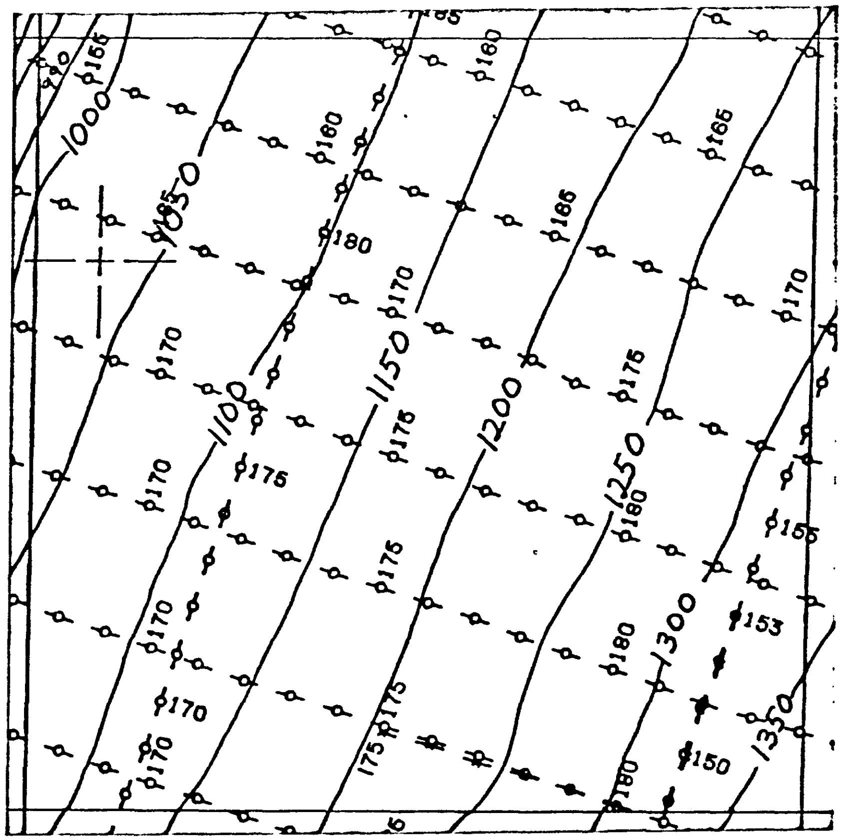
0 1/2 1 STATUTE MILE

0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NI 18-7-702



SCALE 1:48000

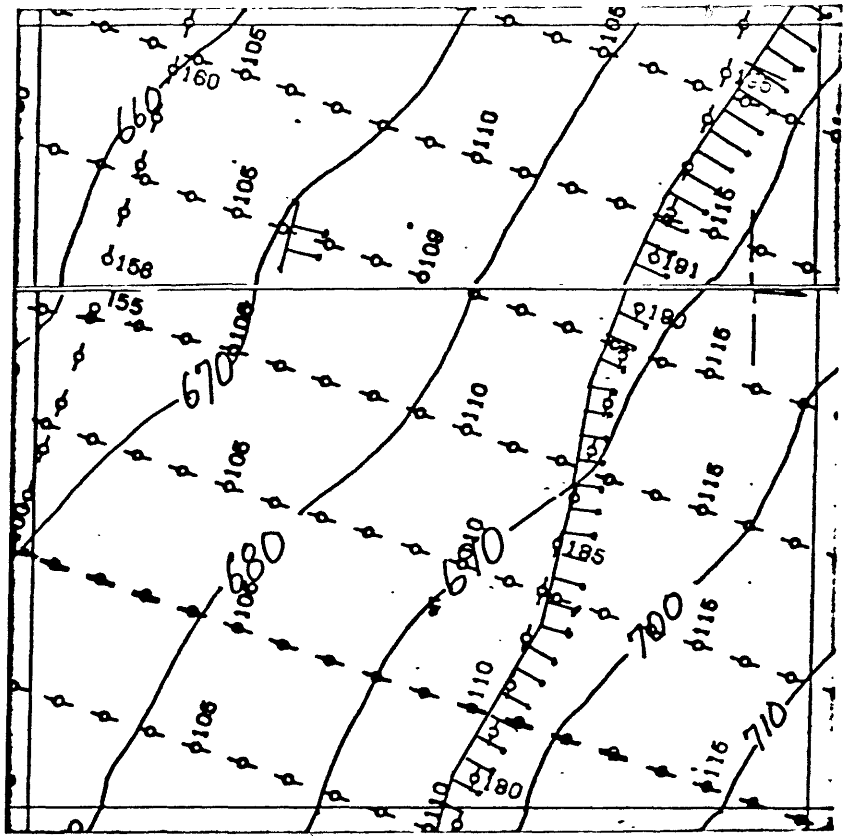
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max.1375m , min.980m
Slope Gradient: 58 m/km, Direction:SE
Surface Sediment Type: Silt/Clay

Proposed
Lease Sale 56

Block
NI 18-7-741



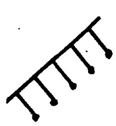
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 712m , min.656m
Slope Gradient: 10 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

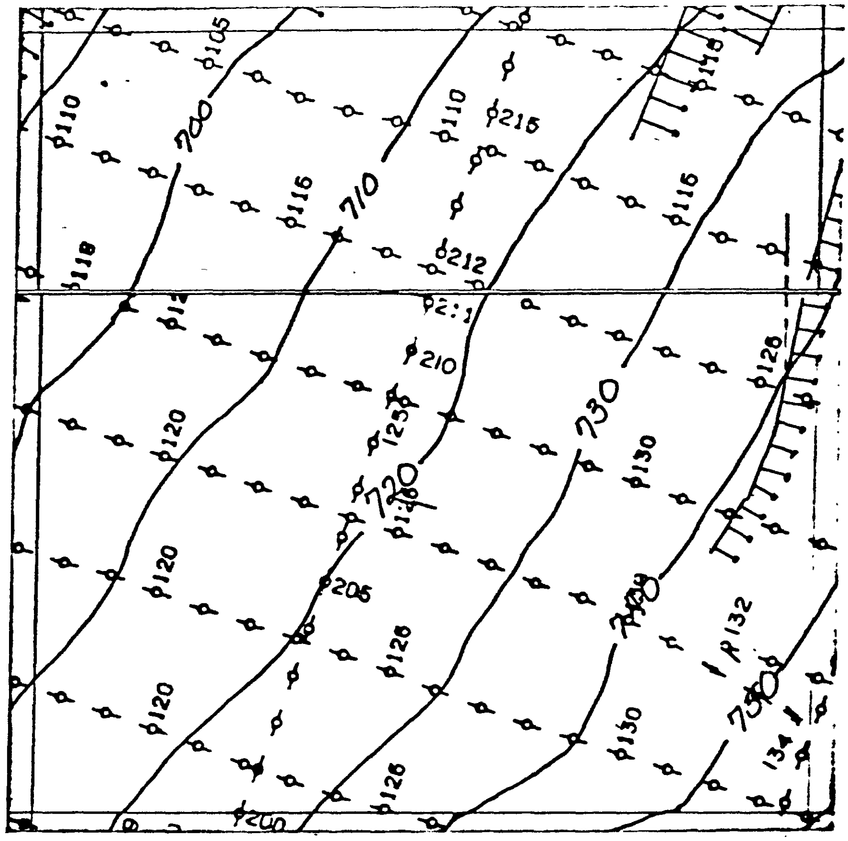
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NI 18-7-742



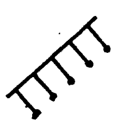
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

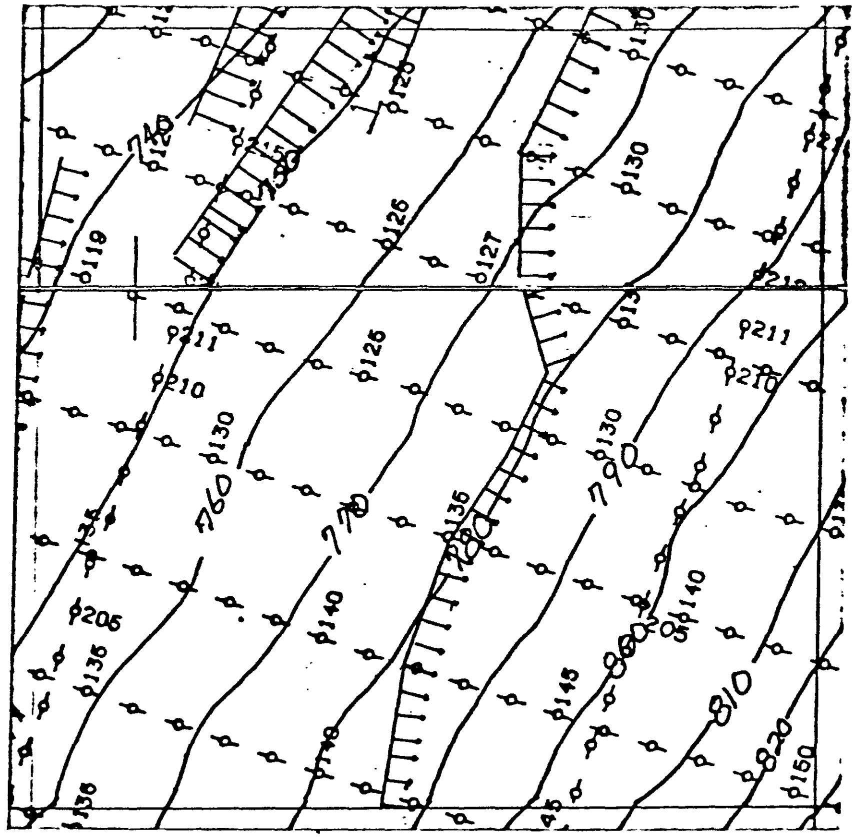
Water Depth: max. 754m , min. 690m
Slope Gradient: 12 m/km, Direction SE
Surface Sediment Type: Silt/Clay

CONSTRAINT



Fault

Proposed
Lease Sale 56



Block
NI 18-7-743

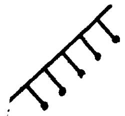
Water Depth: max 825m , min. 730m
Slope Gradient: 18 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

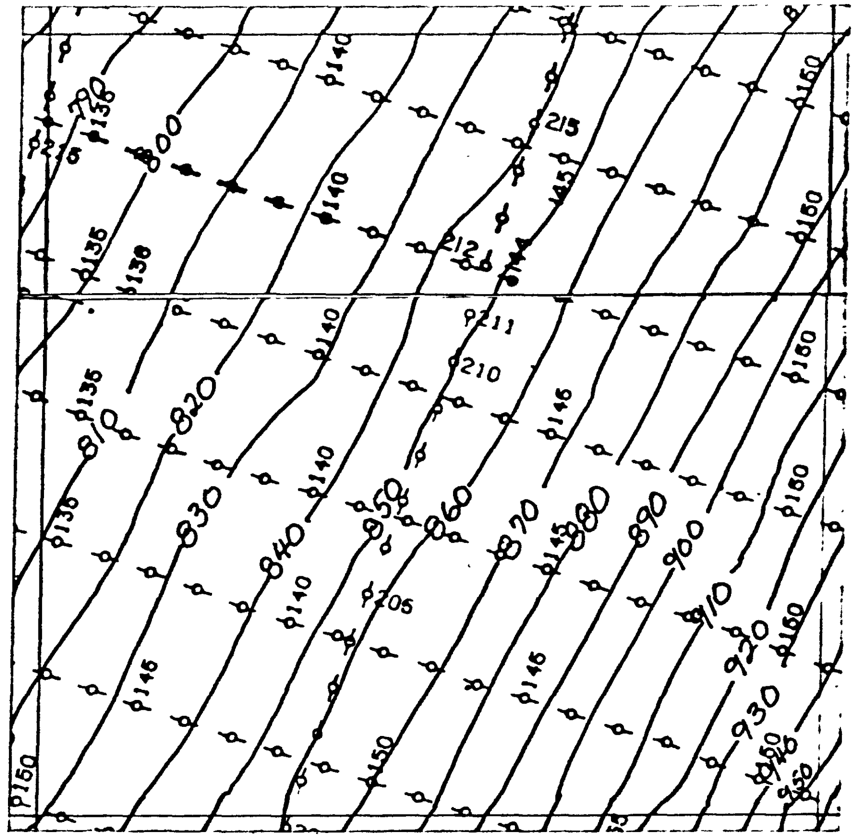
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NI 18-7-744



Water Depth: max. 951m , min. 782m
Slope Gradient: 25 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

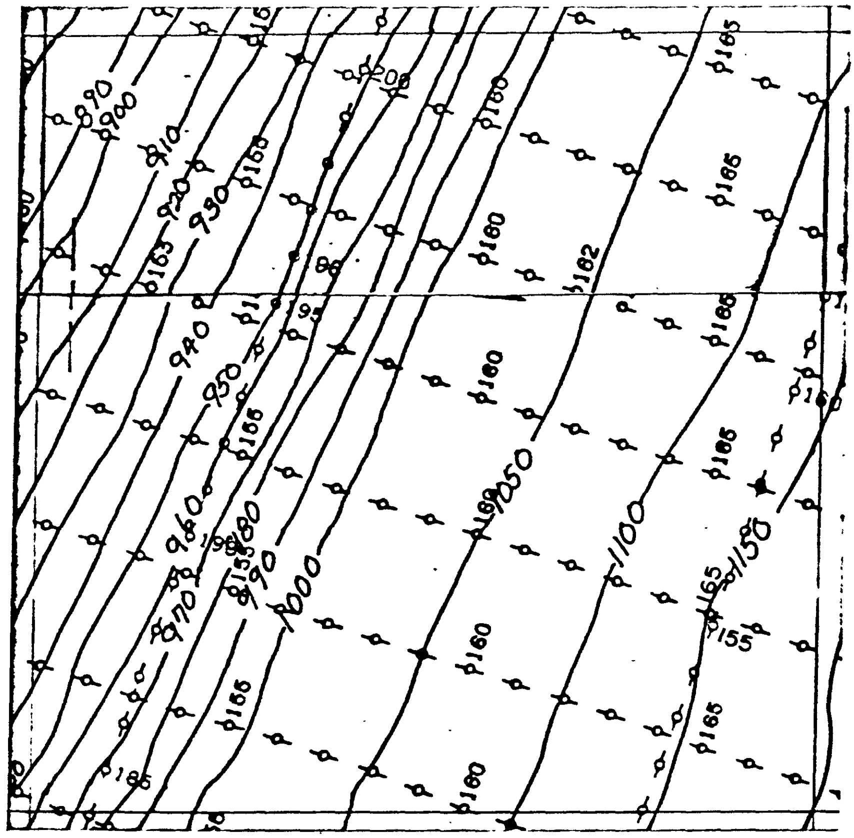
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NI 18-7-745

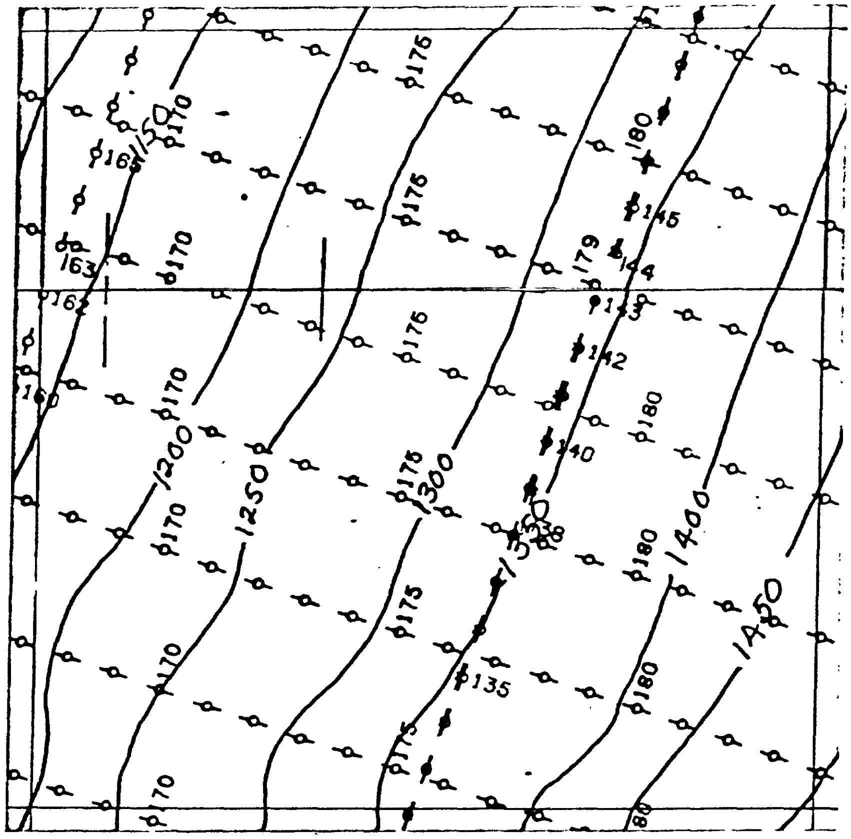


SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 1200m , min. 878m
Slope Gradient: 48 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

Proposed
Lease Sale 56



Block
NI 18-7-746

SCALE 1:48000

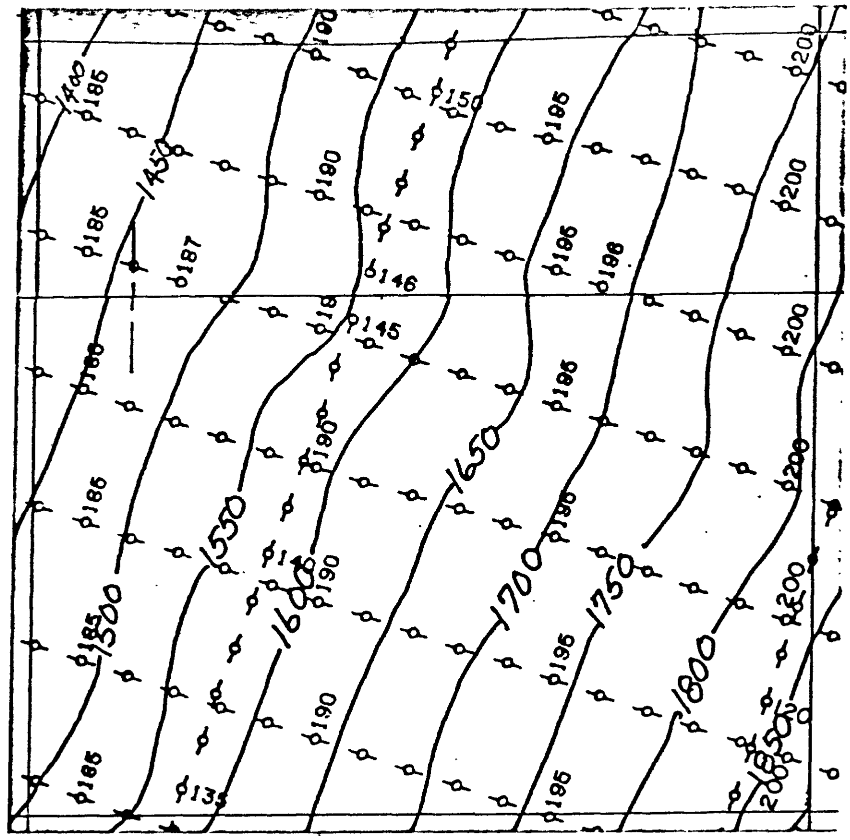
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 1510m , min. 1090m
Slope Gradient: 62 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

Proposed
Lease Sale 56

Block
NI 18-7-747



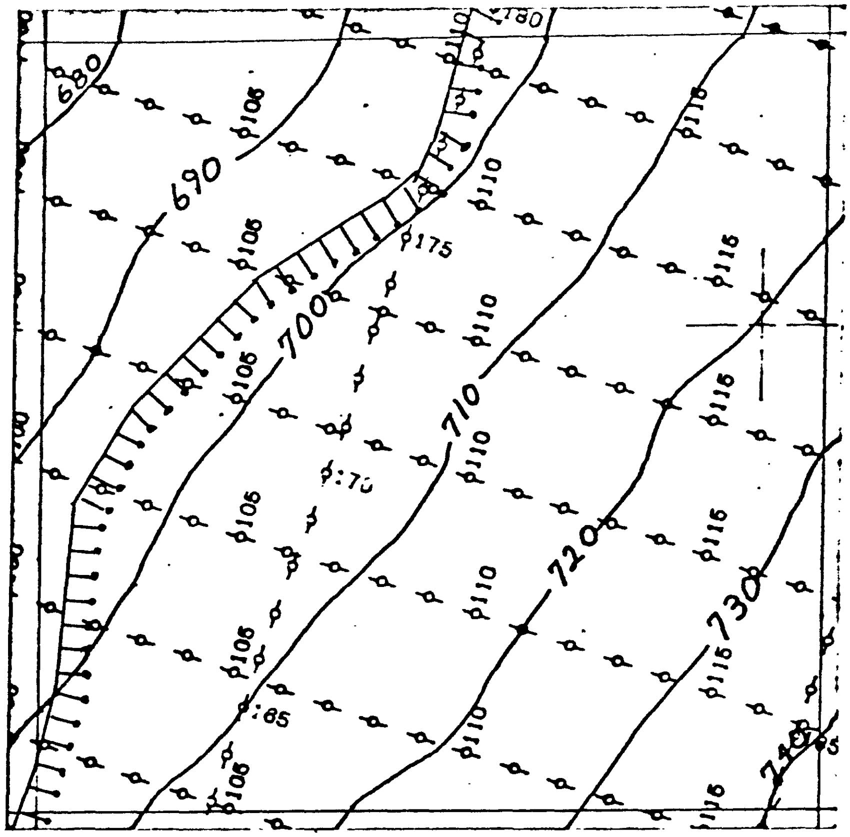
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 1870m, min. 1375m
Slope Gradient: 73 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

Proposed
Lease Sale 56

Block
NI 18-7-785



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

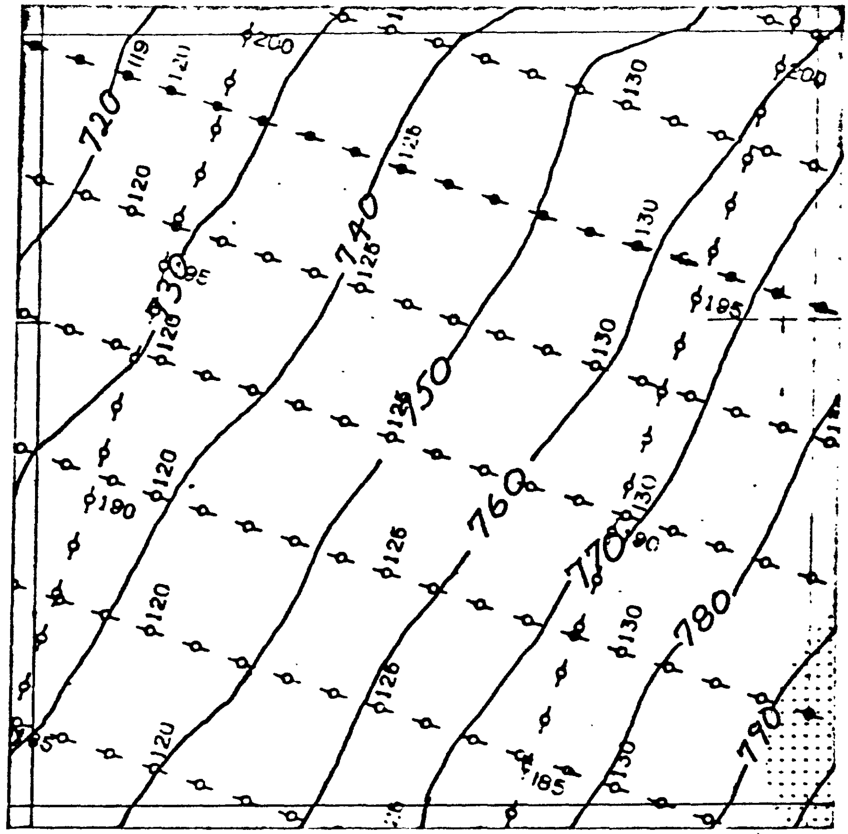
Water Depth: max. 741m , min. 677m
Slope Gradient: 10 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

CONSTRAINT

Fault

Proposed
Lease Sale 56

Block
NI 18-7-786



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

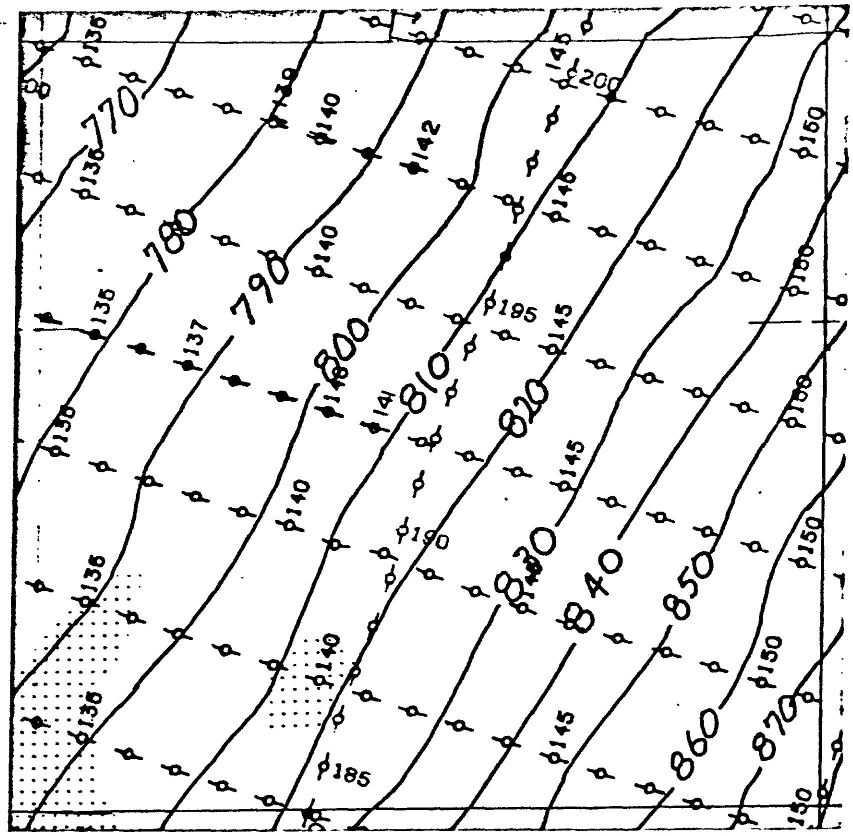
Water Depth: max. 794m , min. 712m
Slope Gradient: 12 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

CONSTRAINT

Gassy Sediments

Proposed
Lease Sale 56

Block
NI 18-7-787



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

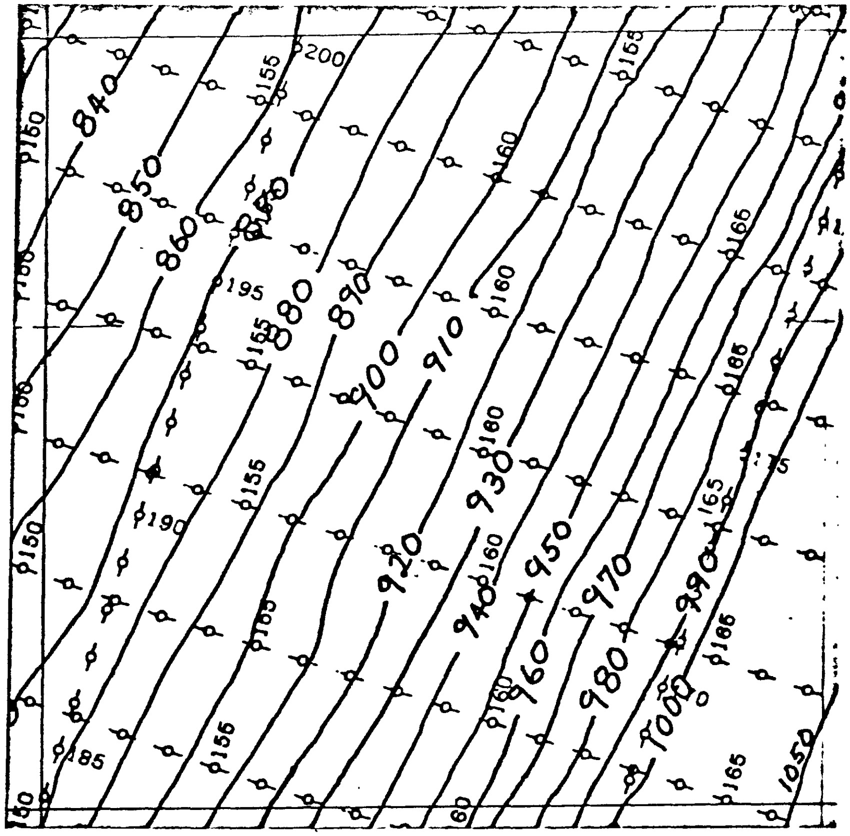
Water Depth: max. 879m , min. 754m
Slope Gradient: 18 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

CONSTRAINT

Gassy Sediments

Proposed
Lease Sale 56

Block
NI 18-7-788



Water Depth: max. 1052m, min. 825m
Slope Gradient: 35 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

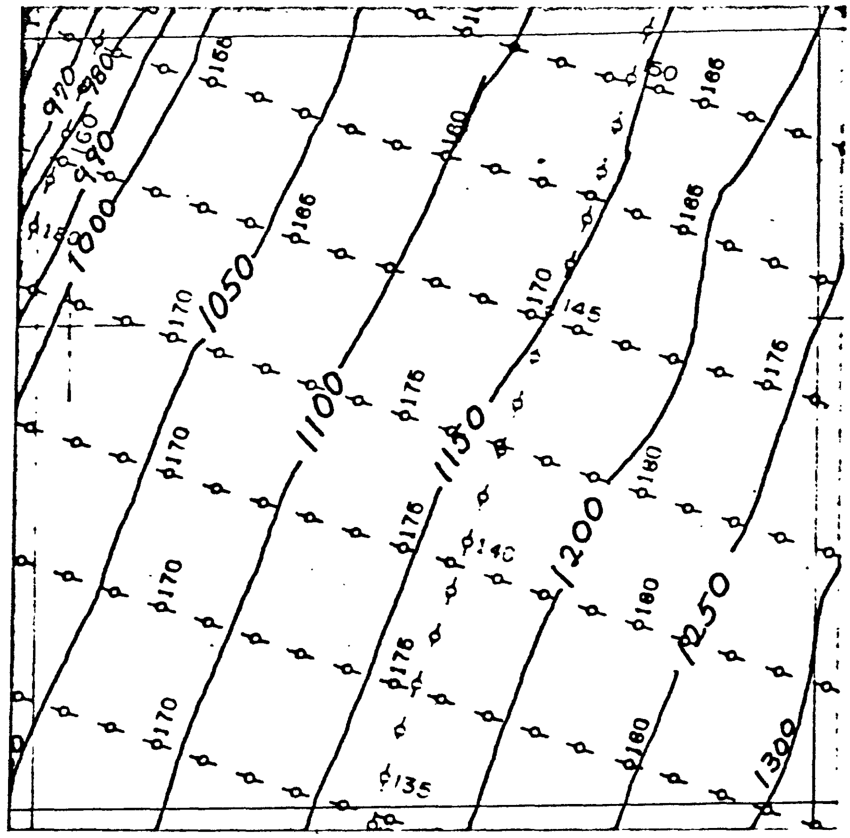
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NI 18-7-789



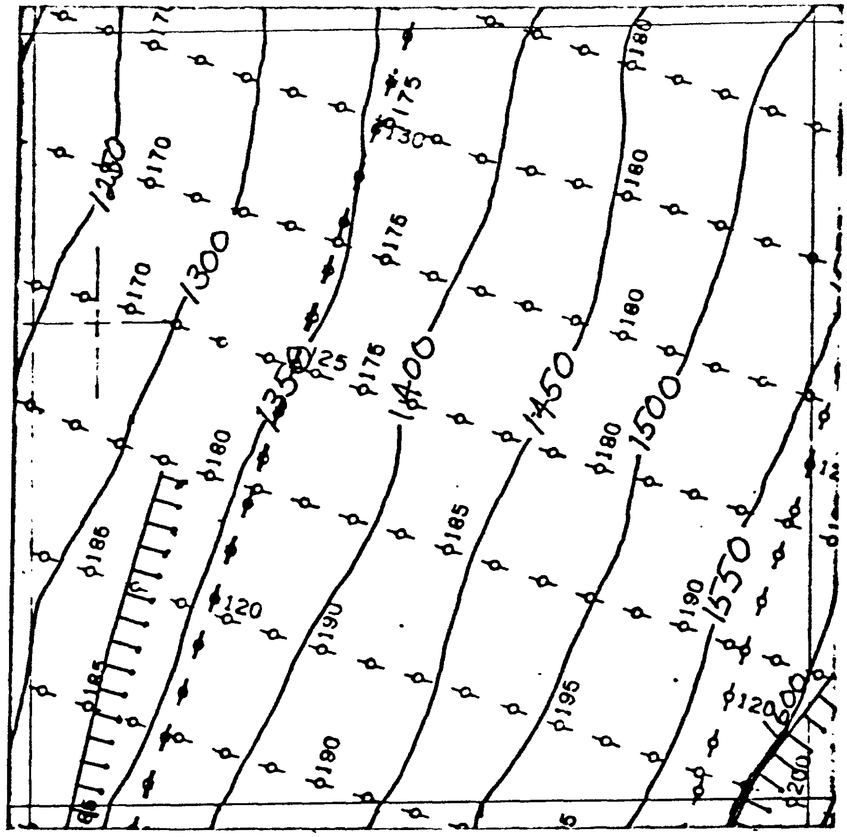
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 1310m, min. 951m
Slope Gradient: 55 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

Proposed
Lease Sale 56

Block
NI 18-7-790



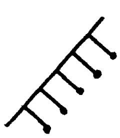
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 1625m, min. 1200m
Slope Gradient: 63 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

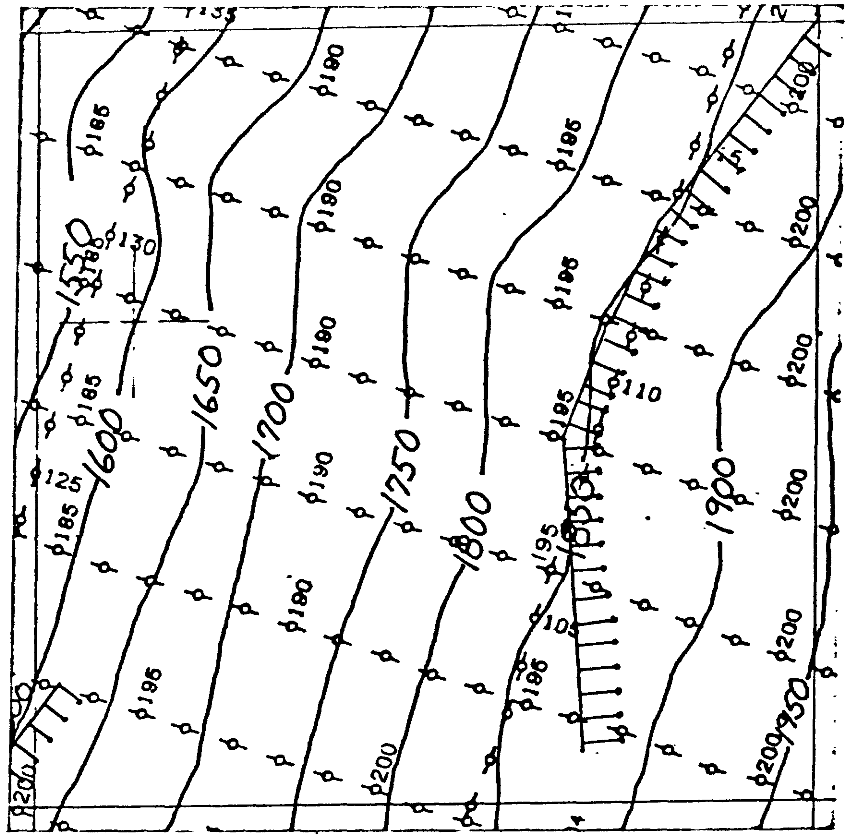
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NI 18-7-791



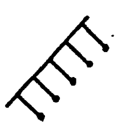
Water Depth: max. 1967m, min. 1512m
Slope Gradient: 52 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

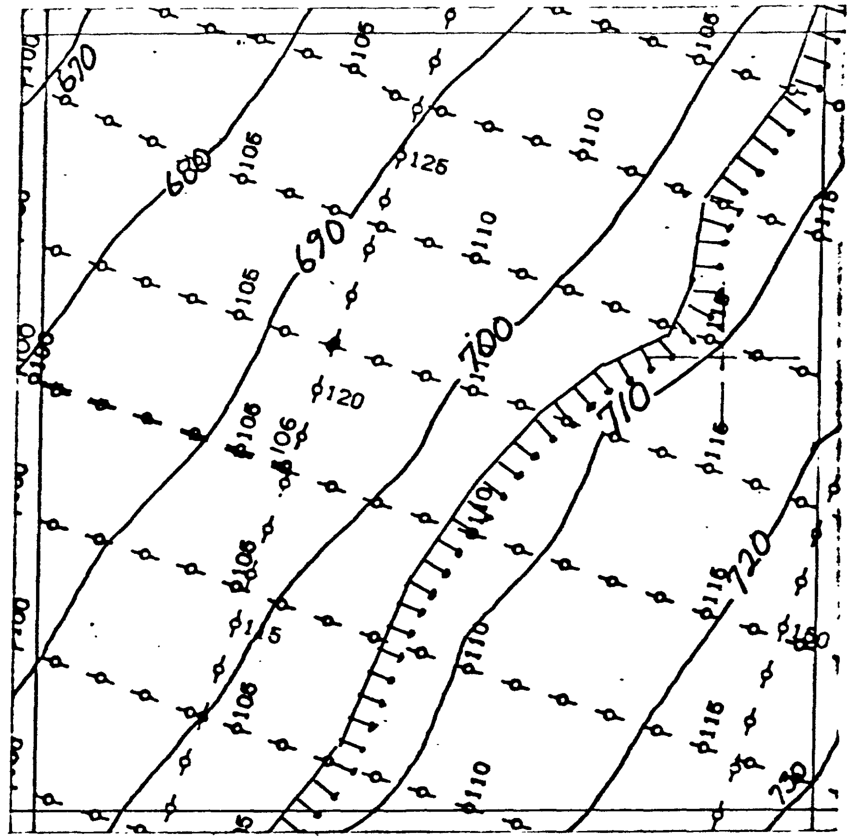
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NI 18-7-828



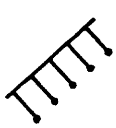
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 730m , min. 670m
Slope Gradient: 10 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

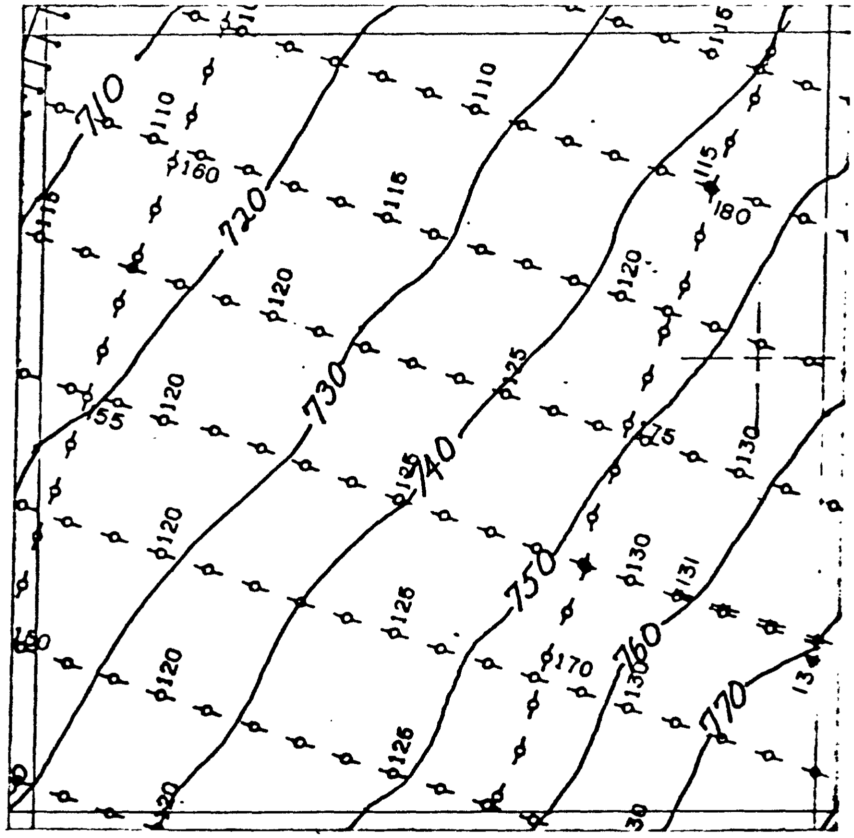
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NI 18-7-829



Water Depth: max. 777m , min.705m
Slope Gradient: 12 m/km, Direction:SE
Surface Sediment Type: Silt/Clay

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

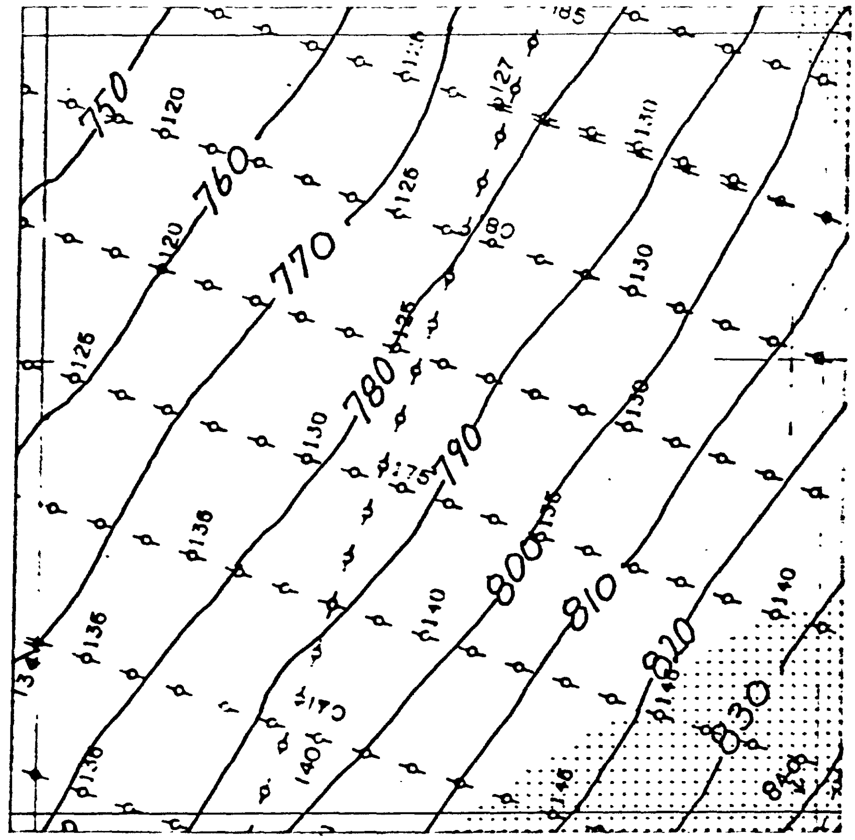
ISOBATHS IN METERS

CONSTRAINT

Fault

Proposed
Lease Sale 56

Block
NI 18-7-830



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

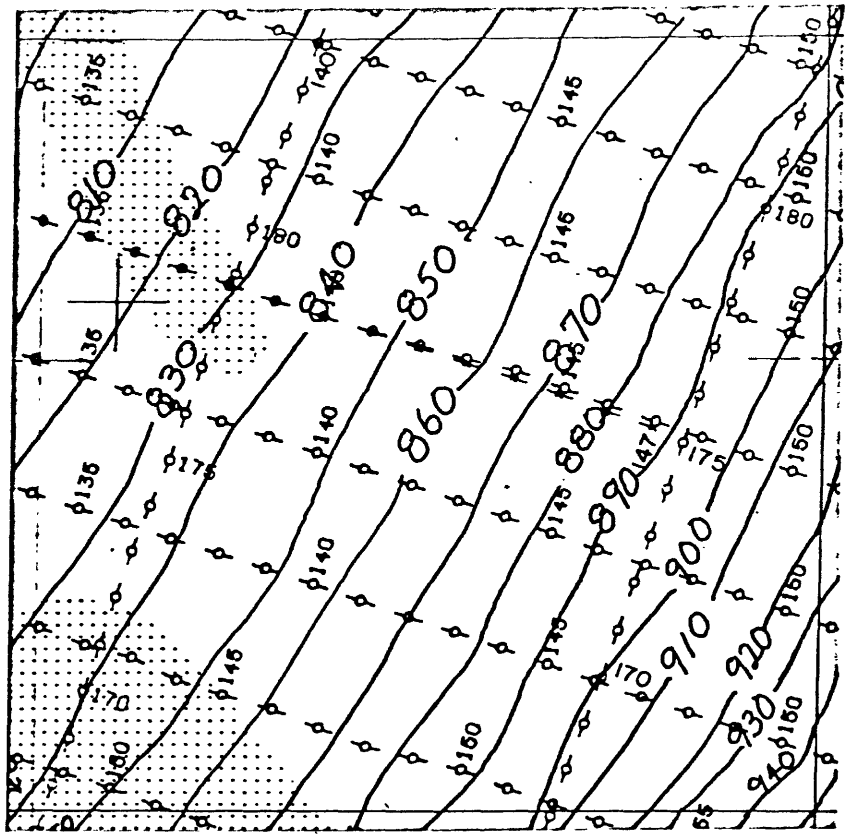
ISOBATHS IN METERS

Water Depth: max. 840m , min. 741m
Slope Gradient: 19 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

CONSTRAINT

Gassy Sediments

Proposed
Lease Sale 56



Block
NI 18-7-831

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

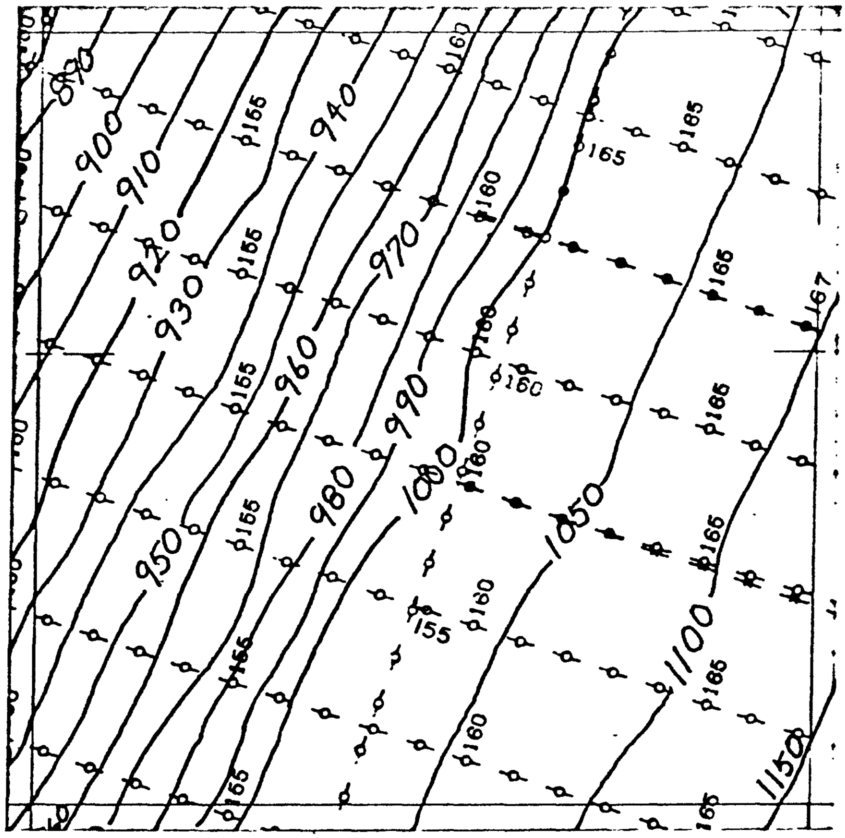
Water Depth: max. 950m , min. 794m
Slope Gradient: 23 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

CONSTRAINT

Gassy Sediments

Proposed
Lease Sale 56

Block
NI 18-7-832



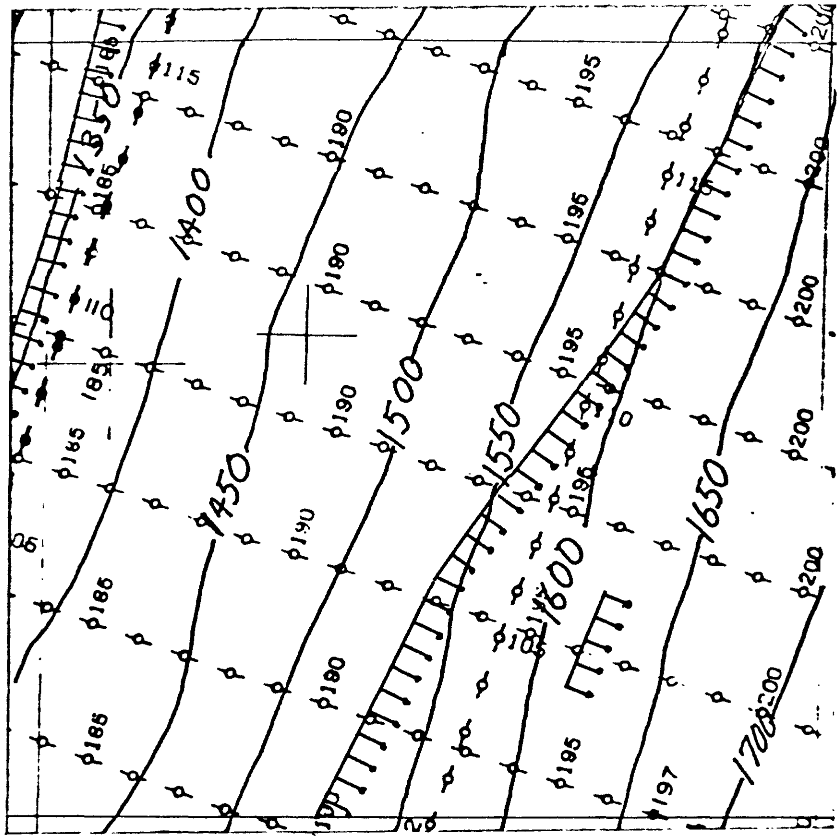
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 1155m , min. 879m
Slope Gradient: 40 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

Proposed
Lease Sale 56

Block
NI 18-7-834



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

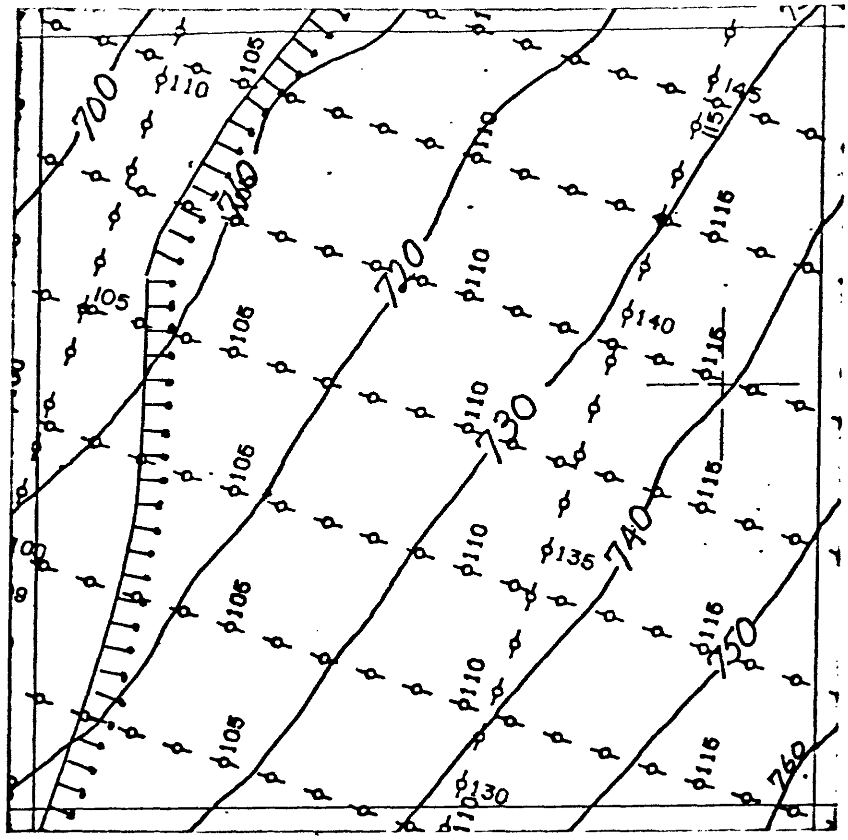
Water Depth: max. 1725m , min. 1310m
Slope Gradient: 61 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

CONSTRAINT

Fault

Proposed
Lease Sale 56

Block
NI 18-7-872



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

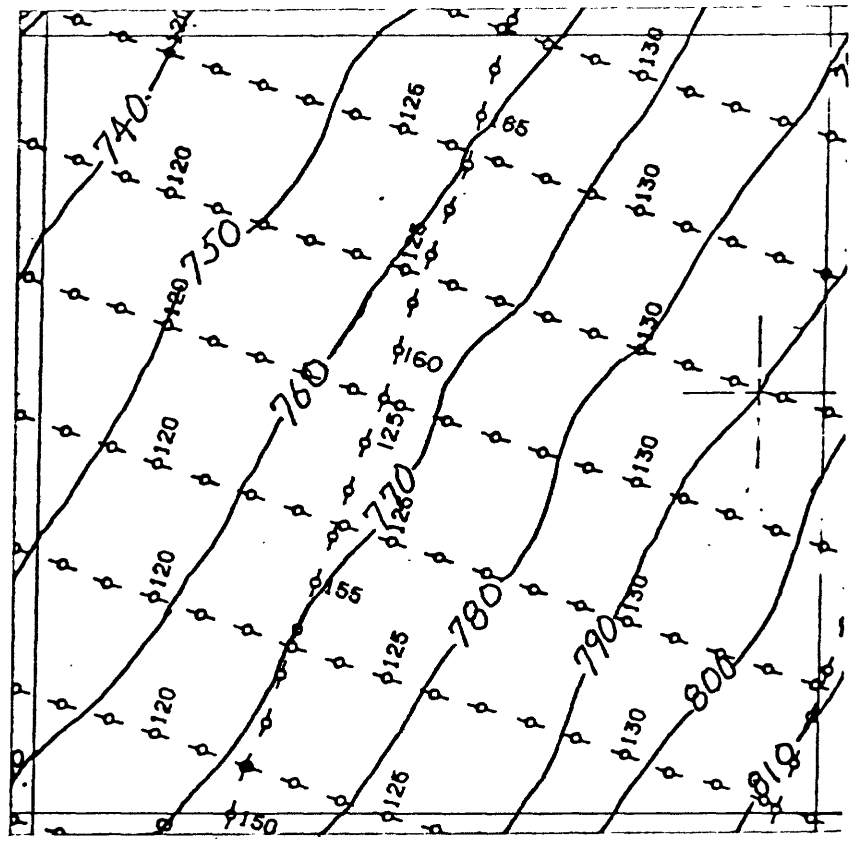
Water Depth: max. 761m , min. 697m
Slope Gradient: 9 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

CONSTRAINT

Fault

Proposed
Lease Sale 56

Block
NI 18-7-873

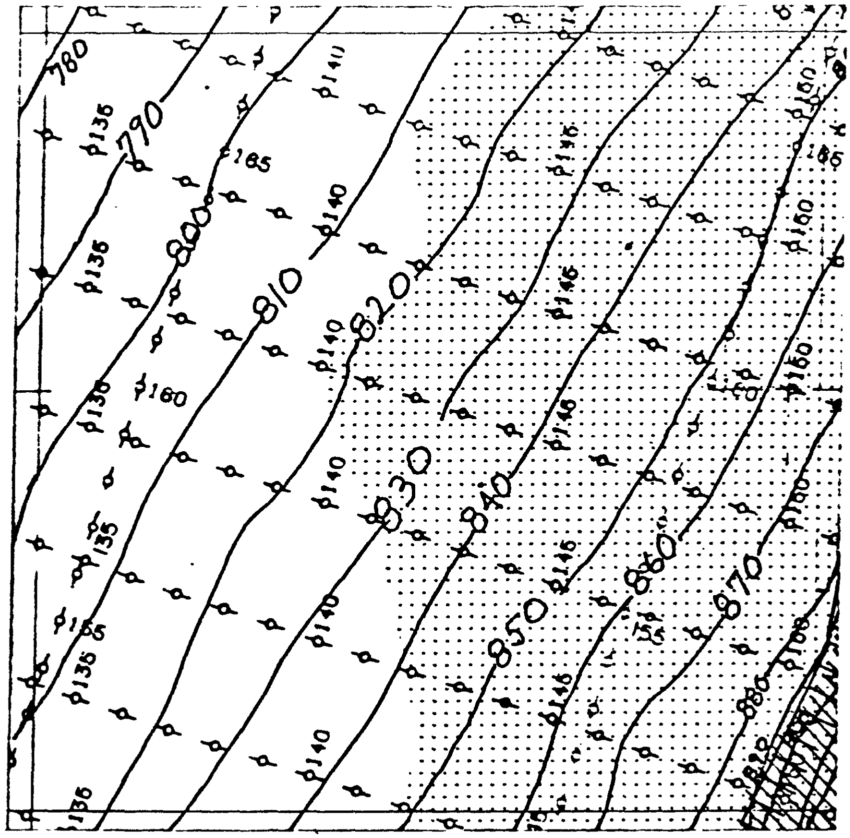


SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 815m , min. 730m
Slope Gradient: 12 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

Proposed
Lease Sale 56



Block
NI 18-7-874

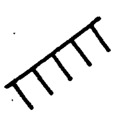
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

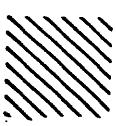
ISOBATHS IN METERS

Water Depth: max. 920m , min. 777m
Slope Gradient: 21 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

HAZARDS

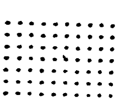


Shallow Fault



Slump or Slide

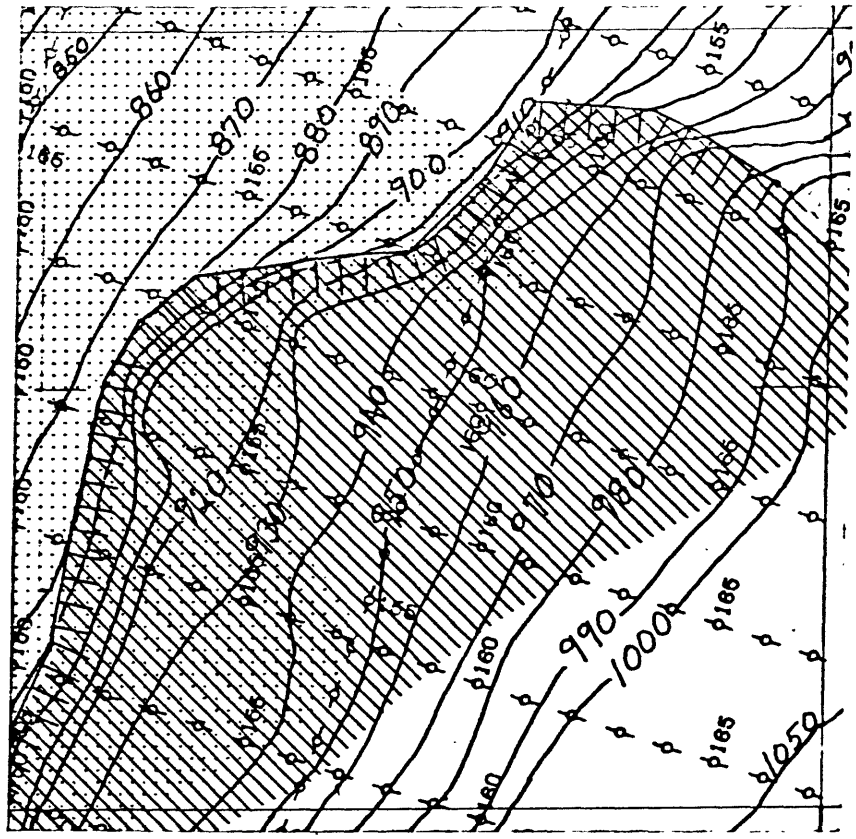
CONSTRAINT



Gassy Sediments

Proposed
Lease Sale 56

Block
NI 18-7-875



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 1055m, min. 840m
Slope Gradient: 32 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

HAZARDS

Shallow Fault

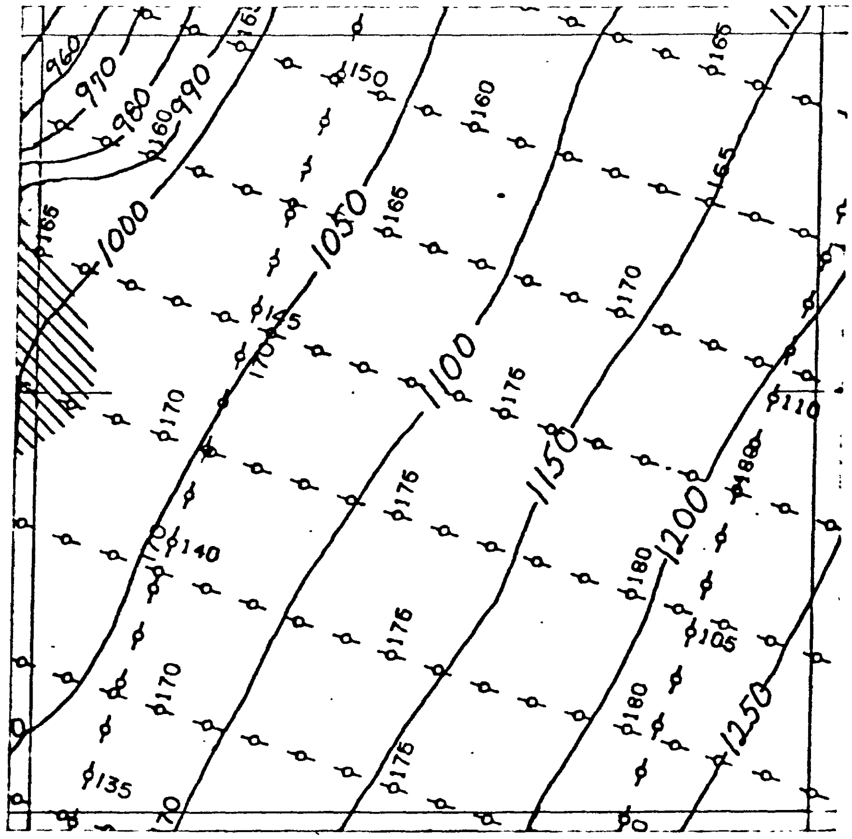
Slump or Slide

CONSTRAINT

Gassy Sediments

Proposed
Lease Sale 56

Block
NI 18-7-876

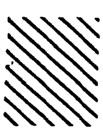


SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 1280m, min. 950m
Slope Gradient: 50 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

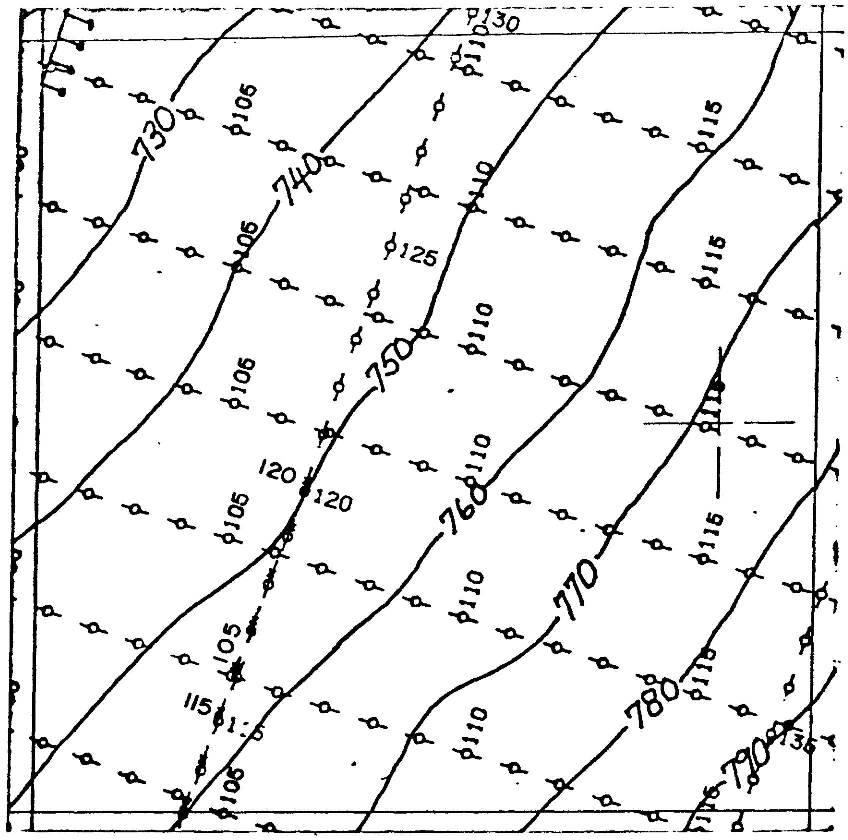
HAZARD



Slump or Slide

Proposed
Lease Sale 56

Block
NI 18-7-916



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

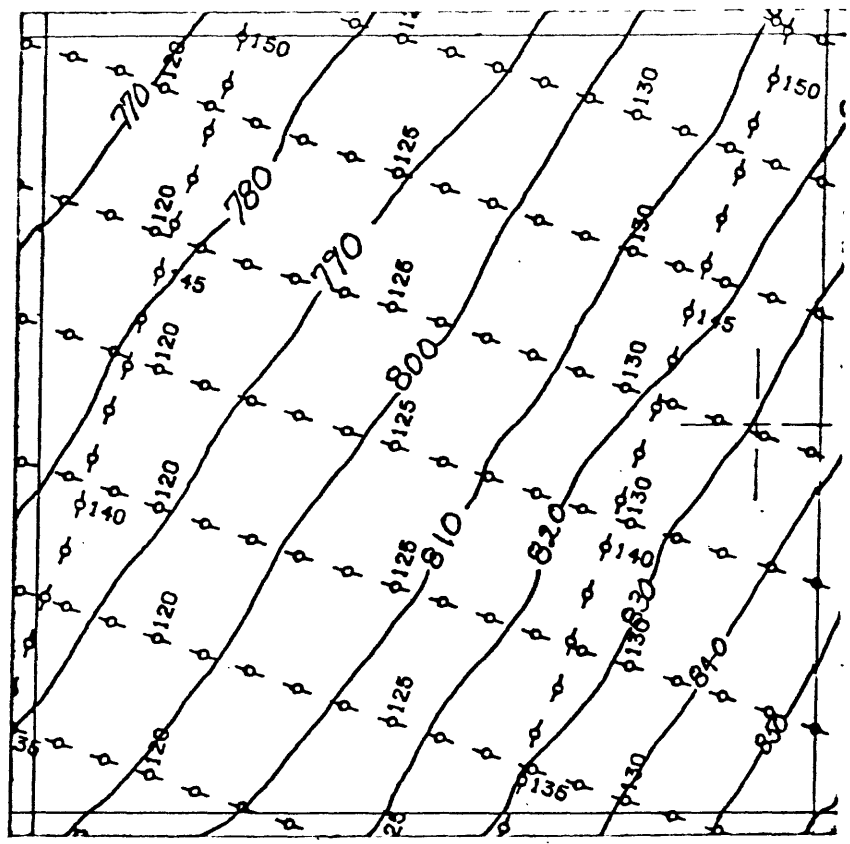
Water Depth: max. 795m , min. 722m
Slope Gradient: 11 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

CONSTRAINT

Fault

Proposed
Lease Sale 56

Block
NI 18-7-917



SCALE 1:48000

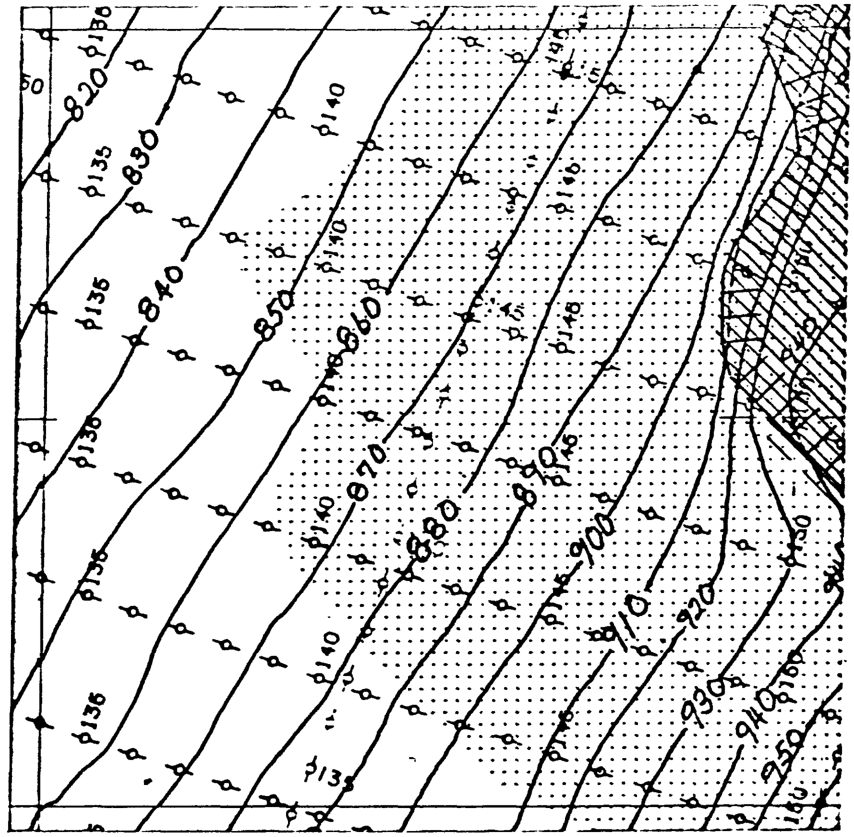
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 860m , min. 761m
Slope Gradient: 15 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

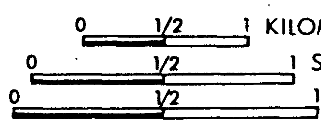
Proposed
Lease Sale 56

Block
NI 18-7-918



Water Depth: max. 960m , min. 815m
Slope Gradient: 21 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

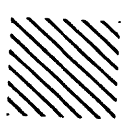
SCALE 1:48000



ISOBATHS IN METERS

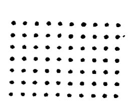
HAZARDS

Shallow Fault



Slump or Slide

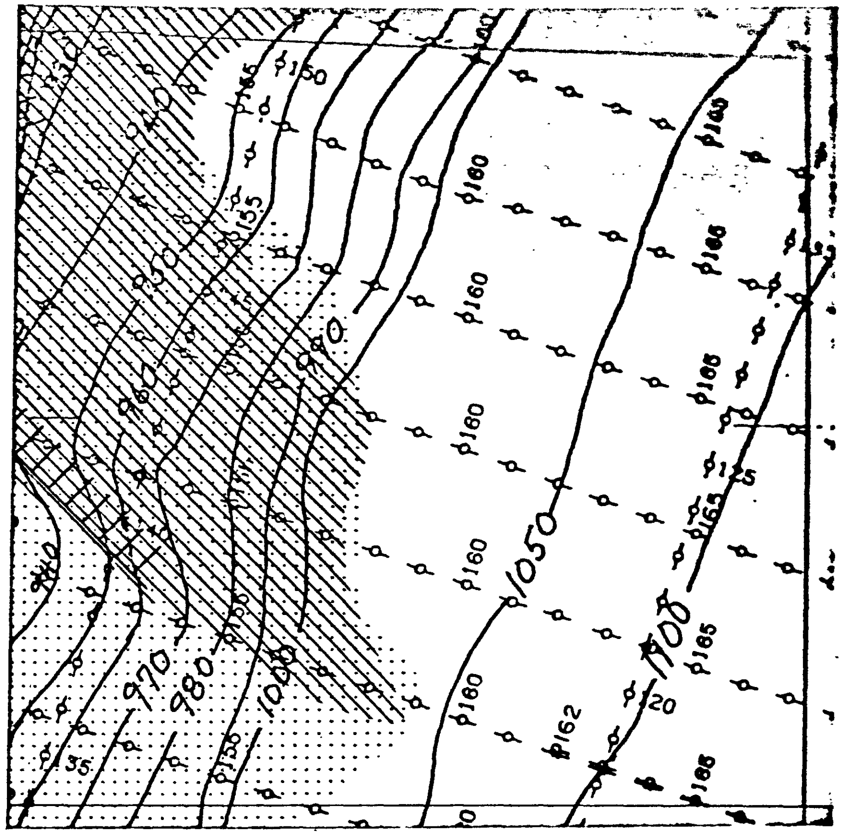
CONSTRAINT



Gassy Sediments

Proposed
Lease Sale 56

Block
NI 18-7-919

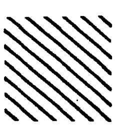


Water Depth: max. 1145m min. 920m
Slope Gradient: 33 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

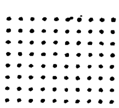
HAZARDS

Shallow Fault



Slump or Slide

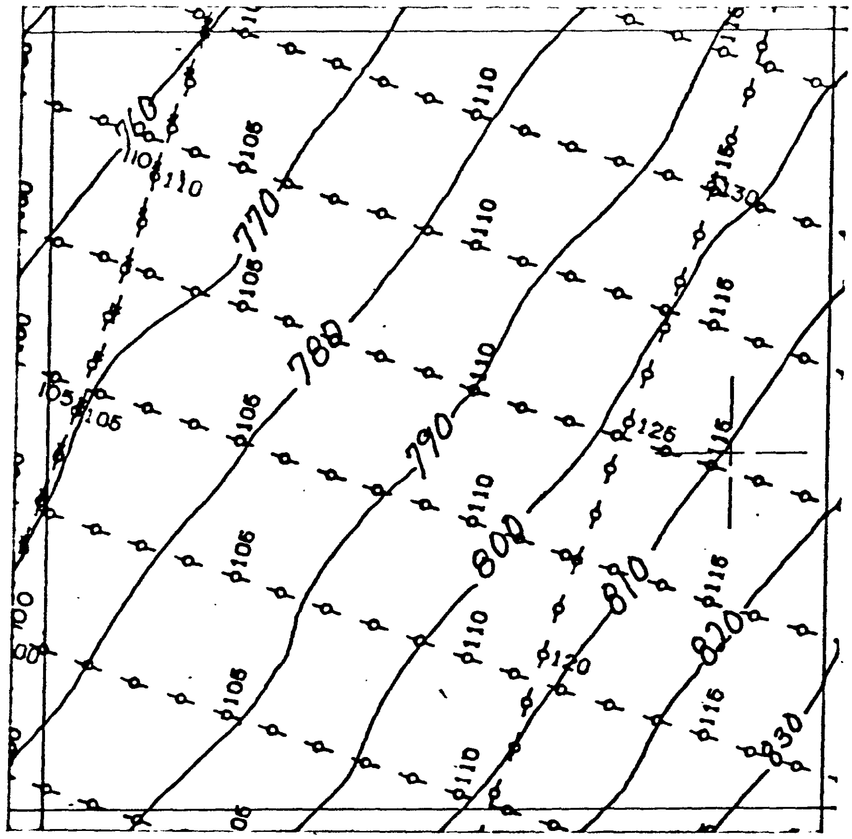
CONSTRAINT



Gassy Sediments

Proposed
Lease Sale 56

Block
NI 18-7-960



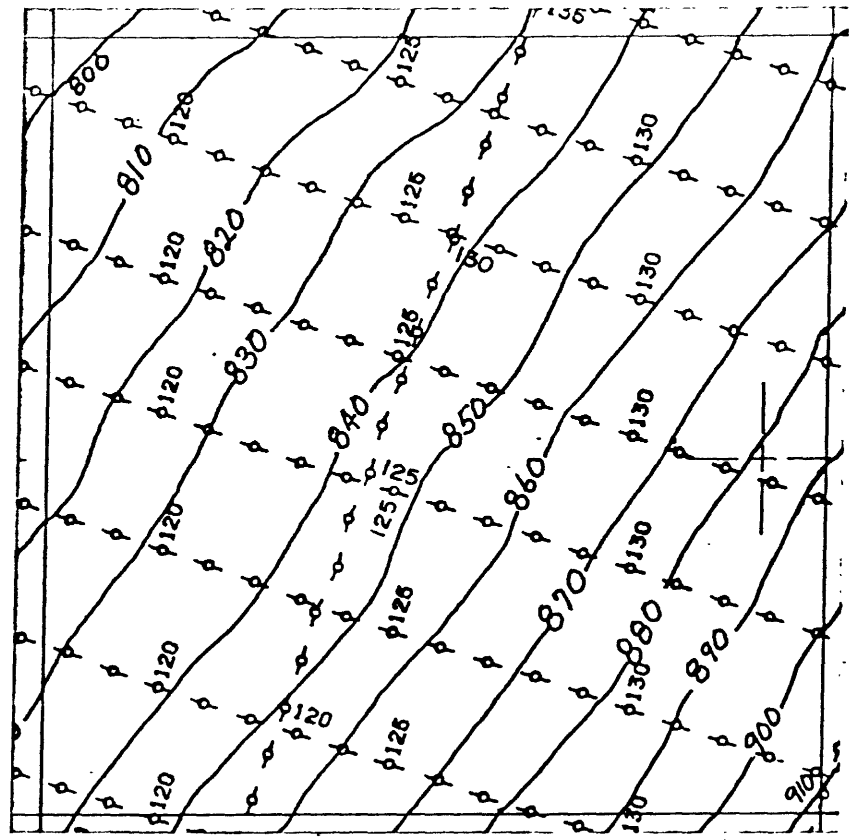
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 838m , min. 750m
Slope Gradient: 12 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

Proposed
Lease Sale 56

Block
NI 18-7-961

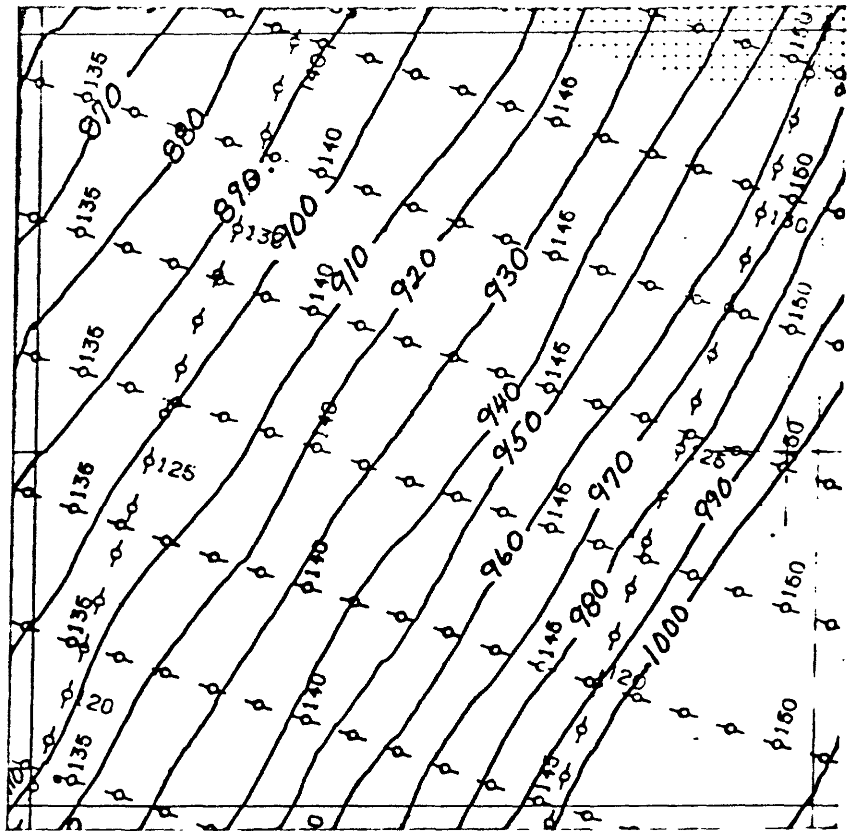


Water Depth: max. 912m , min. 795m
Slope Gradient: 17 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NI 18-7-962



SCALE 1:48000

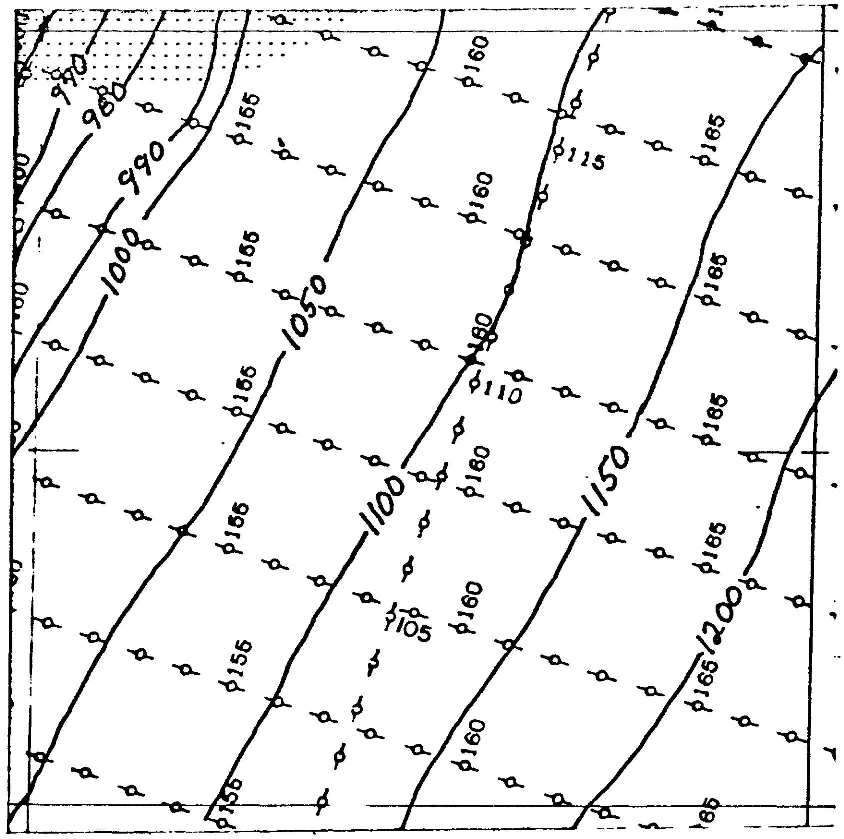
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 1050m , min. 860m
Slope Gradient: 28 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

CONSTRAINT

Gassy Sediments

Proposed
Lease Sale 56



Block
NI 18-7-963

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

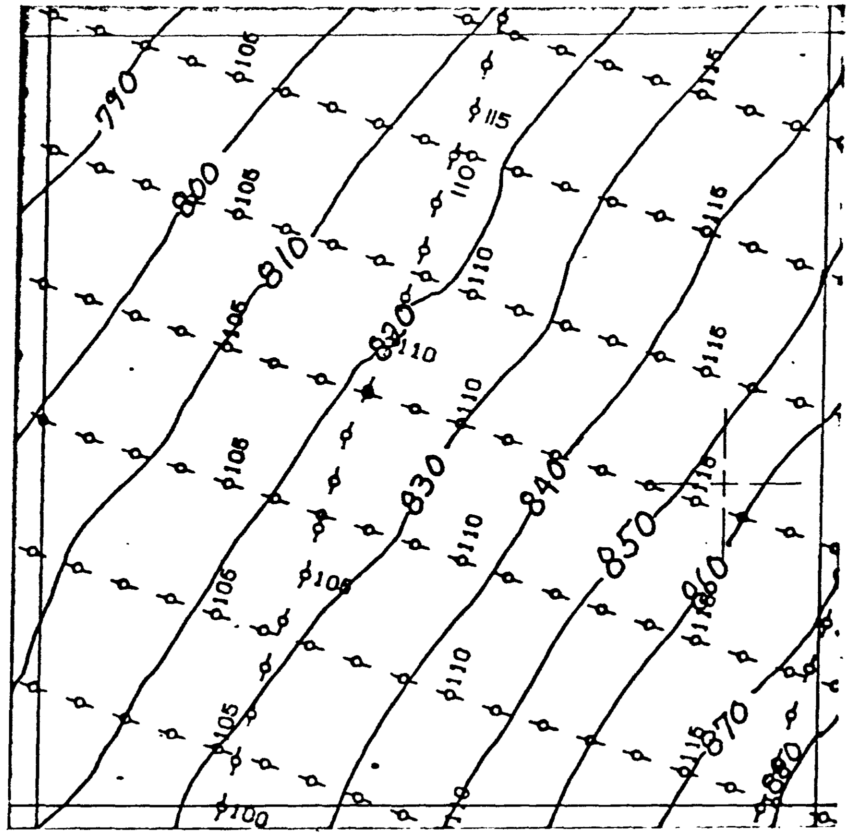
Water Depth: max.1250m , min. 960m
Slope Gradient: 43 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

CONSTRAINT

Gassy Sediments

Proposed
Lease Sale 56

Block
NI 18-7-1004

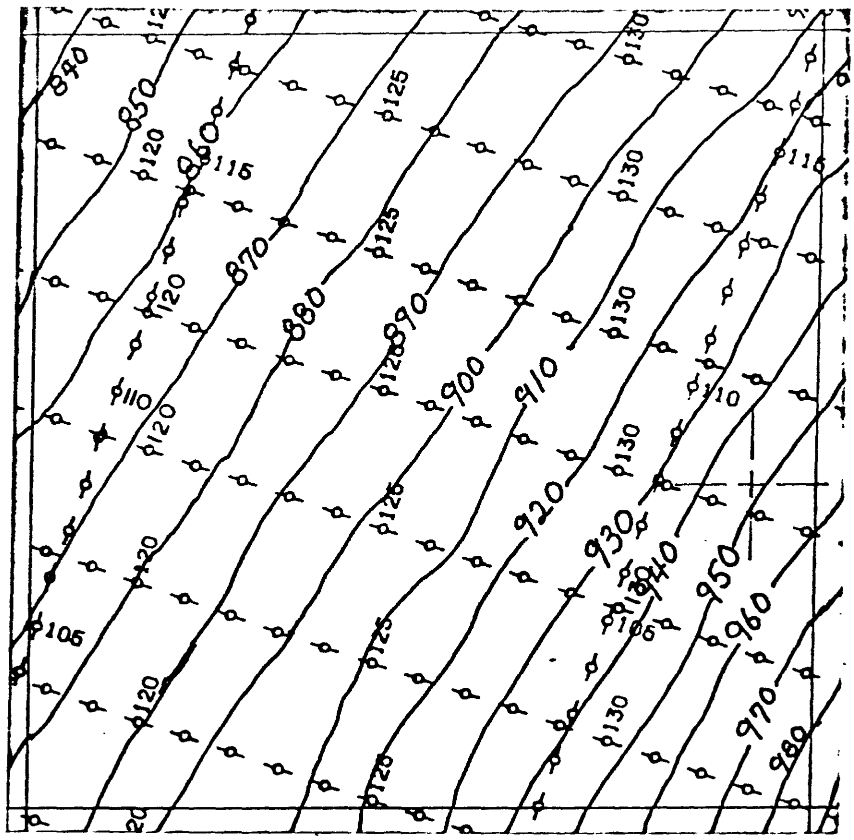


SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 885m , min. 785m
Slope Gradient: 15 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

Proposed
Lease Sale 56



Block
NI 18-7-1005

SCALE 1:48000

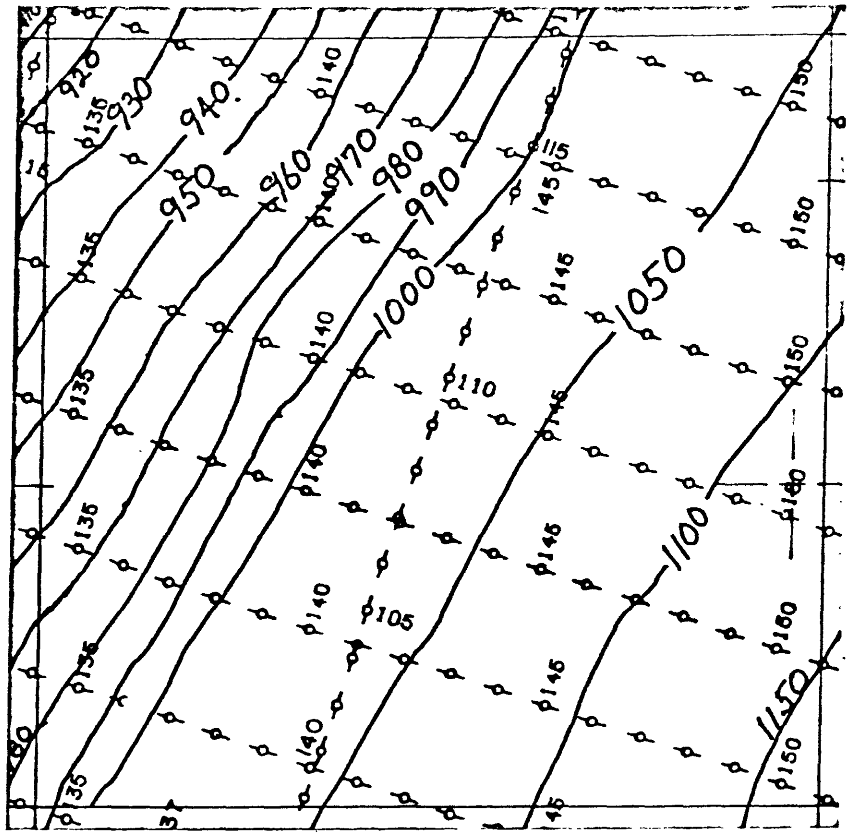
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 985m , min. 838m
Slope Gradient: 15 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

Proposed
Lease Sale 56

Block
NI 18-7-1006



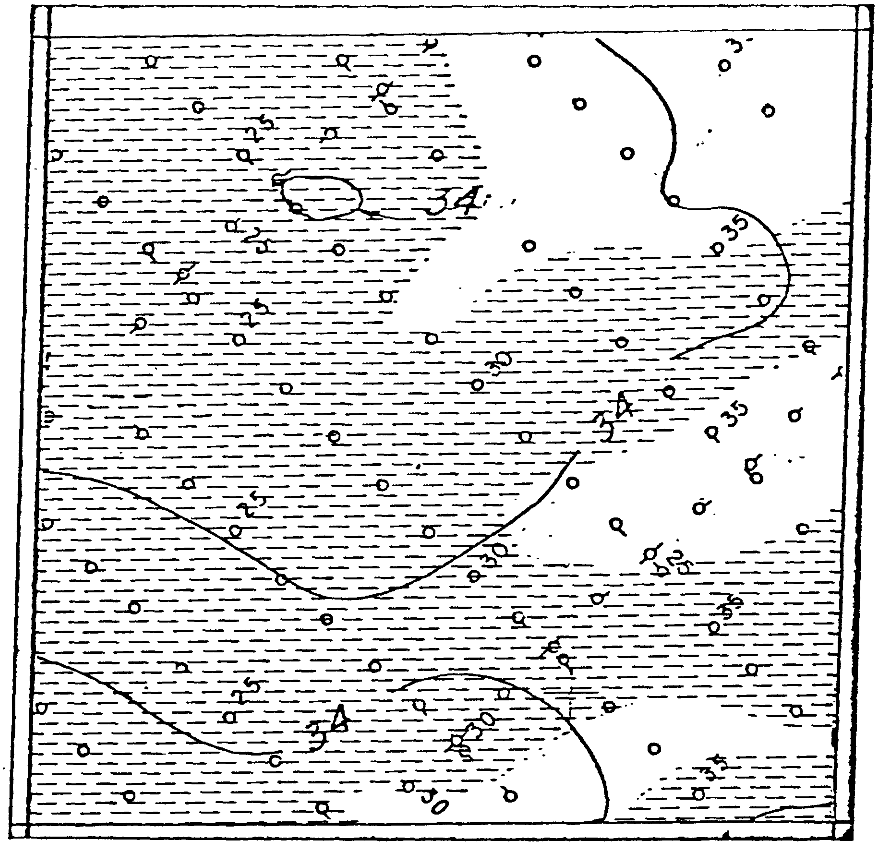
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 1165m, min. 912m
Slope Gradient: 37 m/km, Direction: SE
Surface Sediment Type: Silt/Clay

Proposed
Lease Sale 56

Block
NI 17–12–242 *



Water Depth: max. 34m , min. 34m
Slope Gradient: 0 m/km, Direction:
Surface Sediment Type: Sand

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

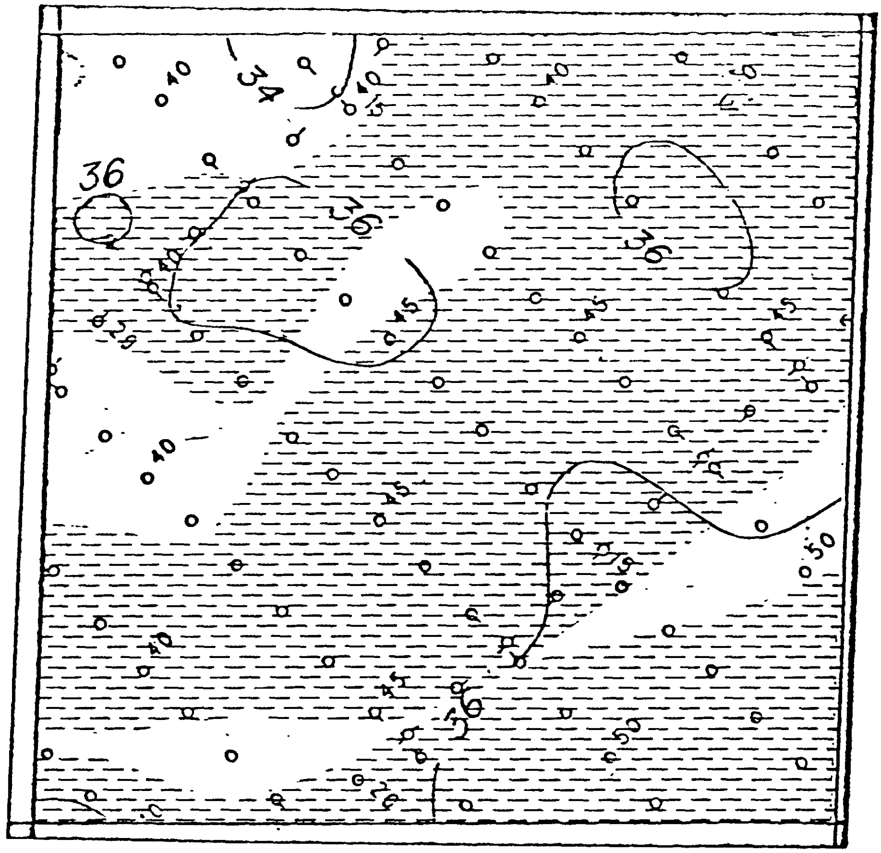
CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NI 17-12-243 *



Water Depth: max. 36m , min. 34m
Slope Gradient: 1m/km, Direction: SE
Surface Sediment Type: Sand

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

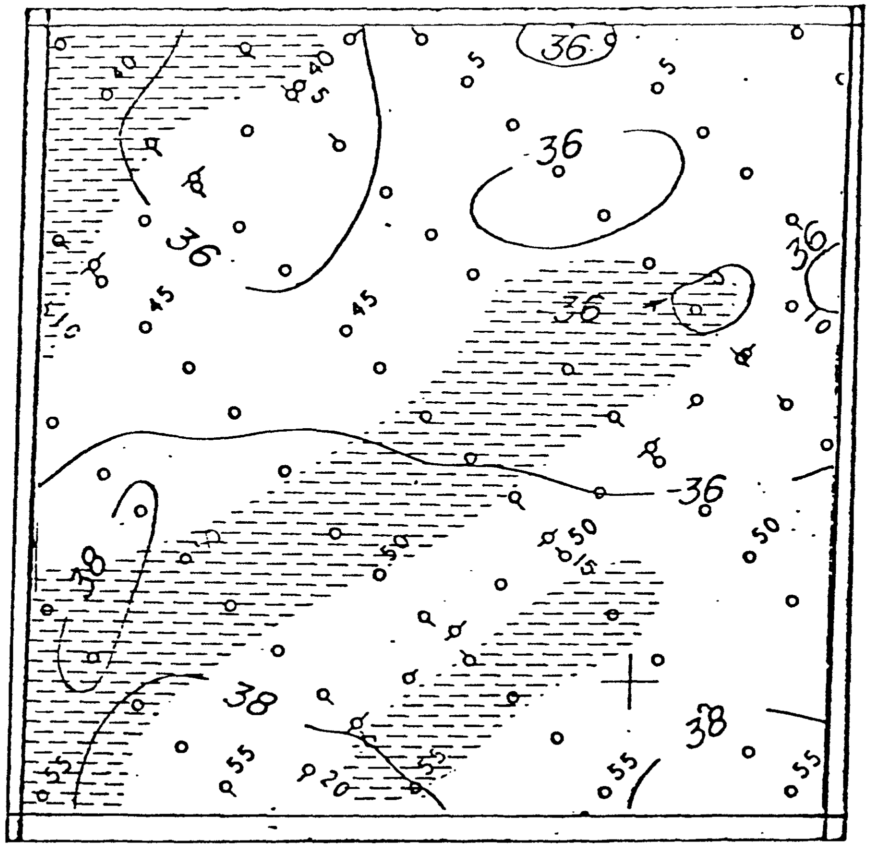
CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NI 17–12–244*



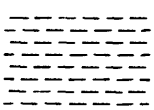
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 38m , min. 36m
Slope Gradient: 1 m/km, Direction: S
Surface Sediment Type: Sand

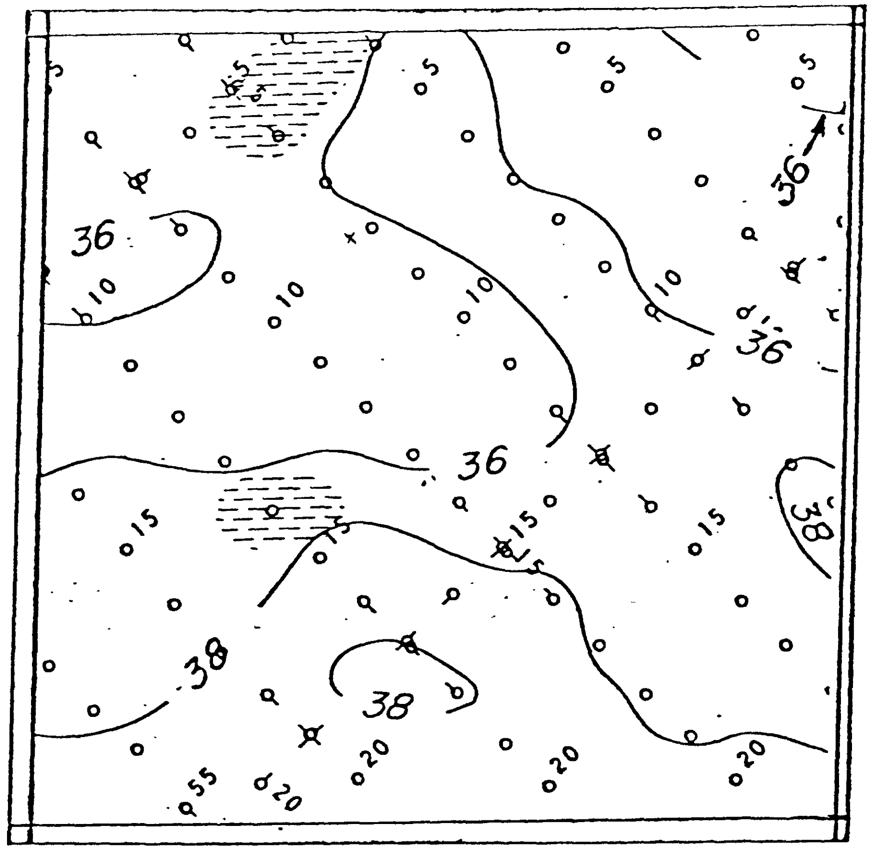
CONSTRAINT


Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NI 17–12–245*

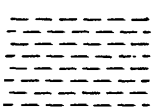


Water Depth: max. 38m , min. 36m
Slope Gradient: 1m/km, Direction: S
Surface Sediment Type: Sand

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

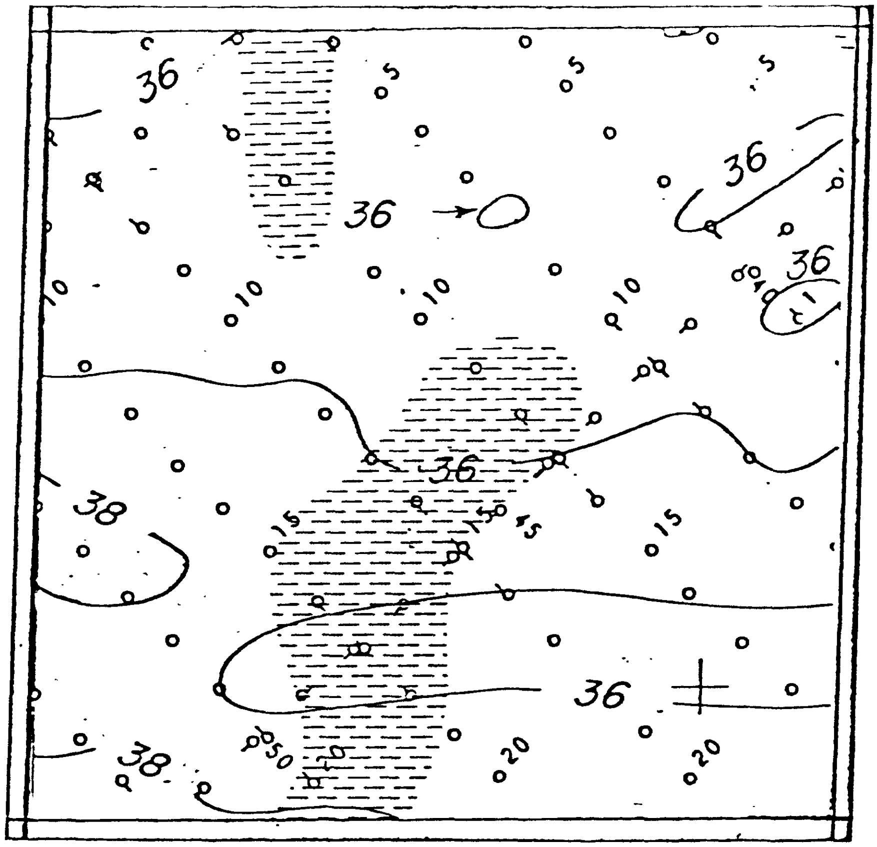
CONSTRAINT

 Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NI 17-12-246*



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 38m , min. 36m
Slope Gradient: 1 m/km, Direction: S
Surface Sediment Type: Sand

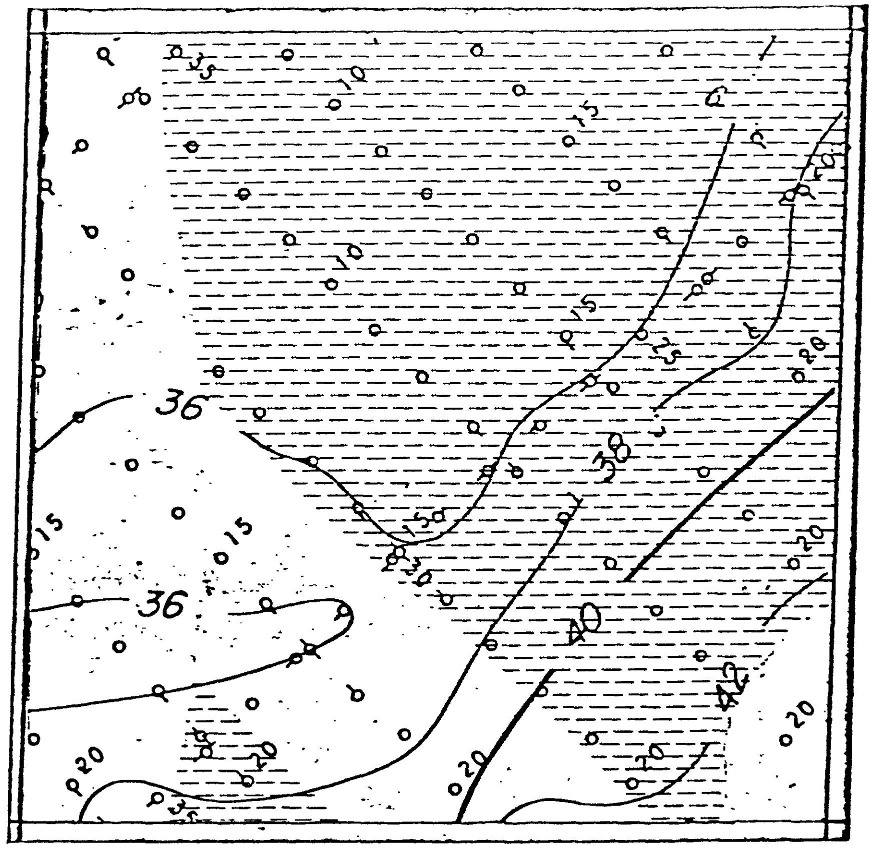
CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NI 17-12-247*



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max 42m, min. 36m
Slope Gradient: 1 m/km, Direction: SE
Surface Sediment Type: Sand

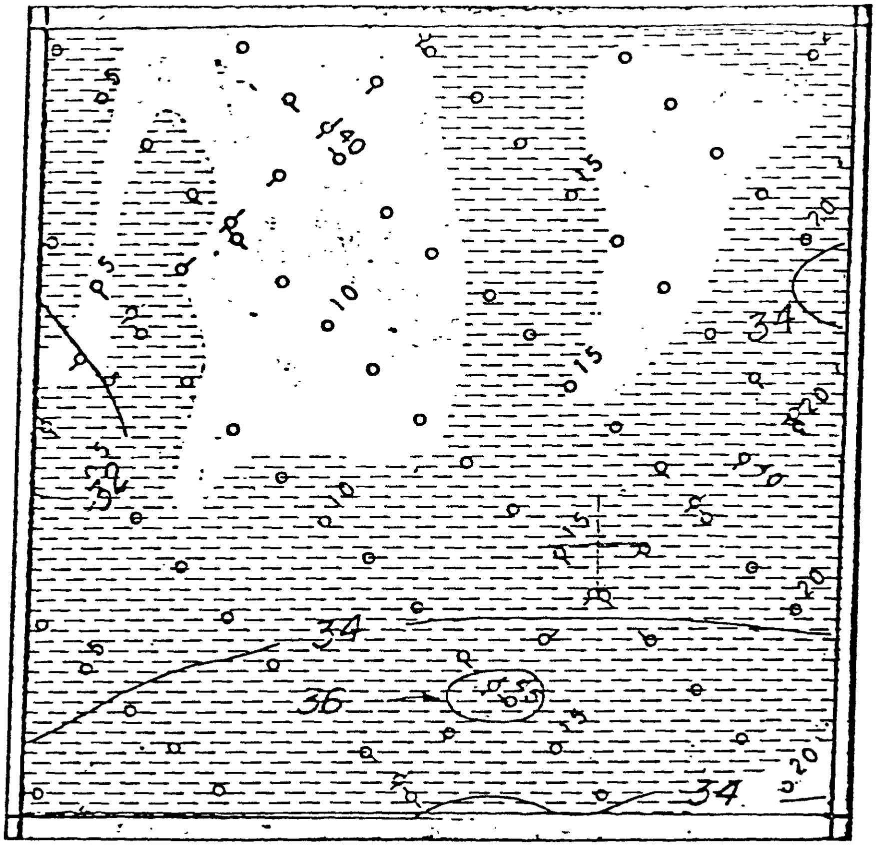
CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NI 17-12-285*



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

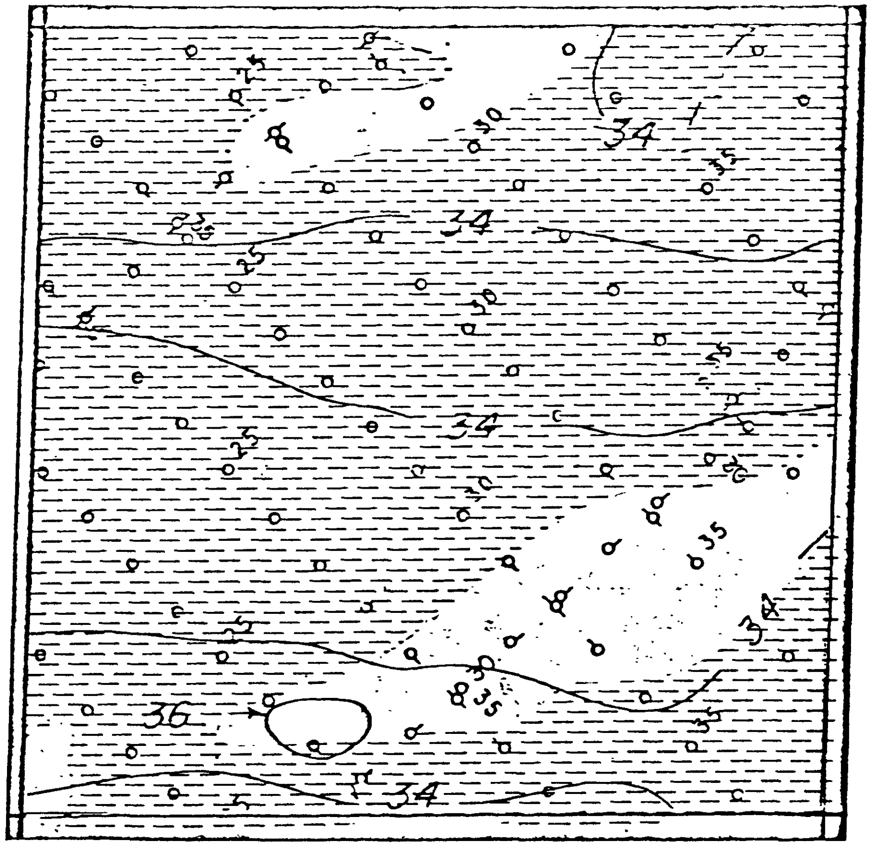
Water Depth: max36m , min32m
Slope Gradient: 1 m/km, Direction: S
Surface Sediment Type: Sand

CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

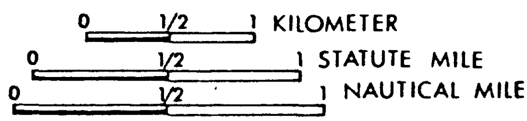
Proposed
Lease Sale 56



Block
NI 17–12–286*

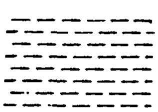
Water Depth: max. 36m , min. 34m
Slope Gradient: 1 m/km, Direction: S
Surface Sediment Type: Sand

SCALE 1:48000



ISOBATHS IN METERS

CONSTRAINT

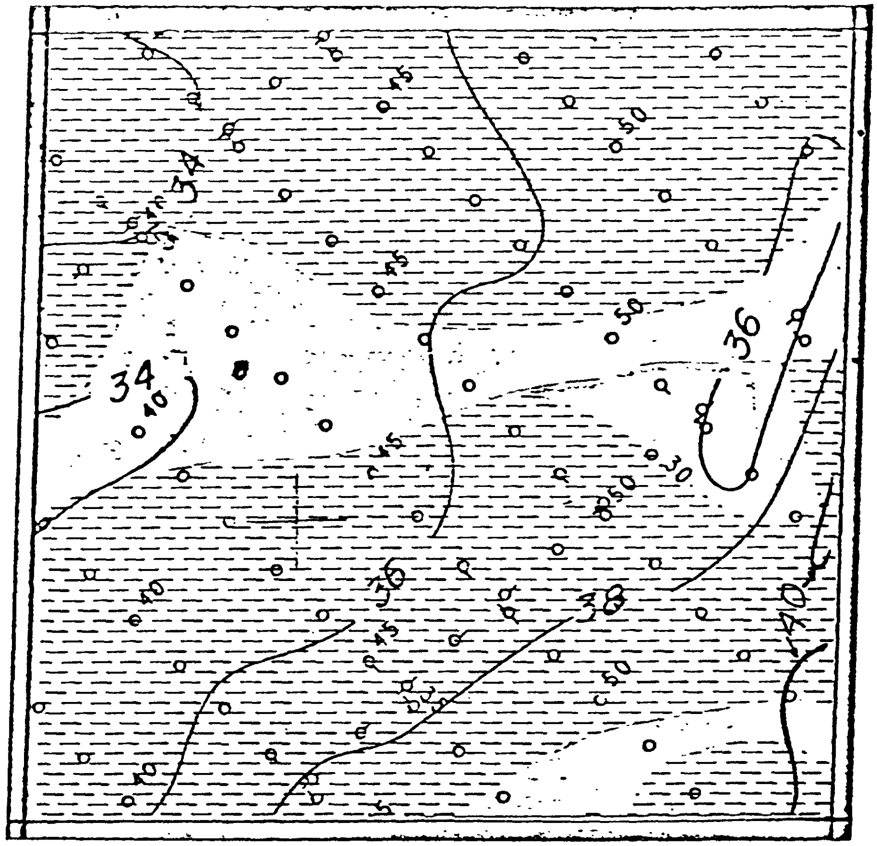


Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NI 17–12–287 *



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

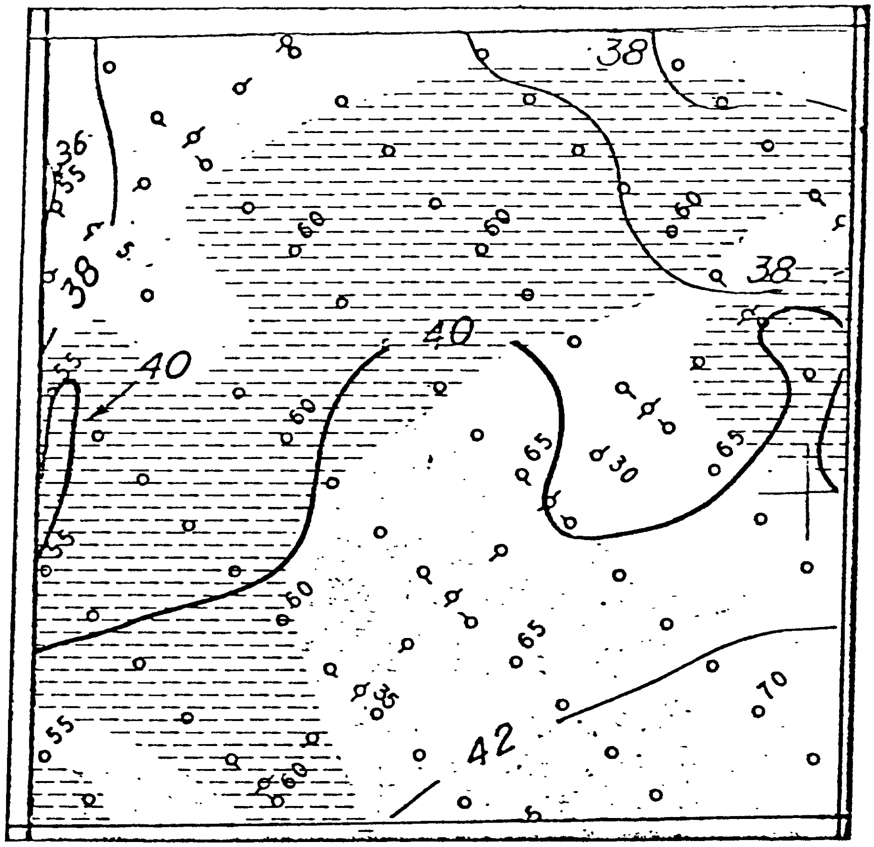
Water Depth: max. 40m , min. 34m
Slope Gradient: 1 m/km, Direction: SE
Surface Sediment Type: Sand

CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56



Block
NI 17-12-288*

Water Depth: max. 42m, min. 36m
Slope Gradient: 2m/km, Direction: SE
Surface Sediment Type: Sand

SCALE 1:48000

0 1/2 1 KILOMETER

0 1/2 1 STATUTE MILE

0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

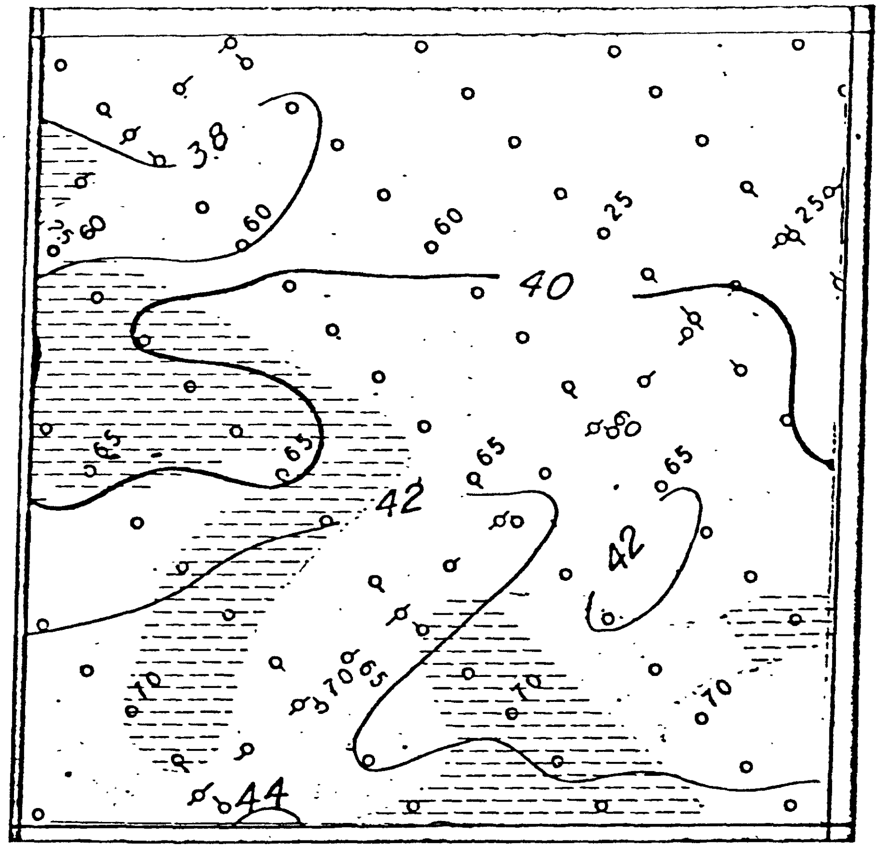
CONSTRAINT

Filled Channel

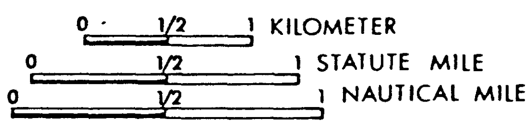
* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NI 17-12-289*



SCALE 1:48000



ISOBATHS IN METERS

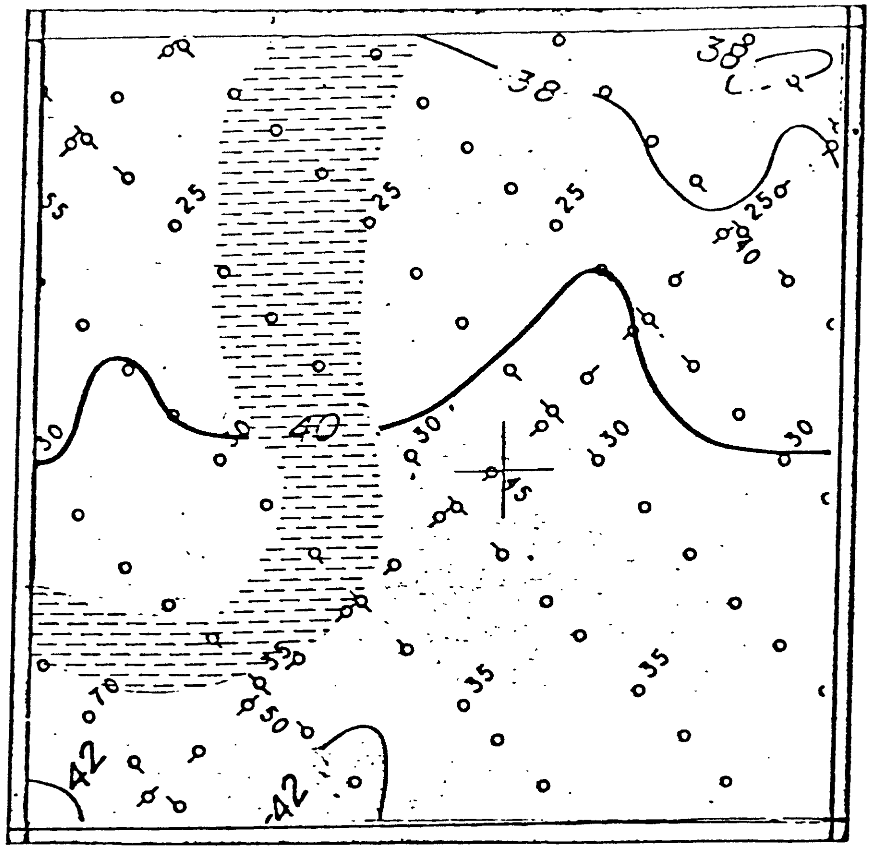
Water Depth: max. 44m, min. 38m
Slope Gradient: 2 m/km, Direction: S
Surface Sediment Type: Sand

CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56



Block
NI 17–12–290 *

SCALE 1:48000

0 1/2 1 KILOMETER

0 1/2 1 STATUTE MILE

0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 42m , min. 38m
Slope Gradient: 1 m/km, Direction: S
Surface Sediment Type: Sand

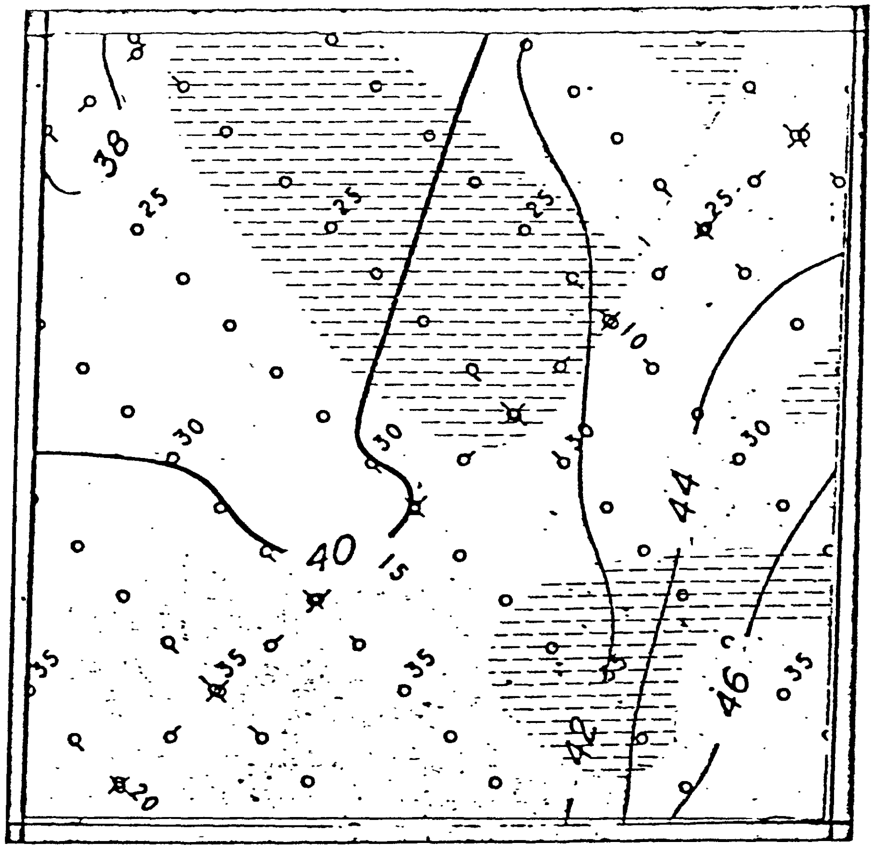
CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NI 17–12–291 *



Water Depth: max. 46m , min. 38m
Slope Gradient: 1 m/km, Direction: SE
Surface Sediment Type: Sand

SCALE 1:48000

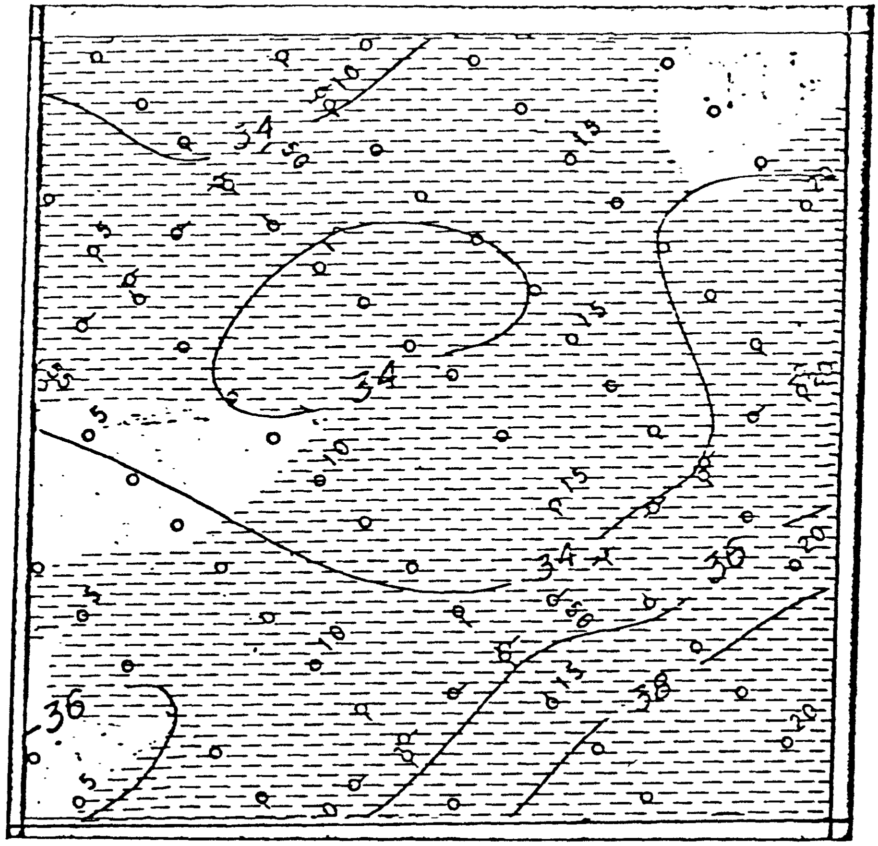
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56



Block
NI 17–12–329*

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

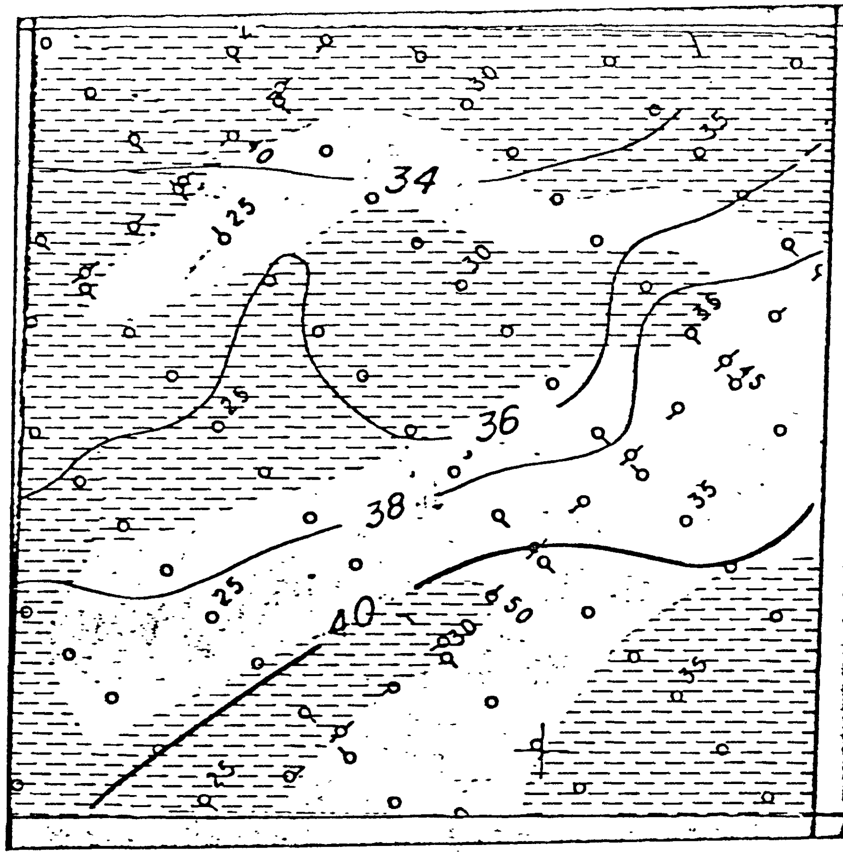
Water Depth: max. 38m , min. 34m
Slope Gradient: 2 m/km, Direction:SE
Surface Sediment Type: Sand

CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56



Block
NI 17–12–330 *

Water Depth: max. 40m , min. 34m
Slope Gradient: 2 m/km, Direction: SE
Surface Sediment Type: Sand

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

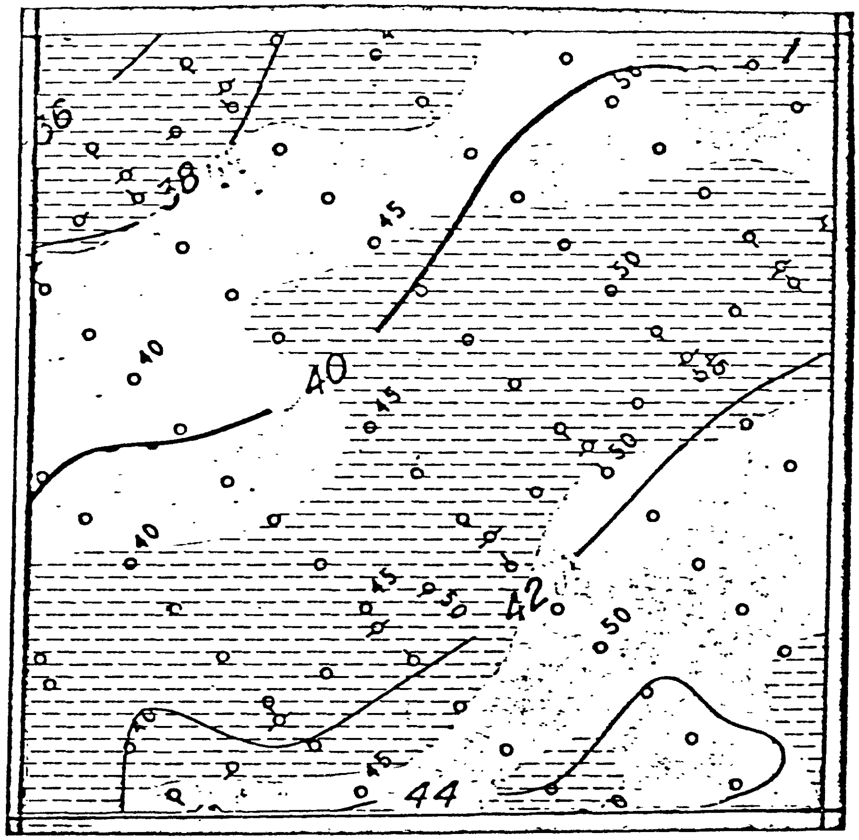
CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NI 17–12–331 *



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 44m , min. 36m
Slope Gradient: 2 m/km, Direction: SE
Surface Sediment Type: Sand

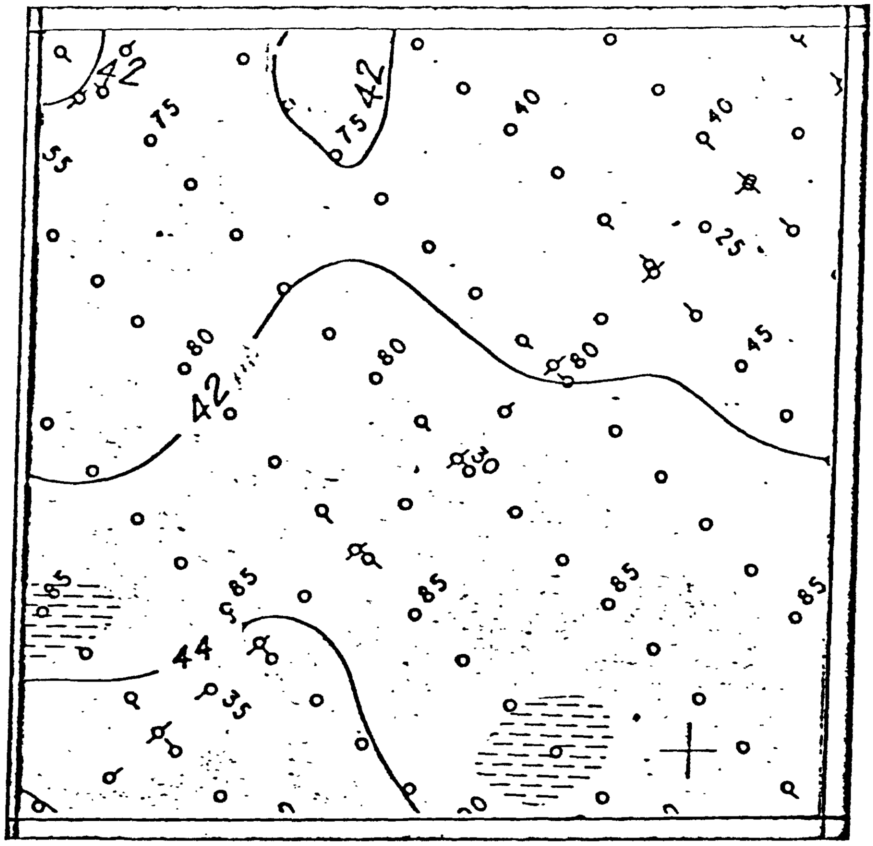
CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NI 17-12-334*



Water Depth: max. 44m , min. 42m
Slope Gradient: 1 m/km, Direction: S
Surface Sediment Type: Sand

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

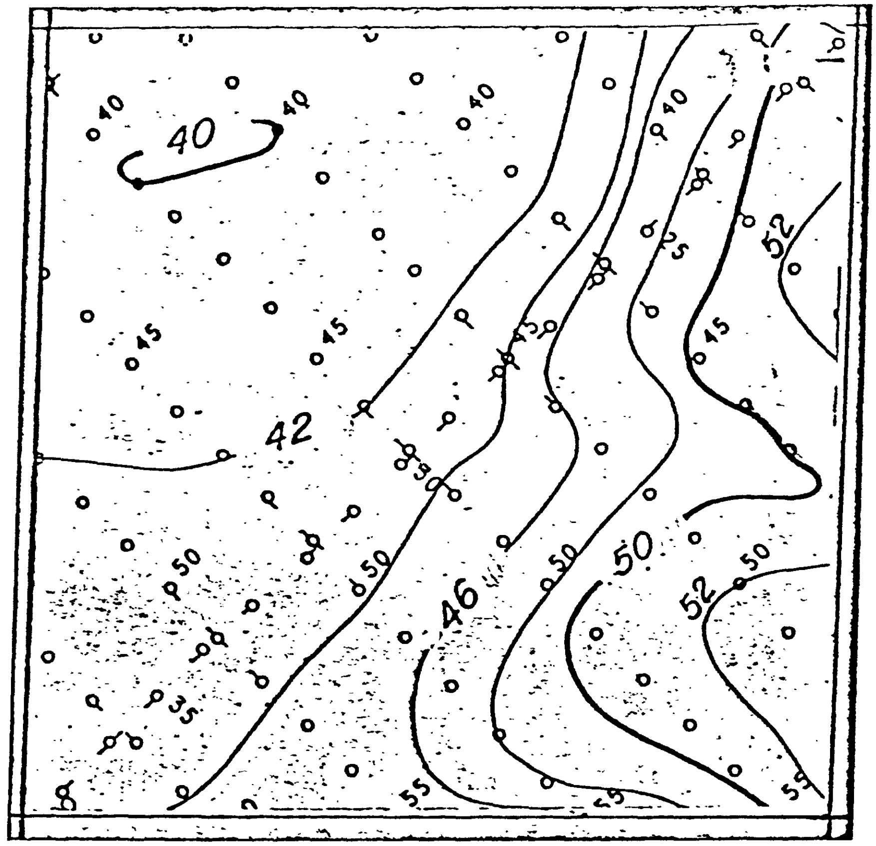
CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NI 17–12–335 *



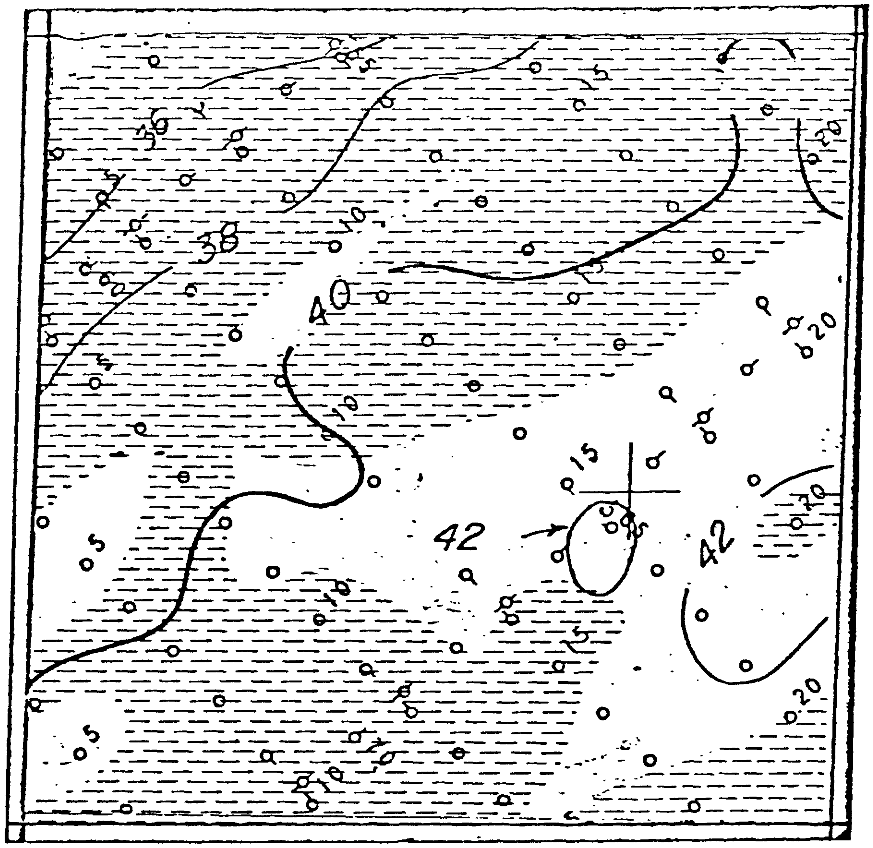
Water Depth: max. 52m , min. 40m
Slope Gradient: 2 m/km, Direction: SE
Surface Sediment Type: Sand

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NI 17-12-373 *



Water Depth: max. 42m , min. 36m
Slope Gradient: 2 m/km, Direction: SE
Surface Sediment Type: Sand

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

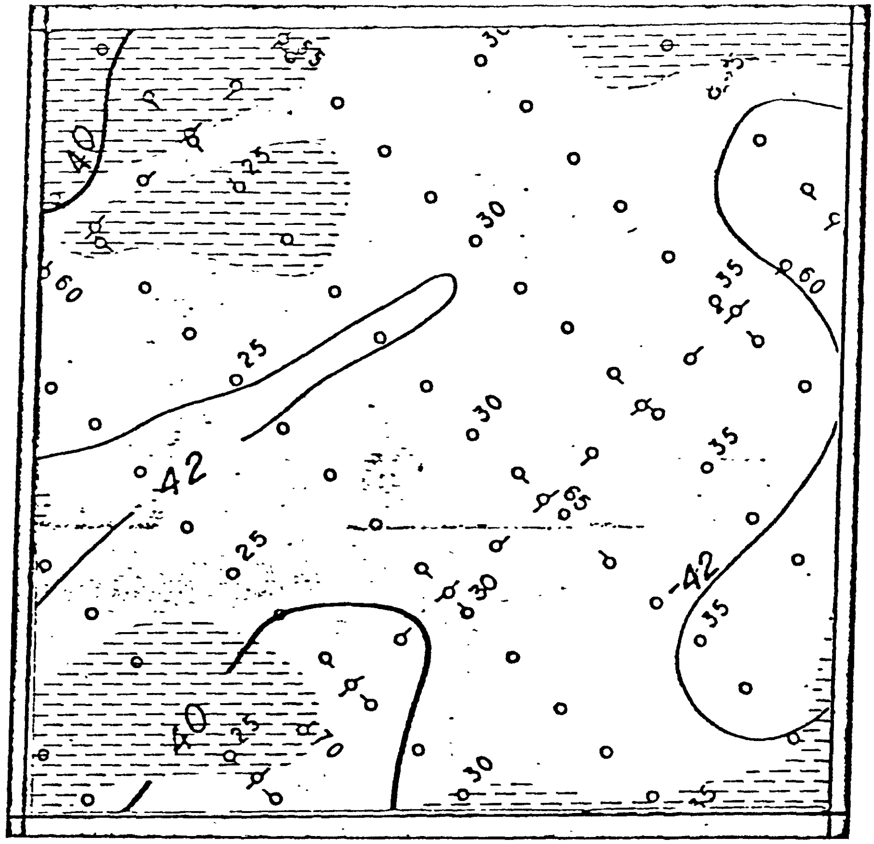
CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NI 17-12-374*



Water Depth: max. 42m , min. 40m
Slope Gradient: 1 m/km, Direction: E
Surface Sediment Type: Sand

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

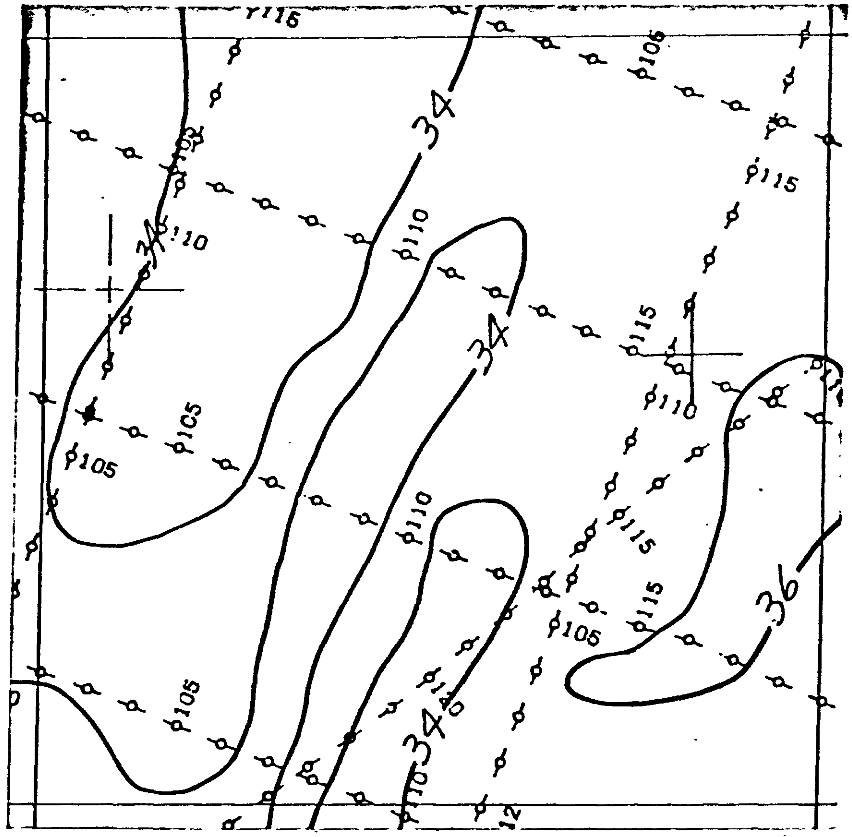
CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

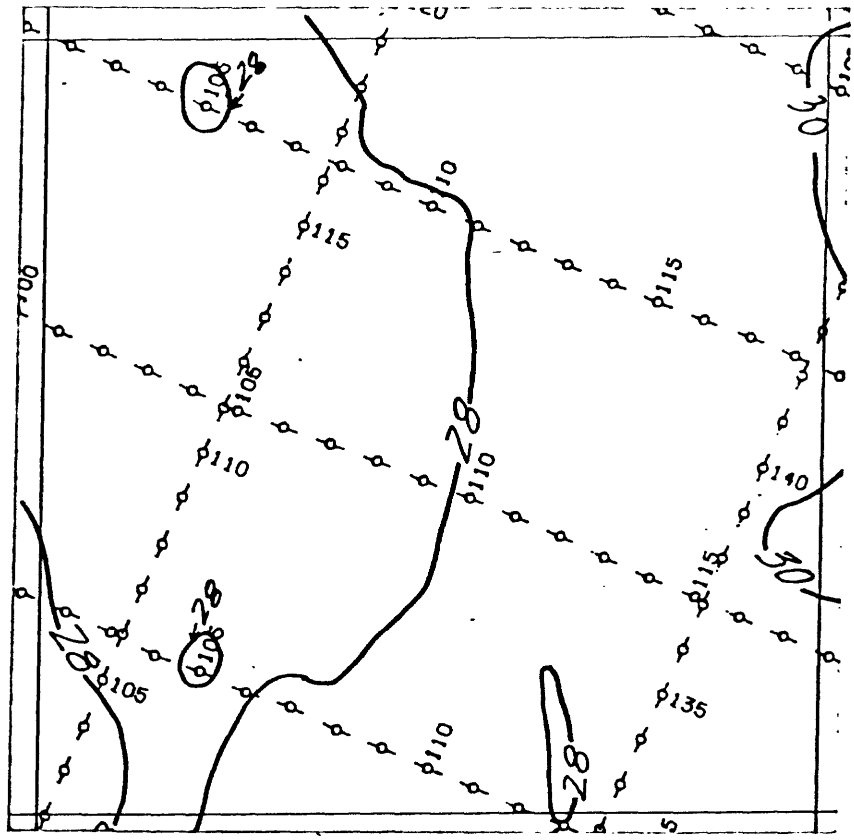
Block
NI 17-12-800



SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 37m , min. 33m
Slope Gradient: <1 m/km, Direction: SE
Surface Sediment Type: Sand

Proposed
Lease Sale 56



Block
NI 17-12-841

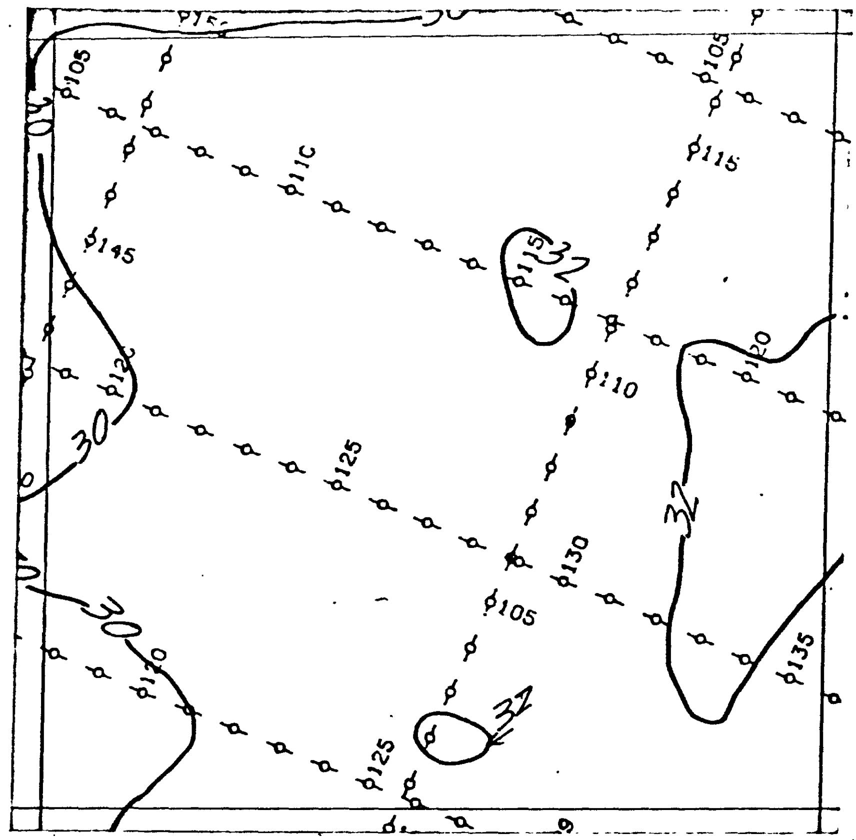
Water Depth: max. 31m , min. 27m
Slope Gradient: <1 m/km, Direction: SE
Surface Sediment Type: Sand

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NI 17-12-842

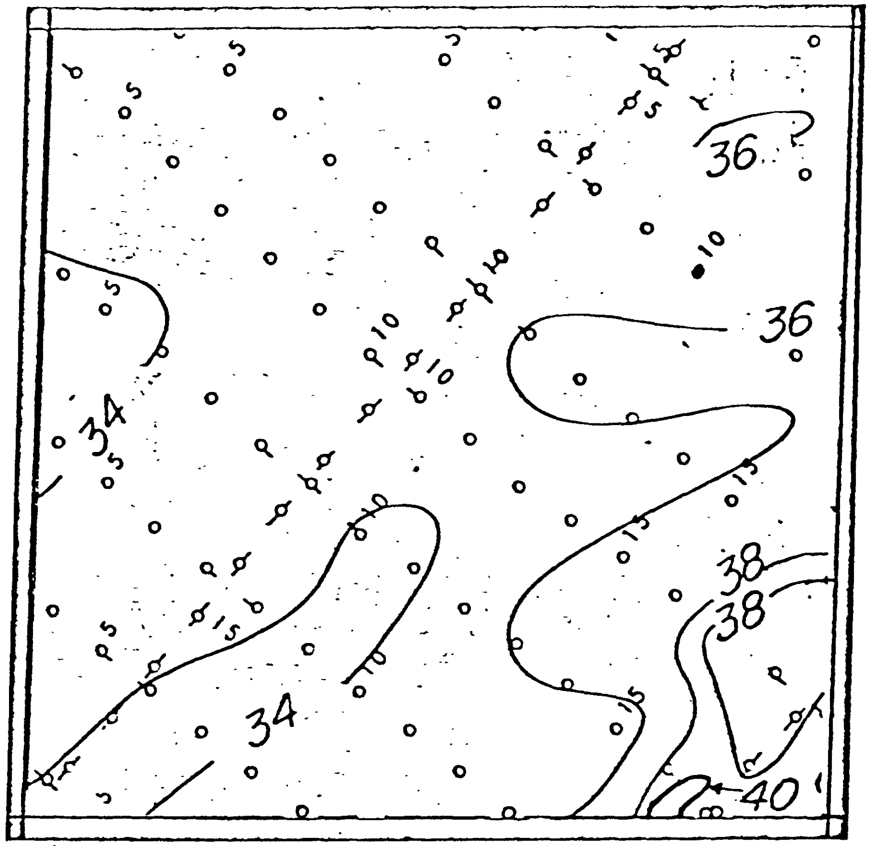


Water Depth: max. 32m , min. 29m
Slope Gradient: < 1 m/km, Direction: E
Surface Sediment Type: Sand

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NI 17–12–843 *



SCALE 1:48000

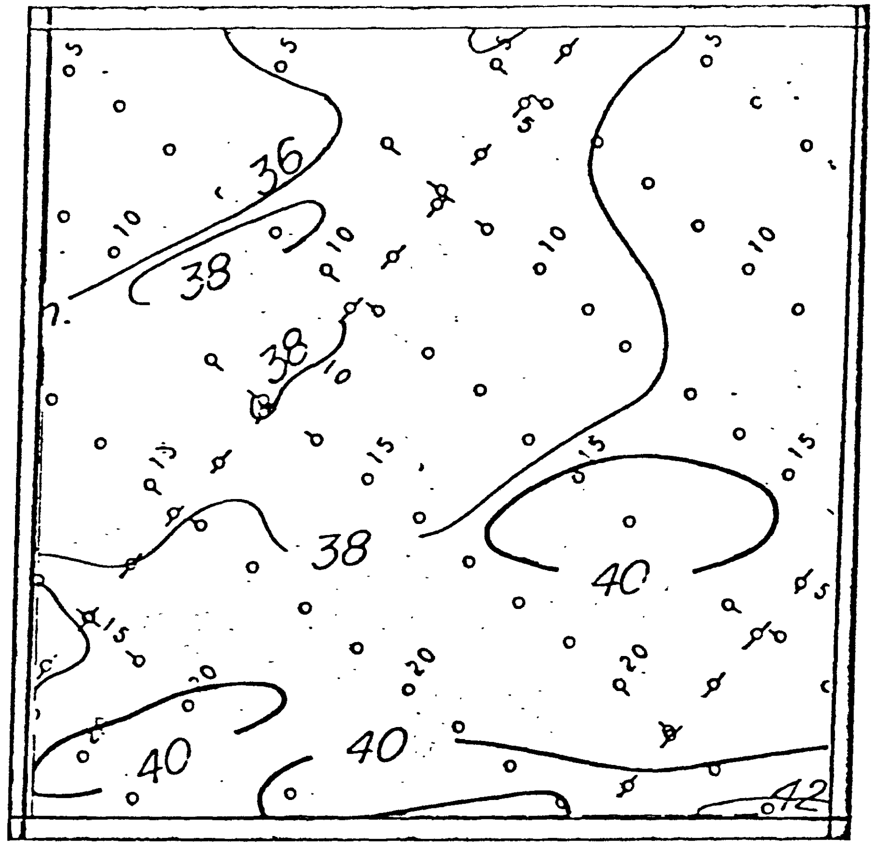
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 40m , min. 34m
Slope Gradient: 1 m/km, Direction: SE
Surface Sediment Type: Sand

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NI 17-12-844*



SCALE 1:48000

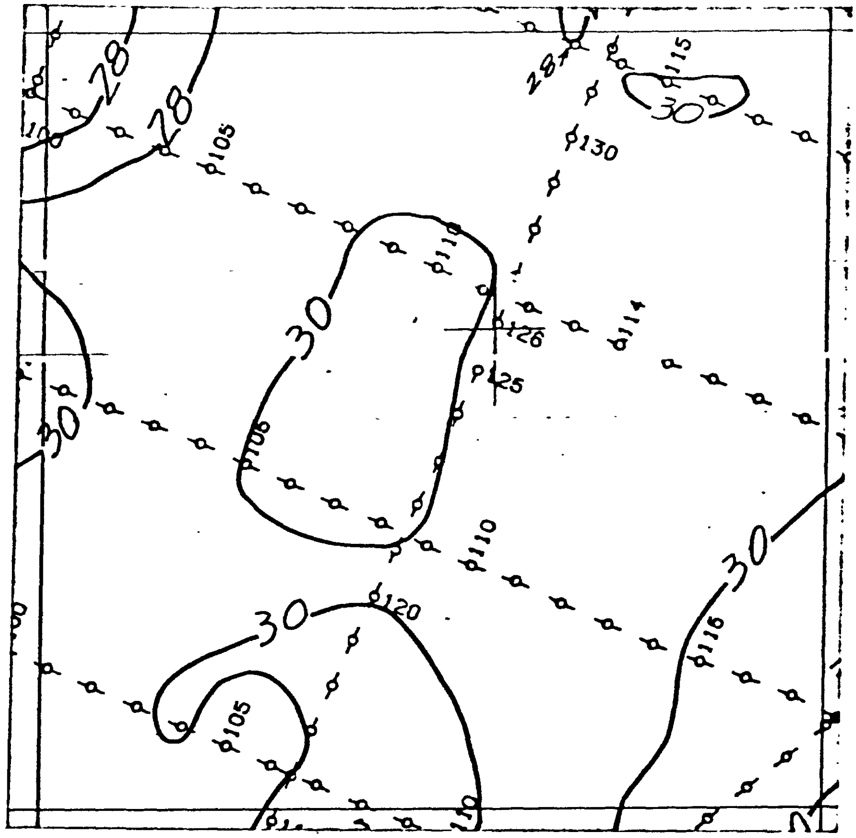
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 42m , min. 36m
Slope Gradient: 1 m/km, Direction: SE
Surface Sediment Type: Sand

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NI 17-12-885

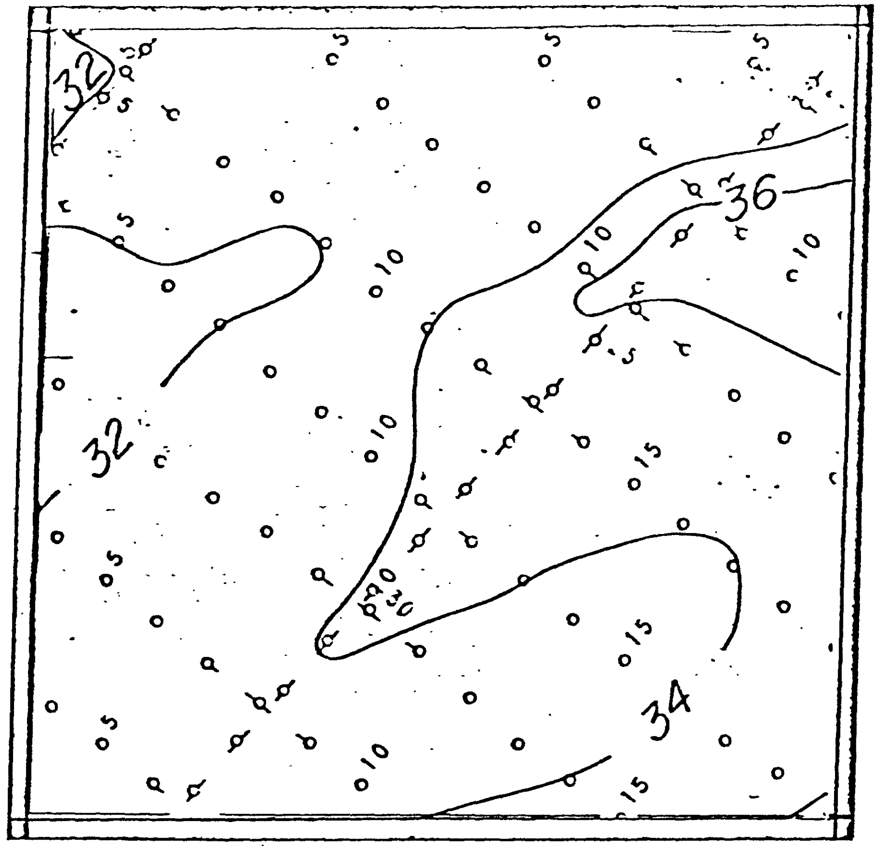


SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 30m , min.28m
Slope Gradient: ∠1 m/km, Direction:E
Surface Sediment Type: Sand

Proposed
Lease Sale 56



Block
NI 17–12–886*

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

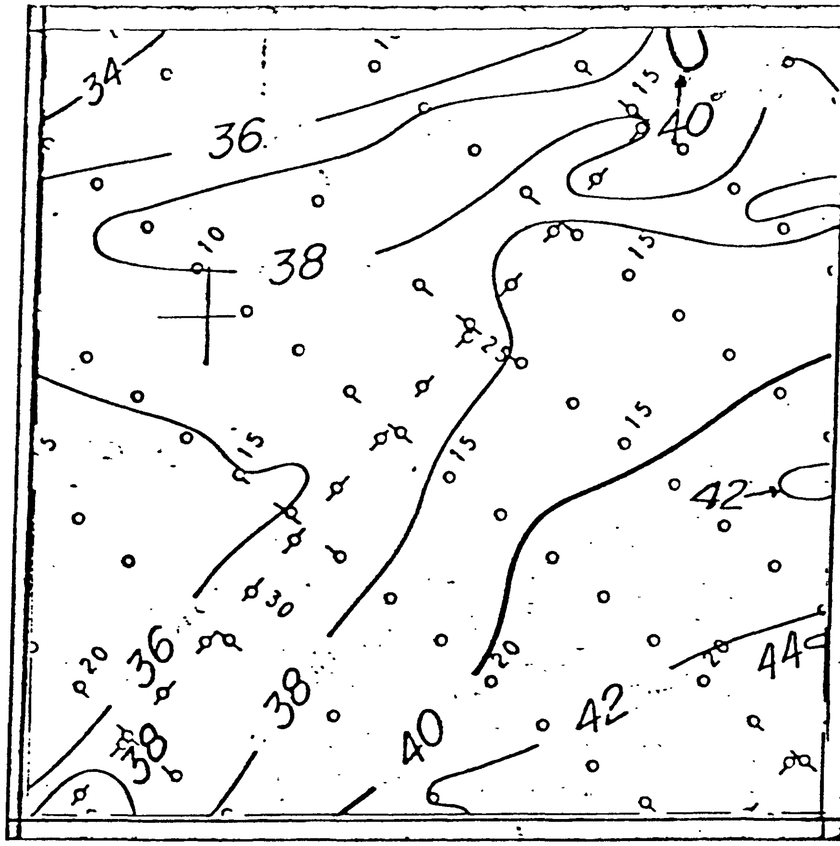
ISOBATHS IN METERS

Water Depth: max. 36m , min.32m
Slope Gradient: 1 m/km, Direction: SE
Surface Sediment Type: Sand

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NI 17-12-887*



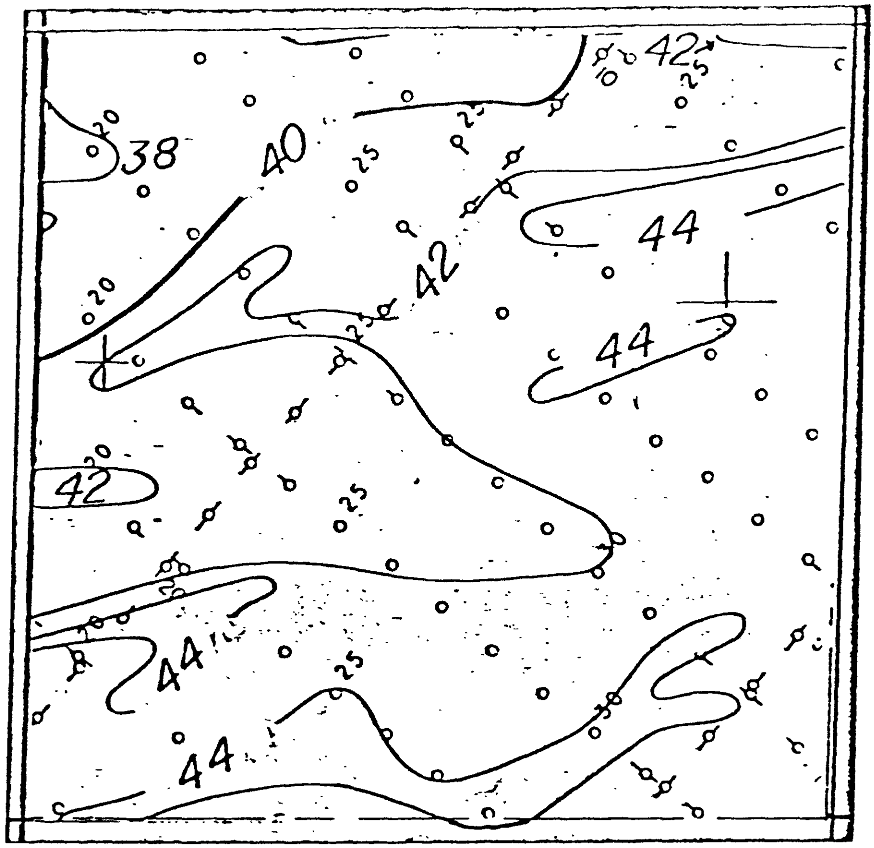
SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max.44m , min. 34m
Slope Gradient: 2 m/km, Direction: SE
Surface Sediment Type: Sand

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NI 17–12–888 *



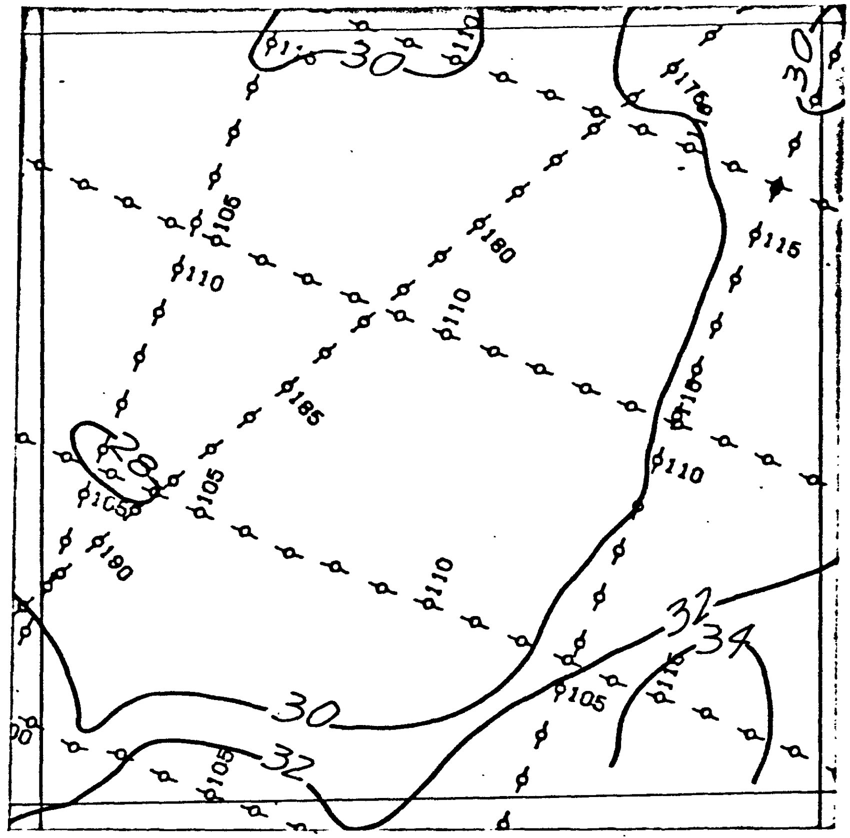
Water Depth: max. 44m , min. 38m
Slope Gradient: 2 m/km, Direction: SE
Surface Sediment Type: Sand

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NI 17-12-929



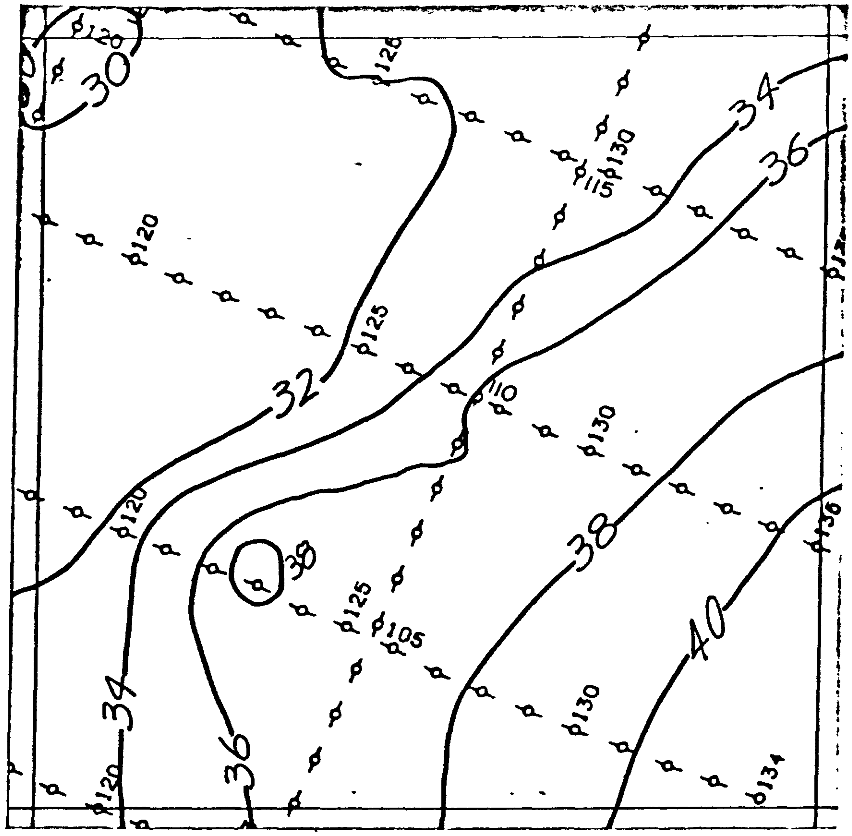
Water Depth: max. 34m , min.28m
Slope Gradient: 1 m/km, Direction:SE
Surface Sediment Type:Sand

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NI 17-12-930



SCALE 1:48000

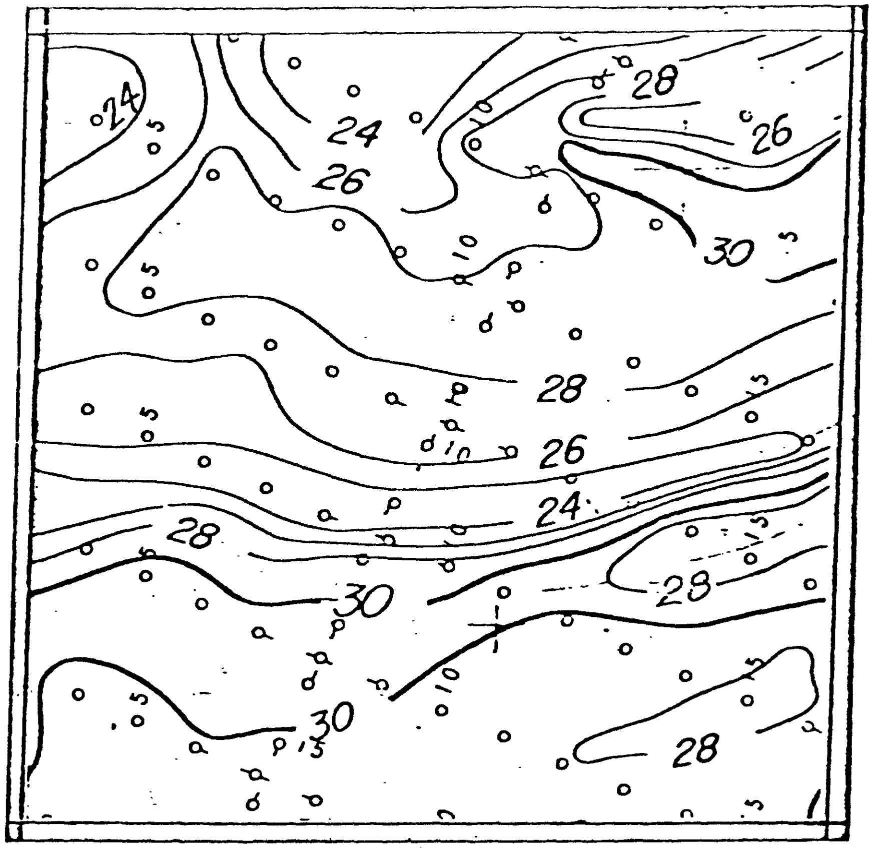
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

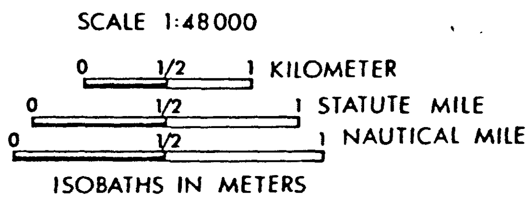
Water Depth: max. 40m , min. 30m
Slope Gradient: 2 m/km, Direction: SE
Surface Sediment Type: Sand

Proposed
Lease Sale 56

Block
NH-17-2-256 *

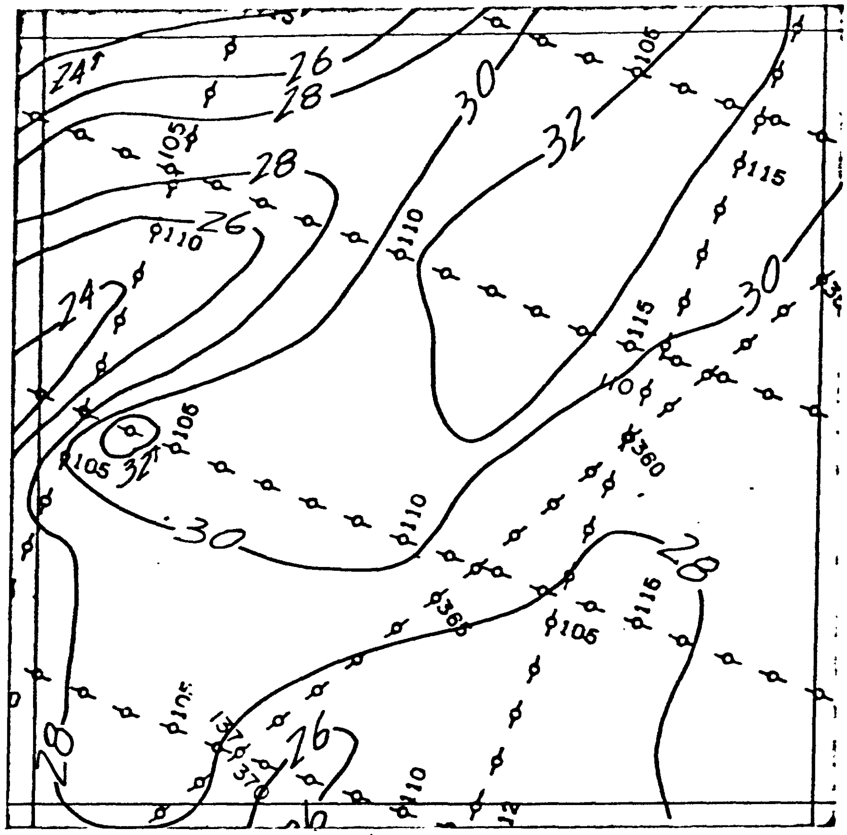


Water Depth: max. 30m , min. 24m
Slope Gradient: 6 m/km, Direction: S
Surface Sediment Type: Sand



* Also included in Lease Sale 43

Proposed
Lease Sale 56



Block
NH 17-2-257

Water Depth: max. 33m , min. 24m
Slope Gradient: 2 m/km, Direction: Variable
Surface Sediment Type: Sand

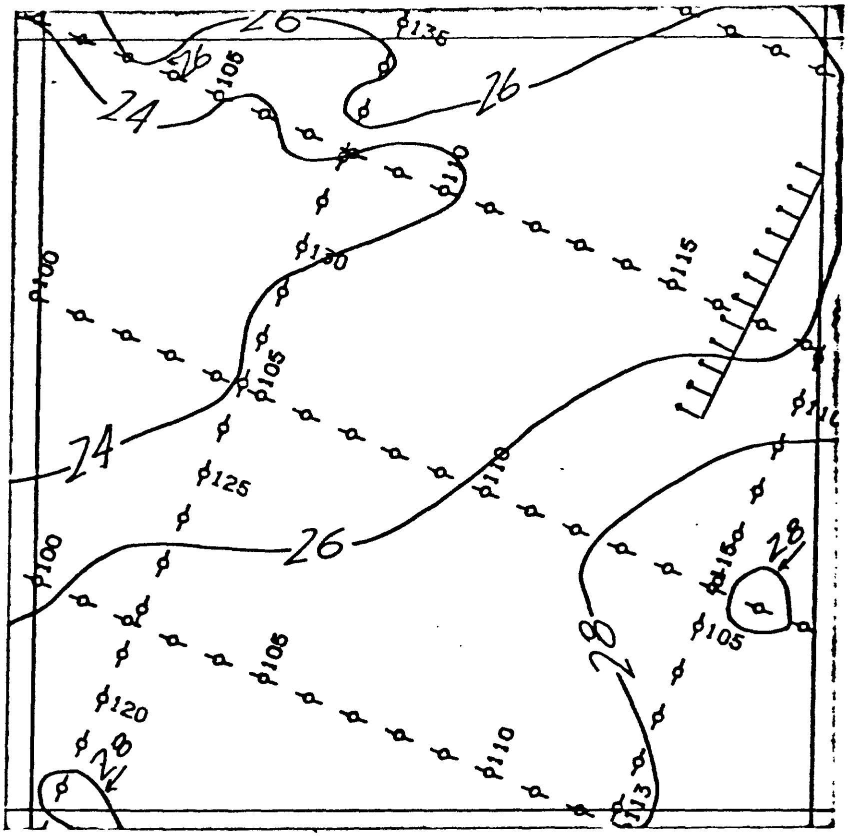
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NH 17-2-298



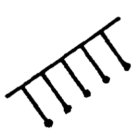
Water Depth: max. 28m , min. 23m
Slope Gradient: 1 m/km, Direction: E
Surface Sediment Type: Sand

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

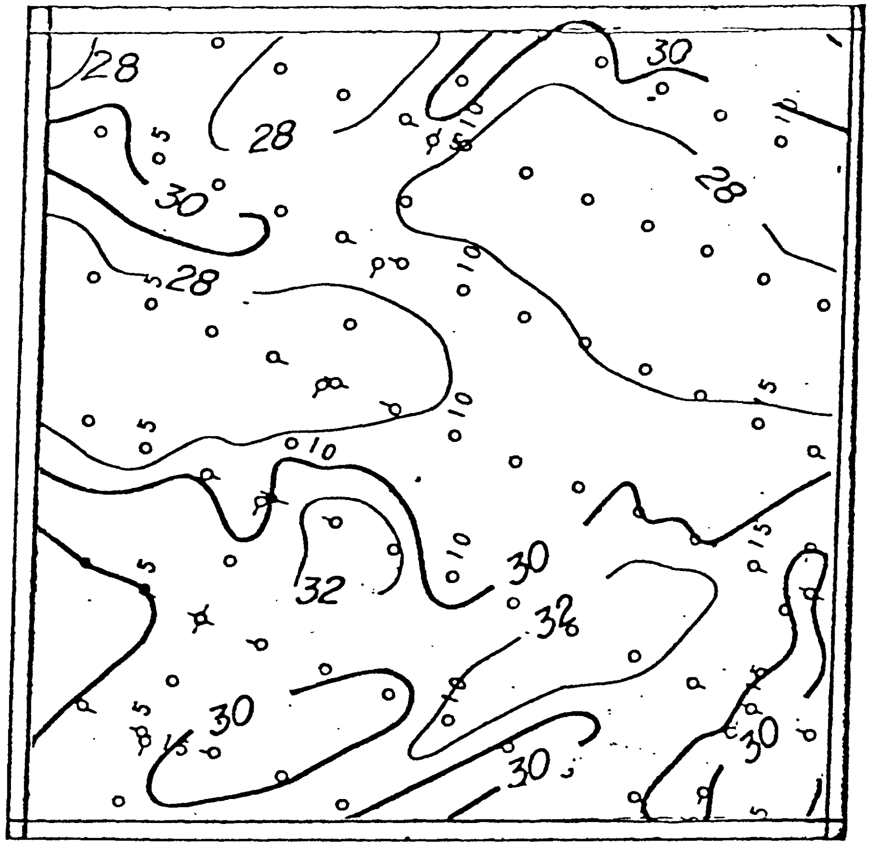
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NH 17–2–299 *



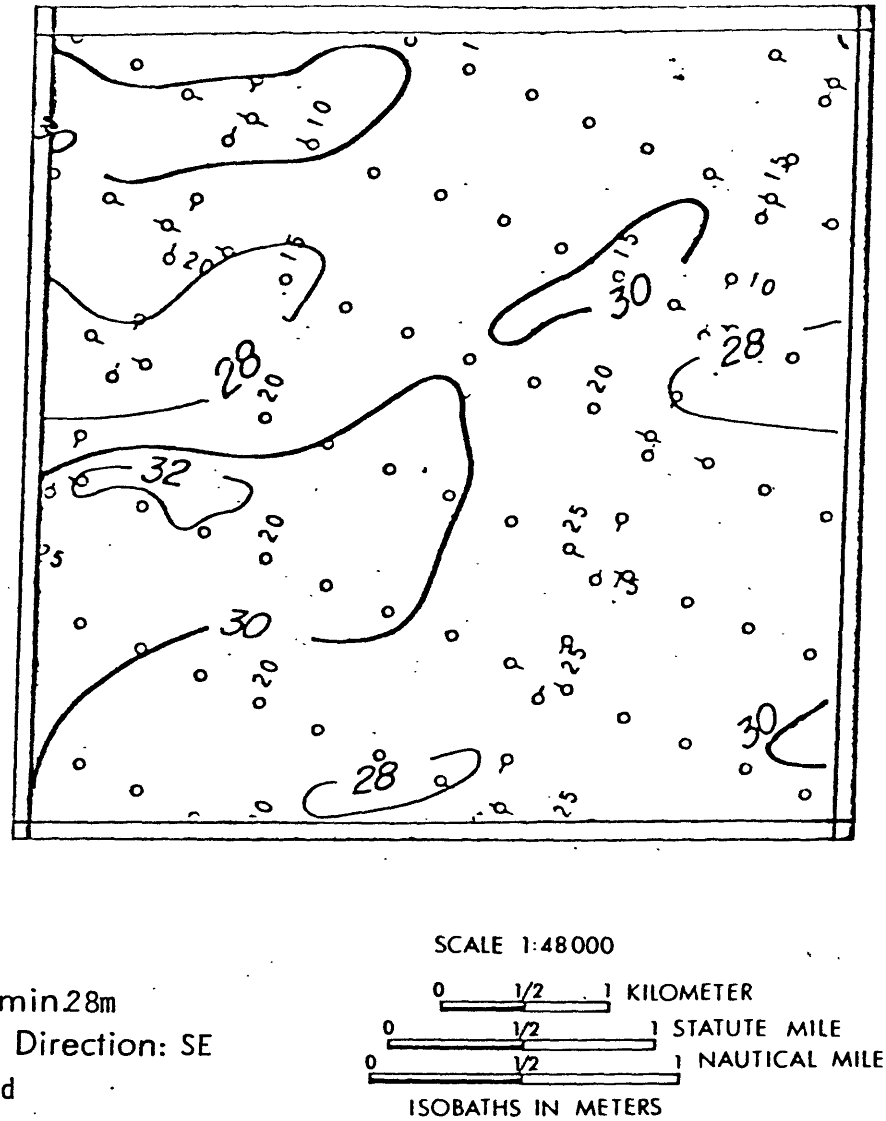
SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 32m , min. 27m
Slope Gradient: 4 m/km, Direction: SE
Surface Sediment Type: Sand

*Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-2-300 *

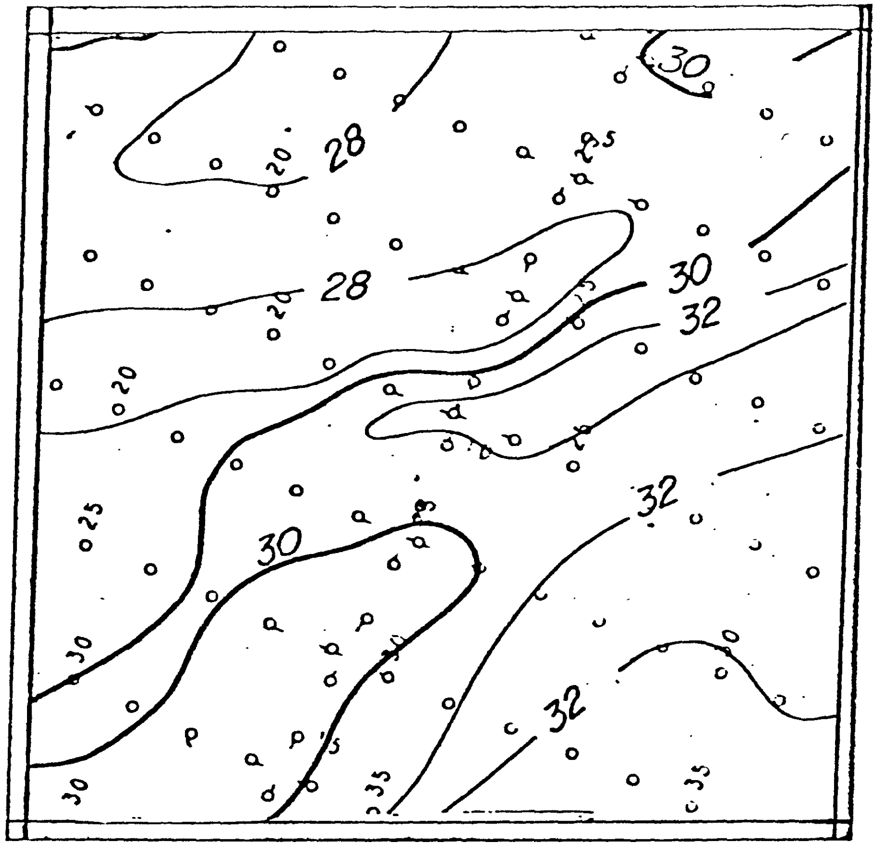


Water Depth: max. 32m , min 28m
Slope Gradient: 2 m/km, Direction: SE
Surface Sediment Type: Sand

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17–2–301 *



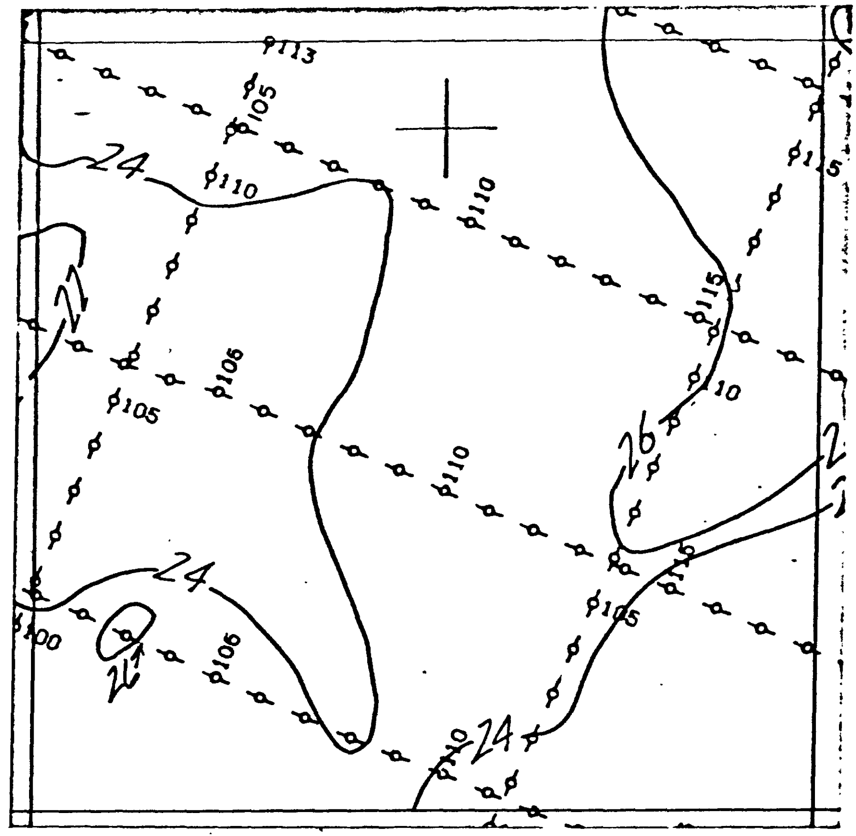
Water Depth: max. 32m , min. 28m
Slope Gradient: 2 m/km, Direction SE
Surface Sediment Type: Sand

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-2-341



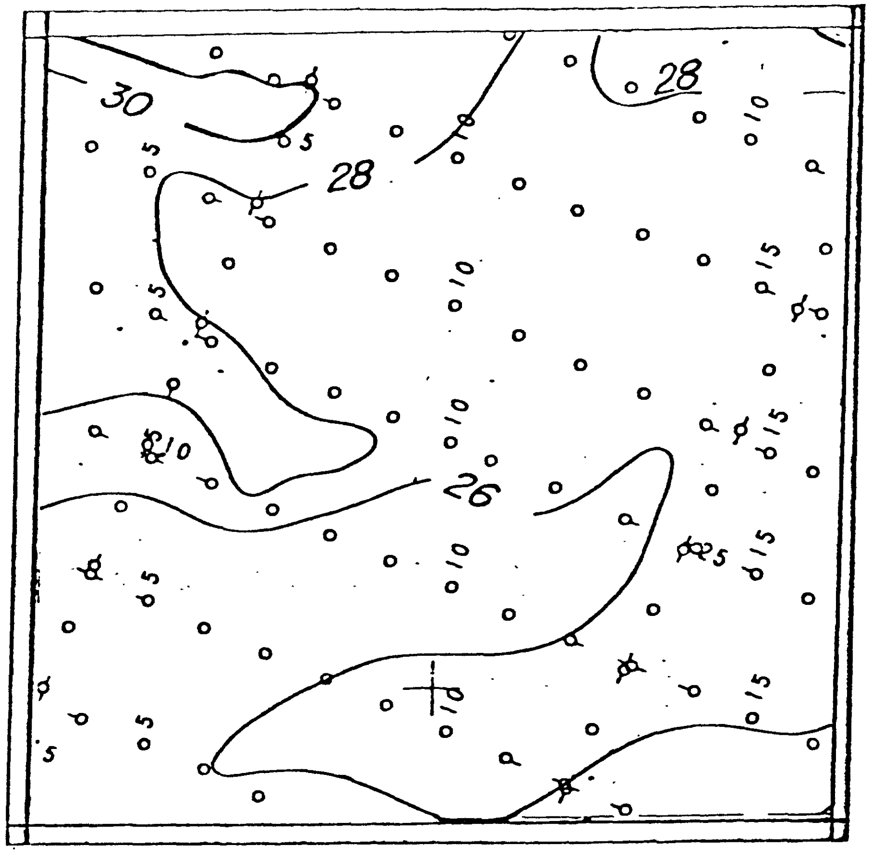
Water Depth: max. 27m , min 22m
Slope Gradient: 1 m/km, Direction: NE
Surface Sediment Type: Sand

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NH 17-2-342 *



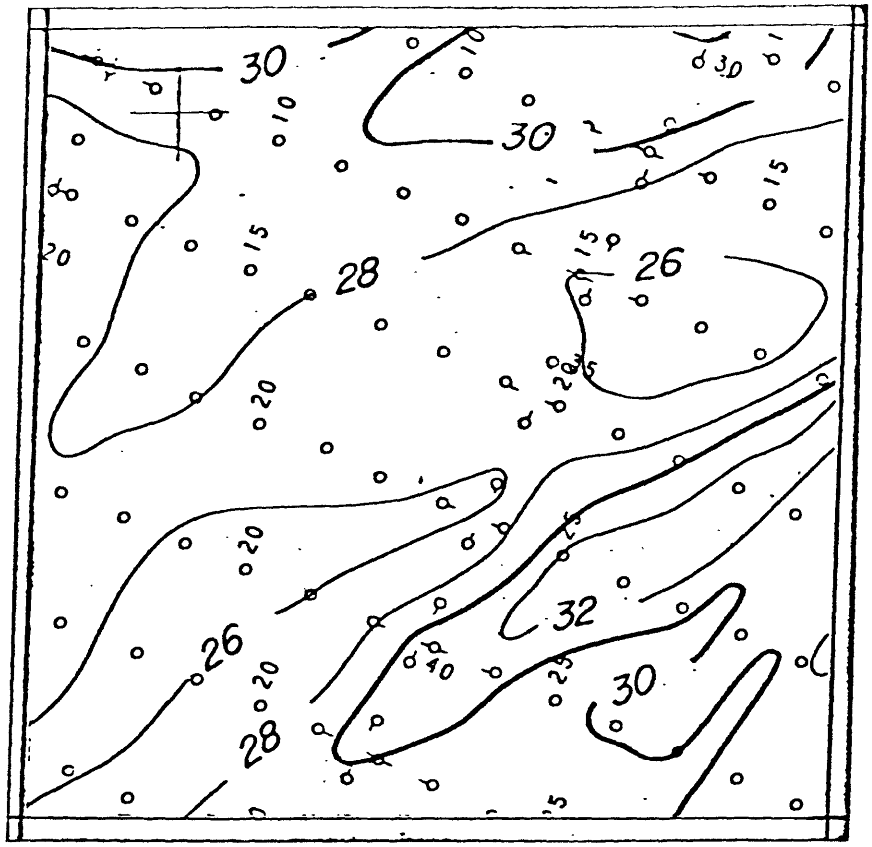
SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 30m , min 26m
Slope Gradient: 2 m/km, Direction: NW
Surface Sediment Type: Sand

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-2-343 *



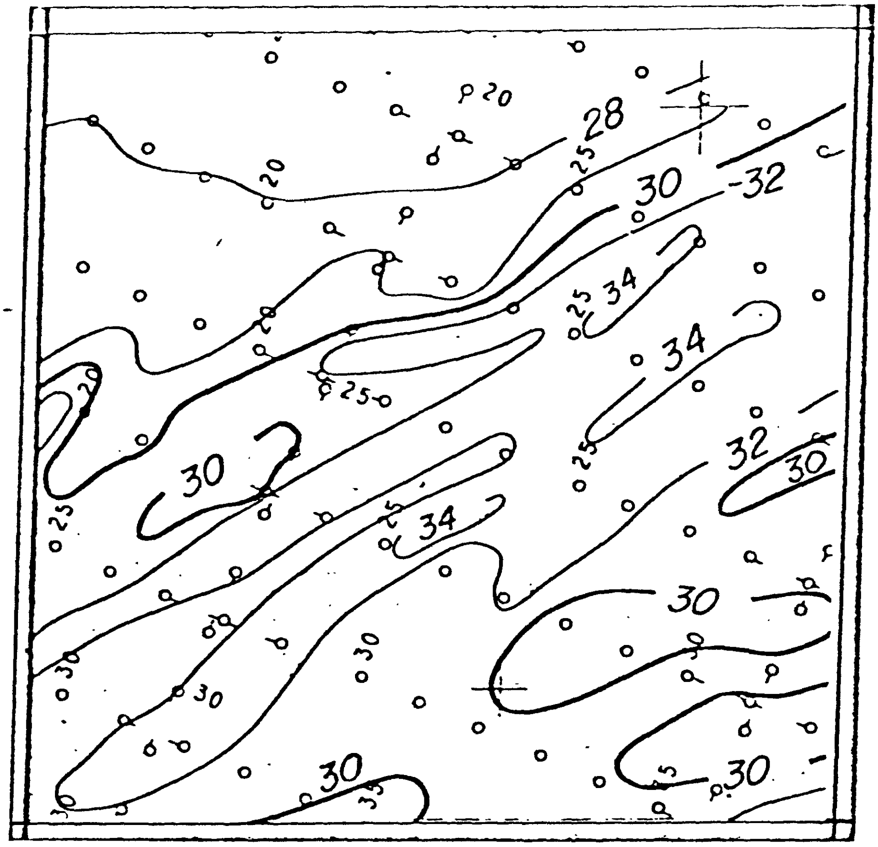
Water Depth: max. 32m , min 26m
Slope Gradient: 4 m/km, Direction: SE&NW
Surface Sediment Type: Sand

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-2-344 *



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

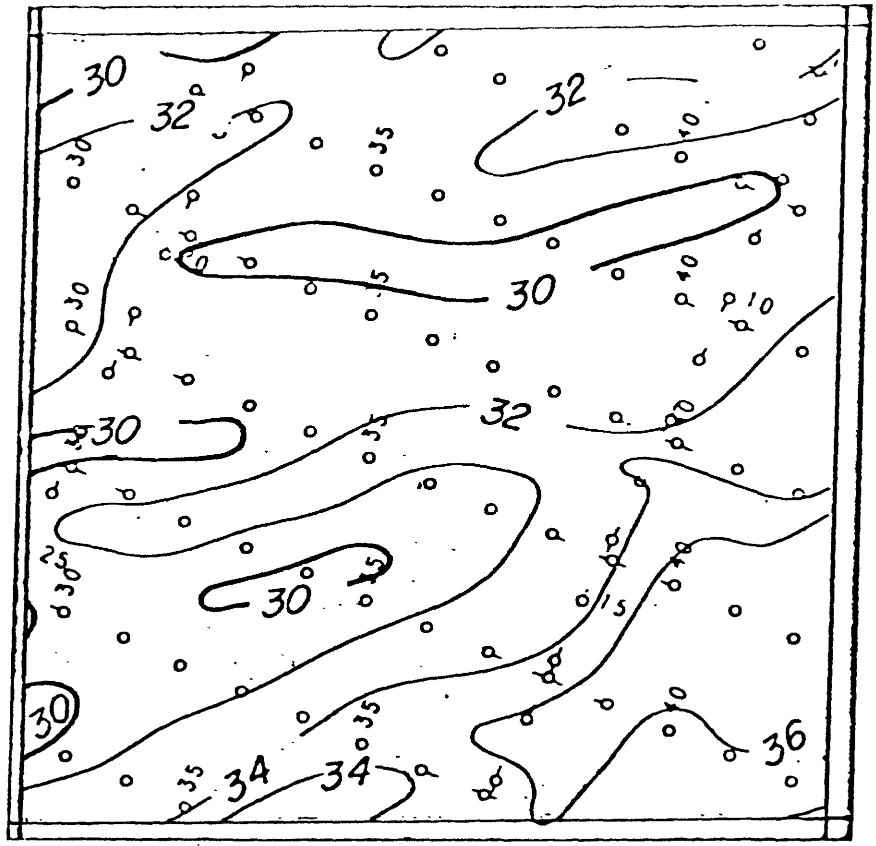
ISOBATHS IN METERS

Water Depth: max.34m , min.28m
Slope Gradient: 4 m/km, Direction:SE
Surface Sediment Type:Sand

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-2-345 *

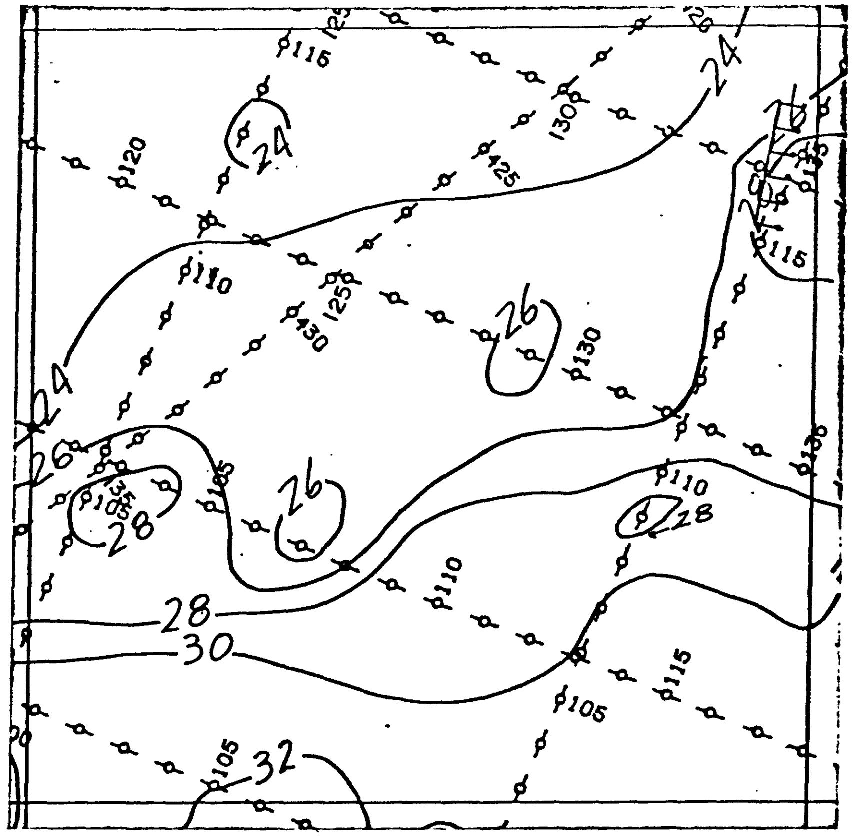


Water Depth: max. 36m , min. 30m
Slope Gradient: 2 m/km, Direction SE
Surface Sediment Type: Sand

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

* Also included in Lease Sale 43

Proposed
Lease Sale 56



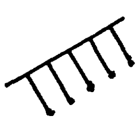
Block
NH 17-2-386

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max.32m , min.23m
Slope Gradient: 2 m/km, Direction:SE
Surface Sediment Type:Sand

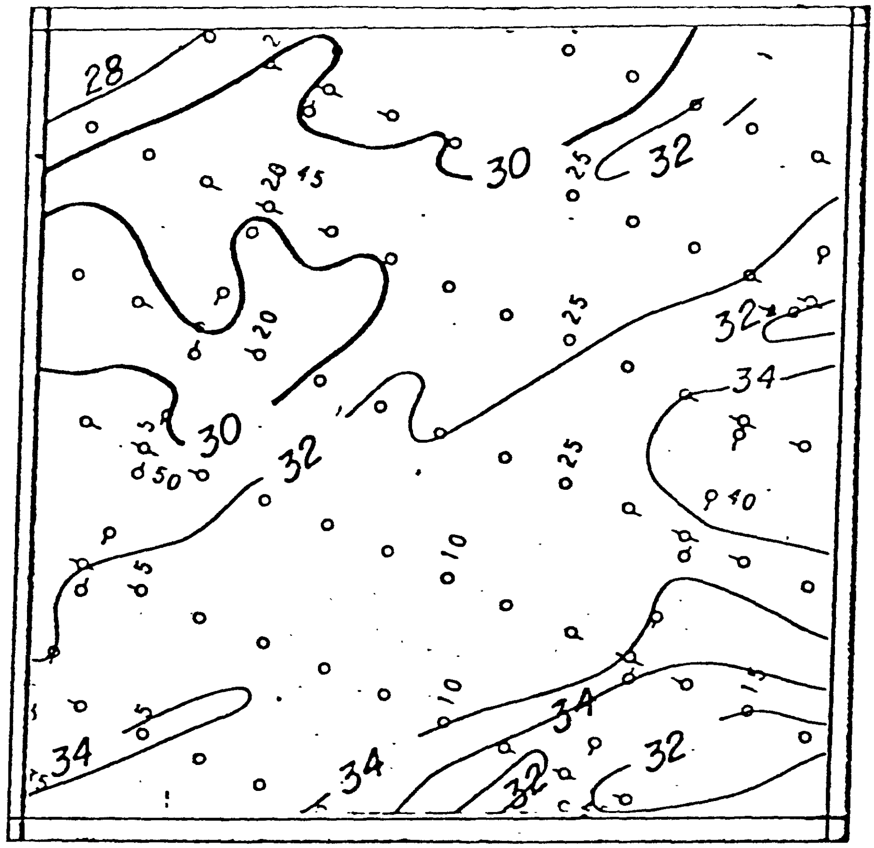
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NH 17-2-387 *



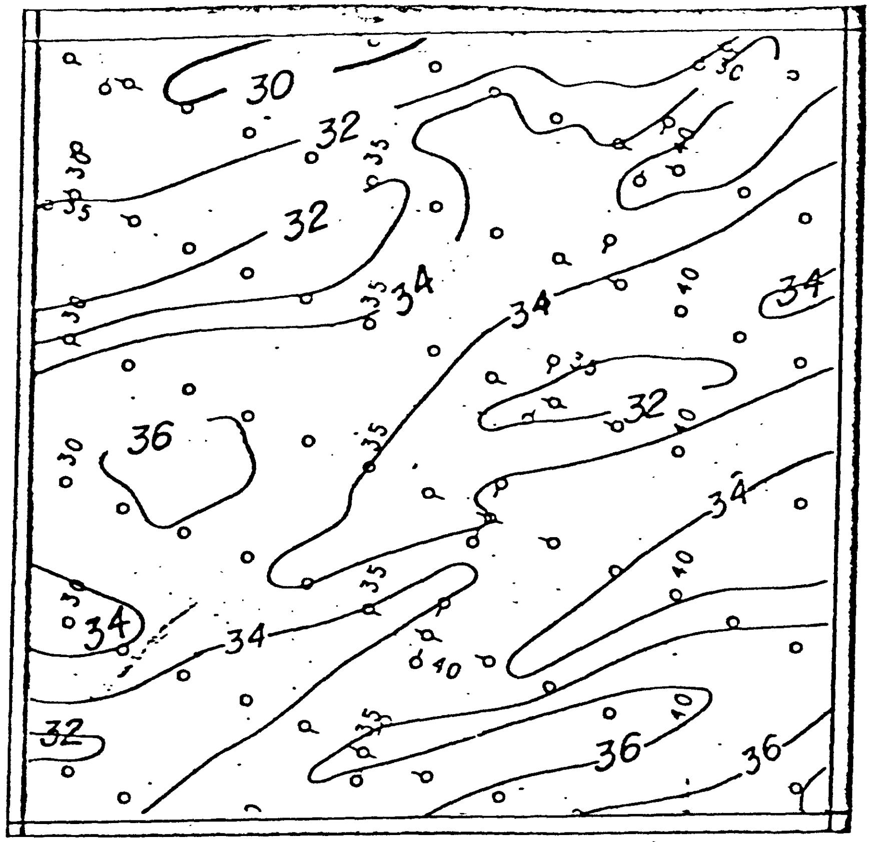
Water Depth: max. 34m , min. 28m
Slope Gradient: 2 m/km, Direction: SE
Surface Sediment Type: Sand

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17–2–388 *



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

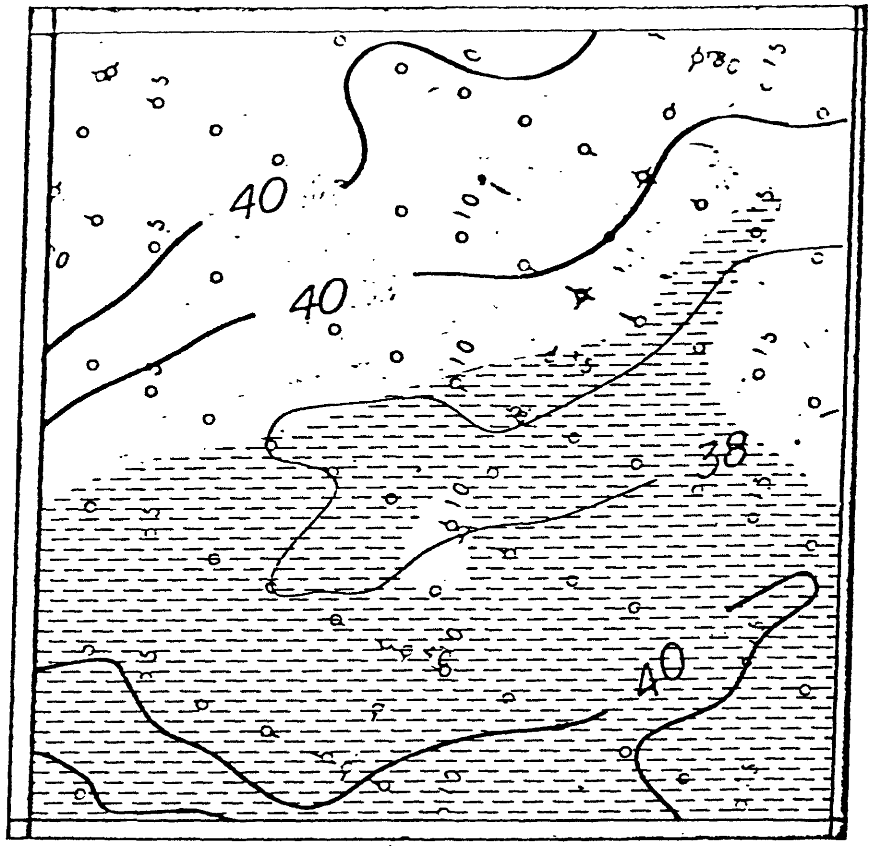
ISOBATHS IN METERS

Water Depth: max. 36m , min. 30m
Slope Gradient: 4 m/km, Direction: SE
Surface Sediment Type: Sand

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-2-695 *



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 40m , min. 38m
Slope Gradient: 1 m/km, Direction: SE&NW
Surface Sediment Type: Sand

CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17–2–696 *

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 44m , min. 38m
Slope Gradient: 1 m/km, Direction: E
Surface Sediment Type: Sand

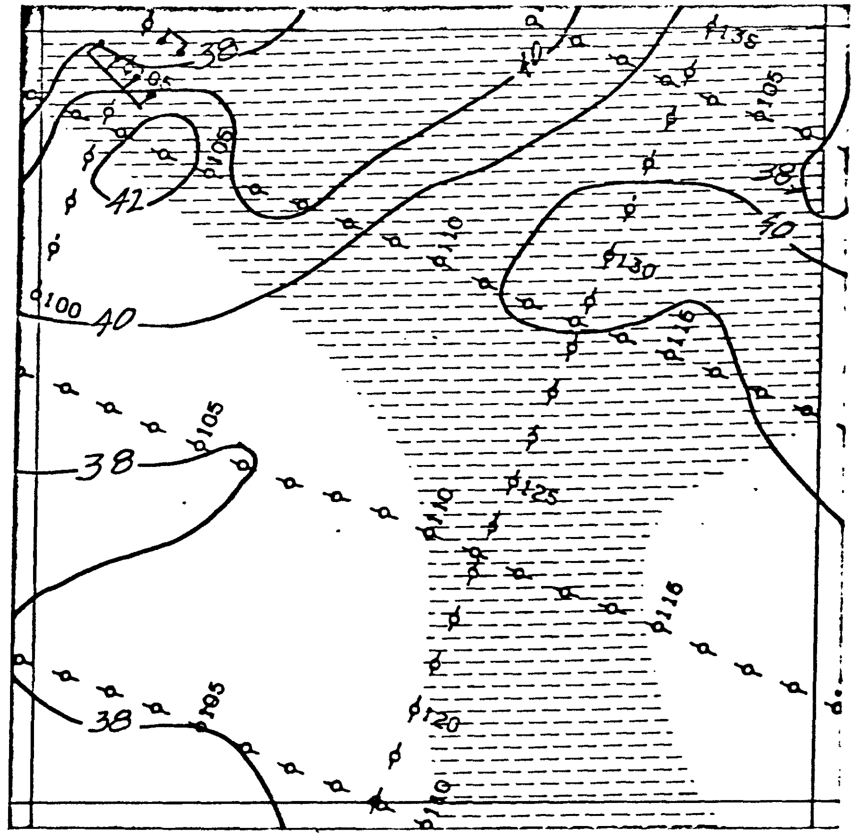
CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-2-697



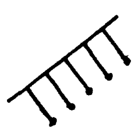
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

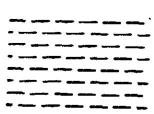
ISOBATHS IN METERS

Water Depth: max. 42m , min. 38m
Slope Gradient: <1` m/km, Direction: N
Surface Sediment Type: Sand

CONSTRAINTS



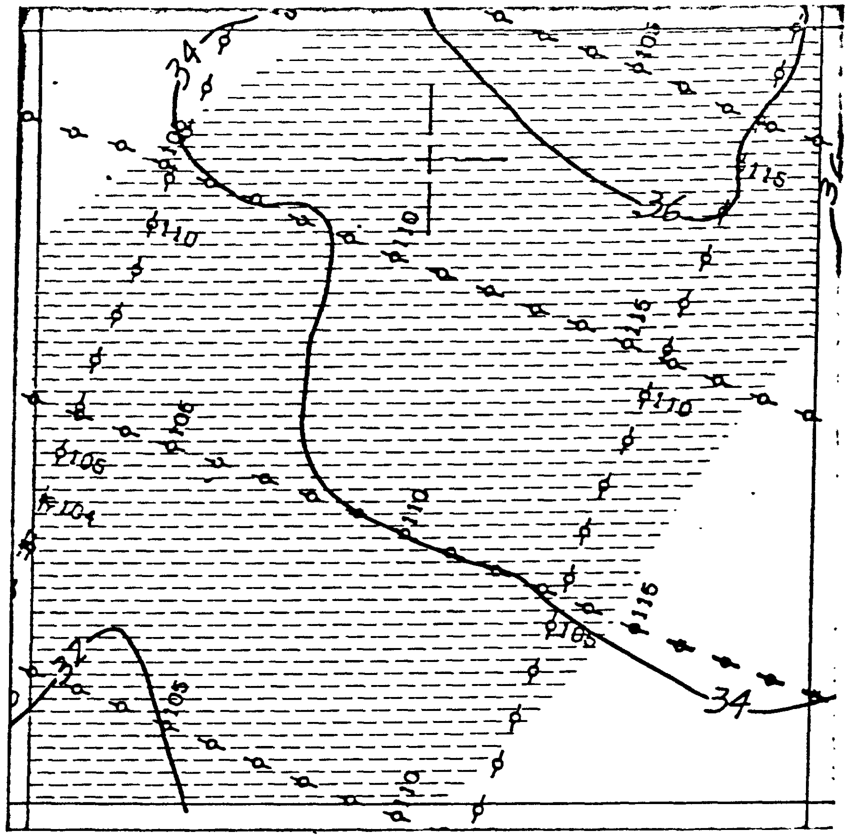
Fault



Filled Channel

Proposed
Lease Sale 56

Block
NH 17-2-738

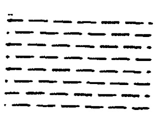


SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 36m , min. 32m
Slope Gradient: <1° m/km, Direction: NE
Surface Sediment Type: Sand

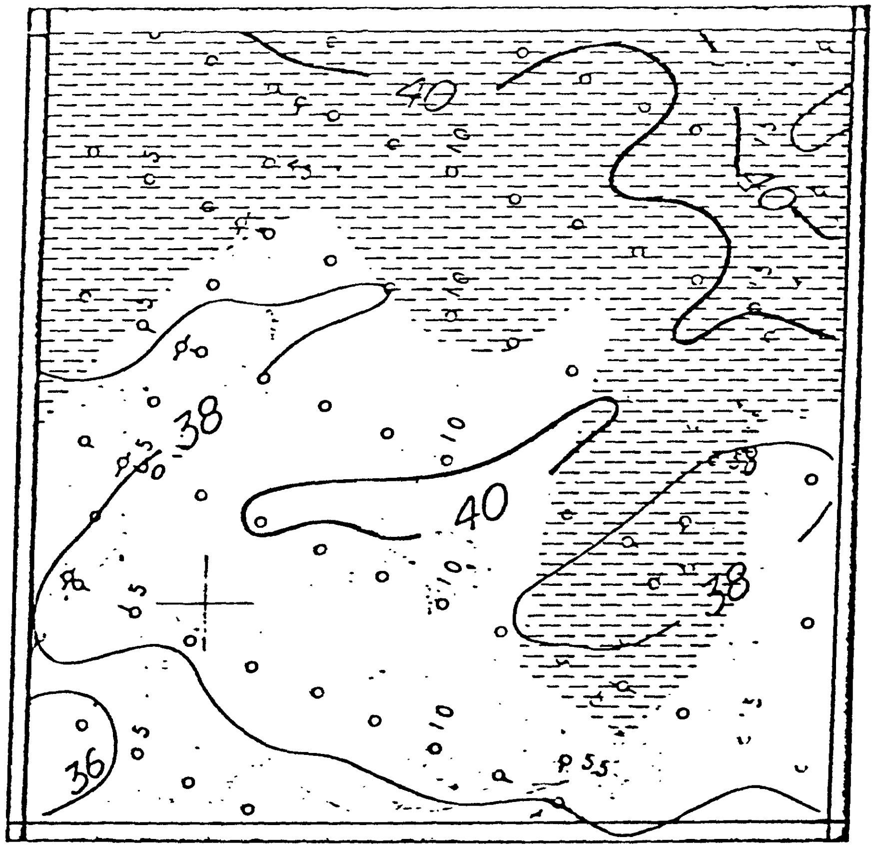
CONSTRAINT



Filled Channel

Proposed
Lease Sale 56

Block
NH 17-2-739 *



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 40m , min. 36m
Slope Gradient: 2 m/km, Direction: E&SE
Surface Sediment Type: Sand

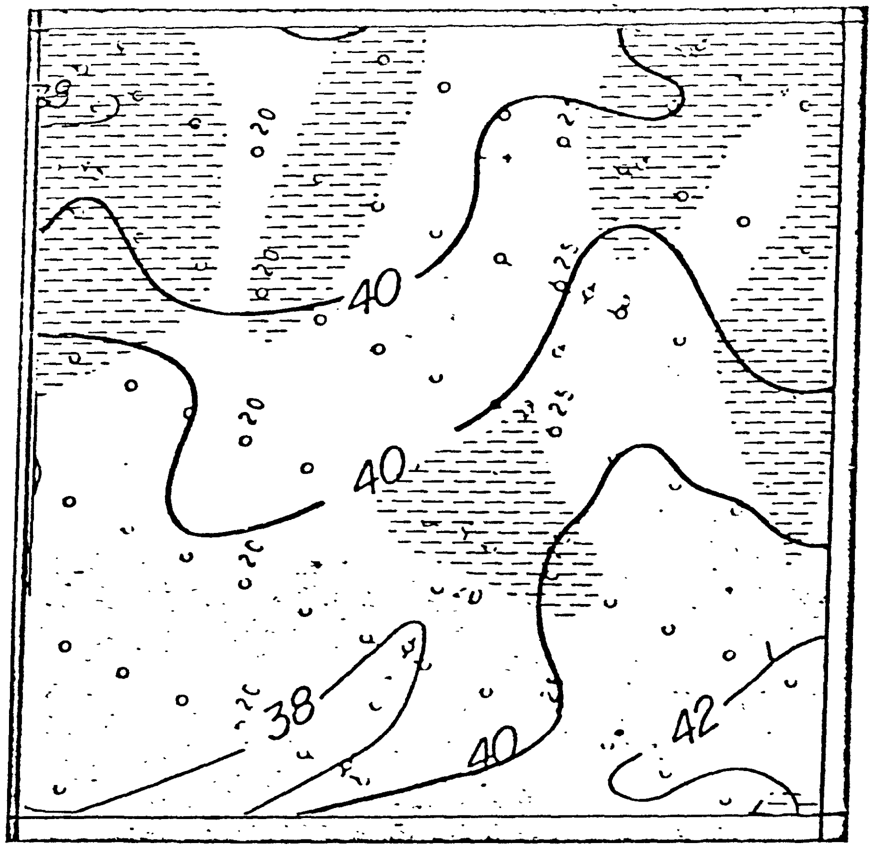
CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17–2–740 *



Water Depth: max. 40m , min. 38m
Slope Gradient: 1 m/km, Direction: SE
Surface Sediment Type: Sand

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

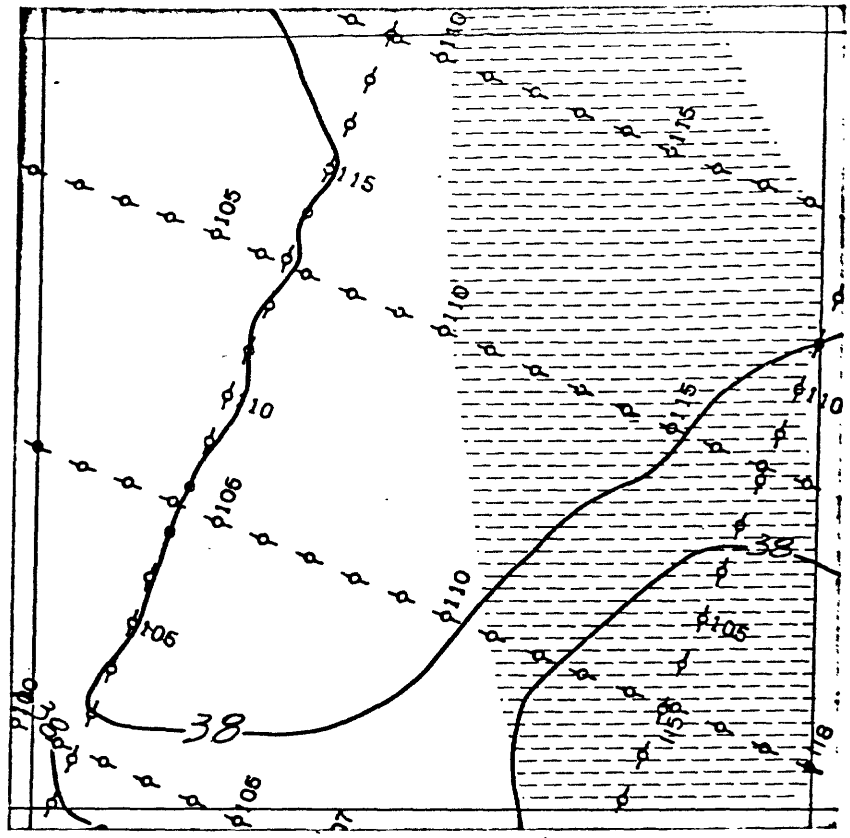
CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-2-741



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

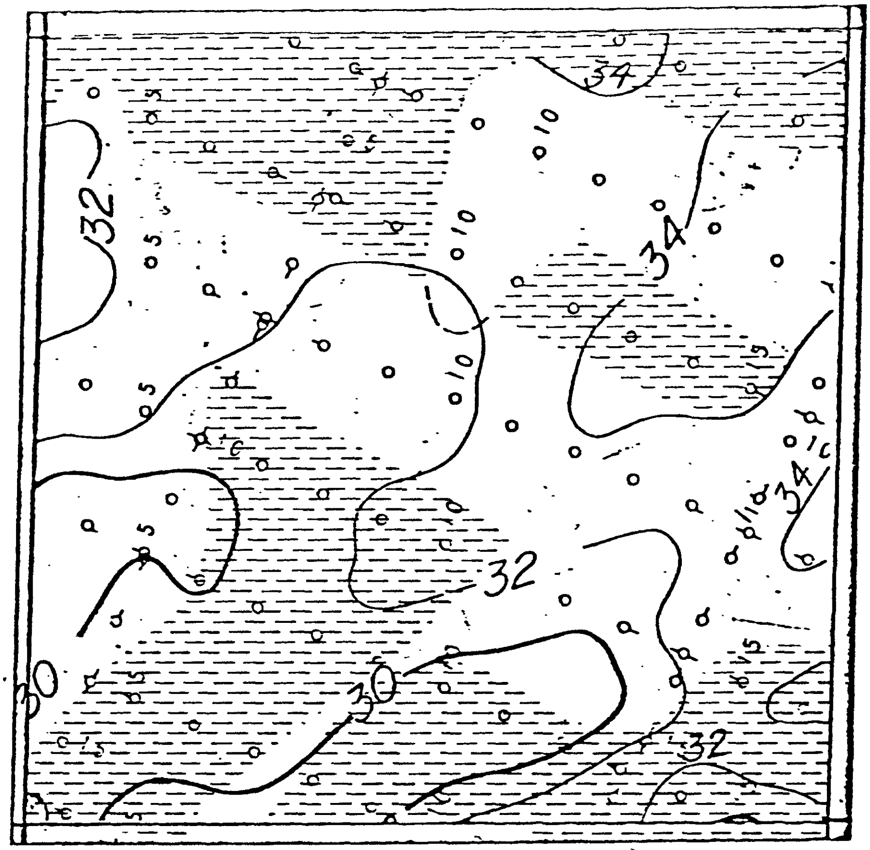
Water Depth: max. 39m , min. 37m
Slope Gradient: < 1 m/km, Direction: SE
Surface Sediment Type: Sand

CONSTRAINT

Filled Channel

Proposed
Lease Sale 56

Block
NH 17-2-781*



Water Depth: max. 34m , min. 30m
Slope Gradient: 2 m/km, Direction: E
Surface Sediment Type: Sand

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

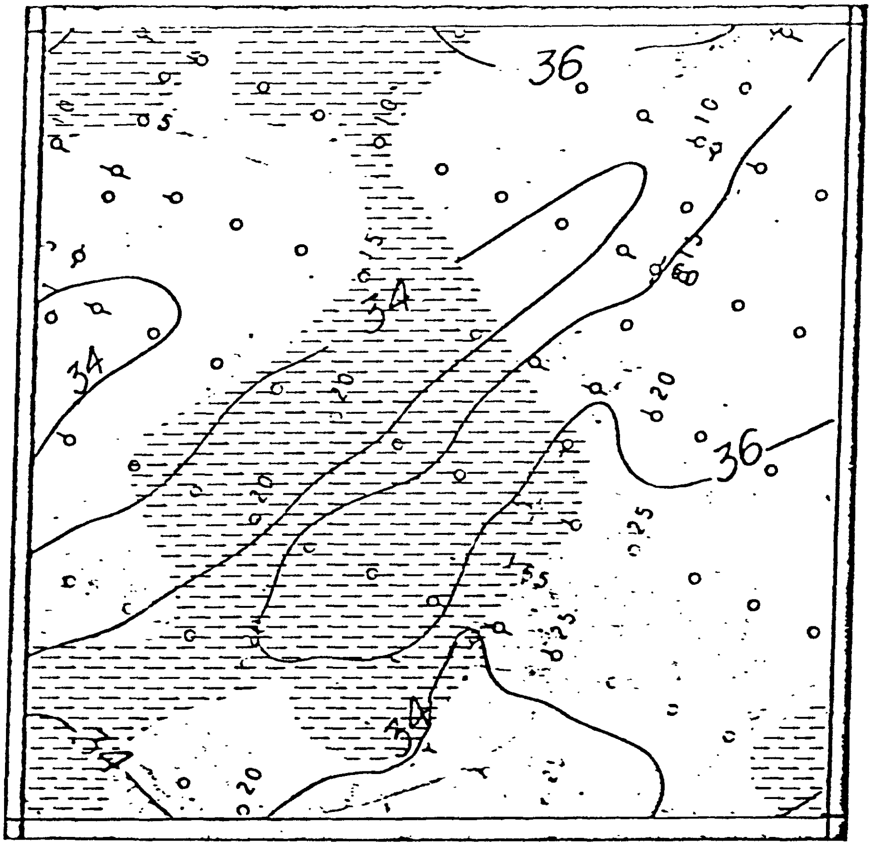
CONSTRAINT

Filled Channel

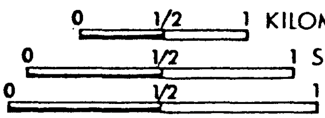
* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-2-782*



Water Depth: max. 36m , min. 33m
Slope Gradient: 2 m/km, Direction: SE
Surface Sediment Type: Sand



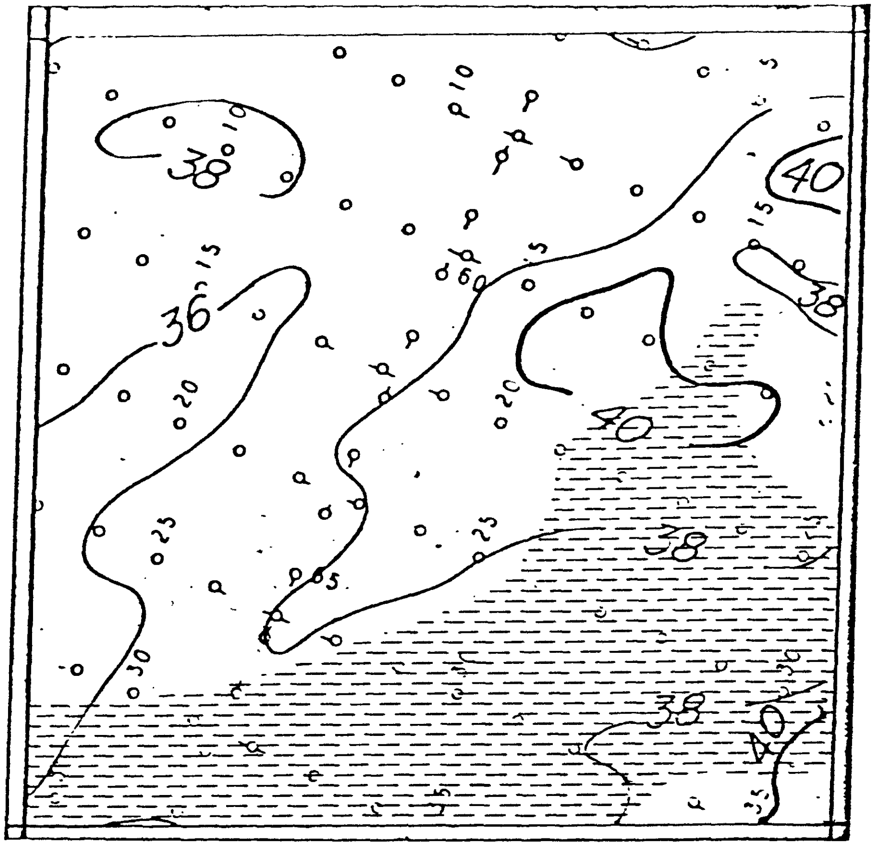
CONSTRAINT

 Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-2-783 *



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max.40m , min36m
Slope Gradient: 2 m/km, Direction: E&SE
Surface Sediment Type: Sand

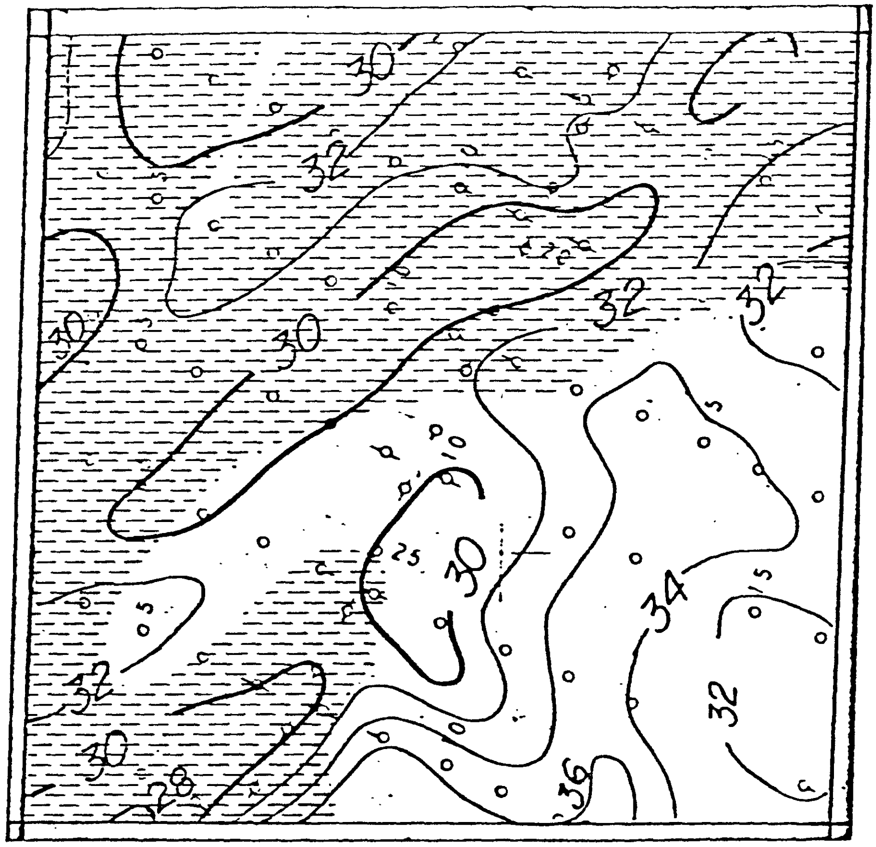
CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-2-825 *



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 36m , min 28m
Slope Gradient: 3 m/km, Direction SE
Surface Sediment Type: Sand

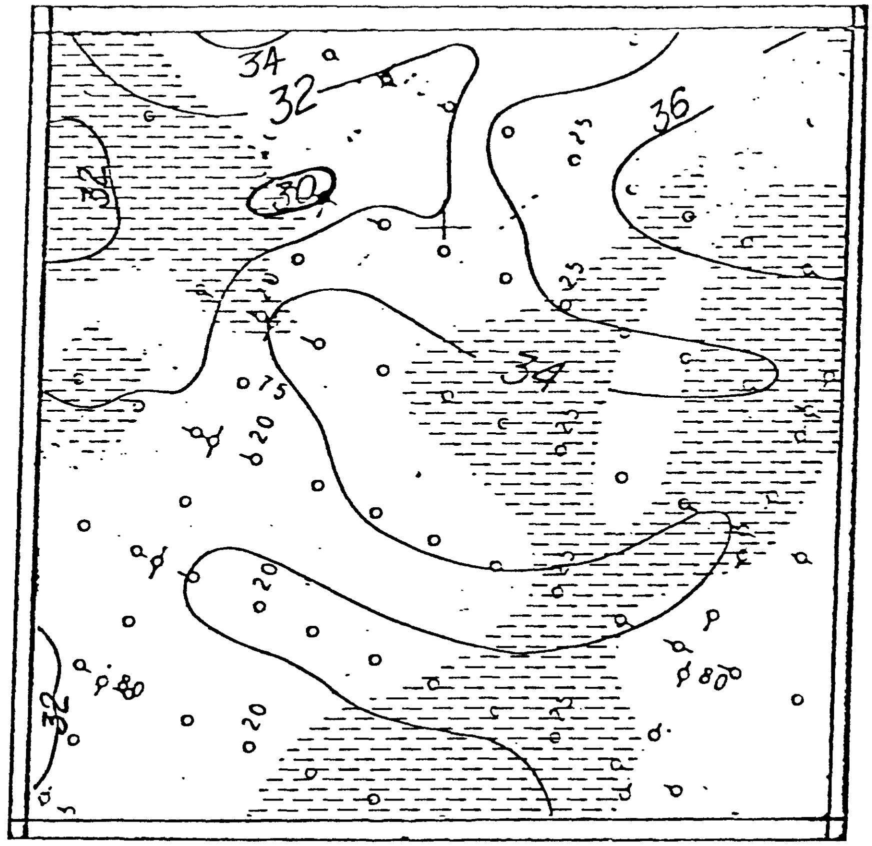
CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17–2–826 *



SCALE 1:48 000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 36m , min.30m
Slope Gradient: 2 m/km, Direction: SE&E
Surface Sediment Type: Sand

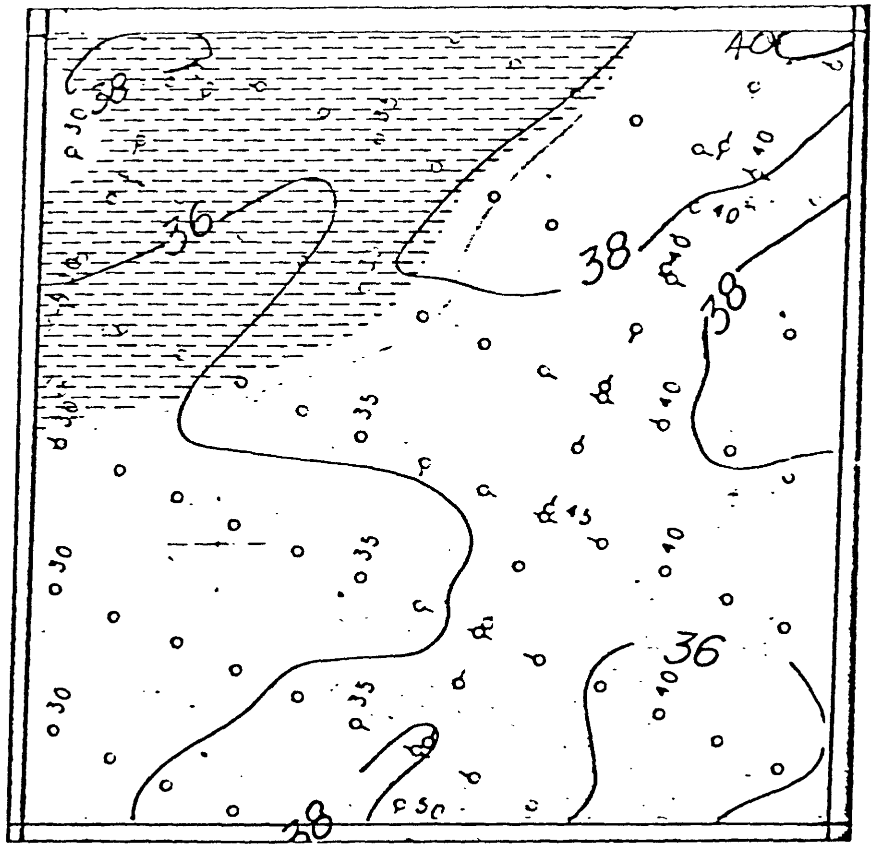
CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-2-827 *



SCALE 1:48000

0 1/2 1 KILOMETER

0 1/2 1 STATUTE MILE

0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 40m , min. 36m

Slope Gradient: 2 m/km, Direction: E

Surface Sediment Type: Sand

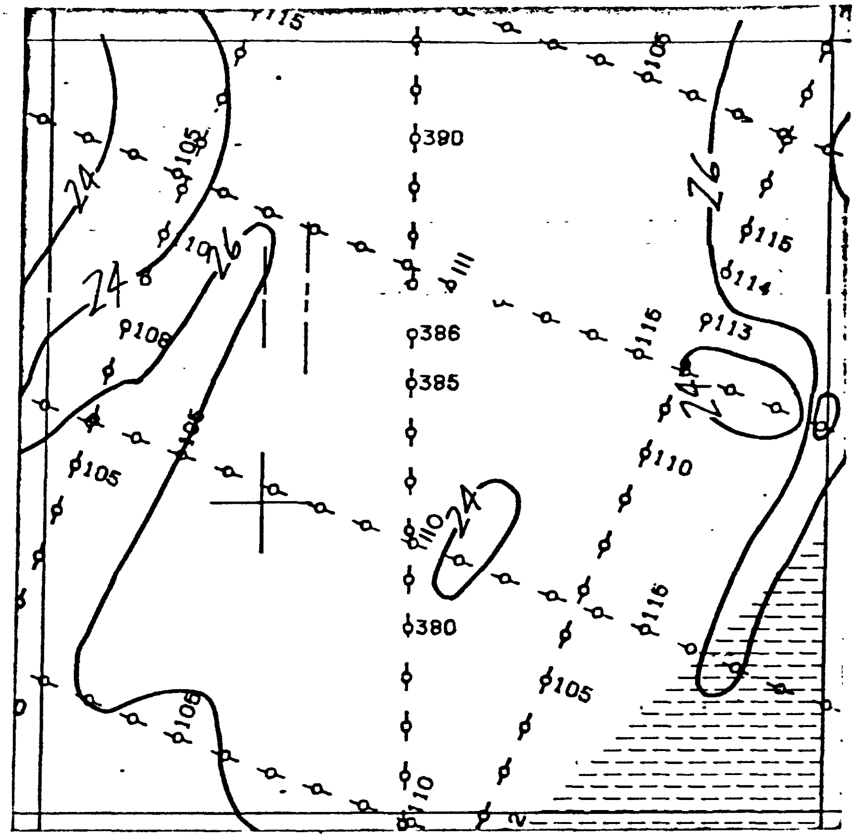
CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-2-910



Water Depth: max. 27m , min.23m
Slope Gradient: <1 m/km, Direction:Variable
Surface Sediment Type:Sand

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

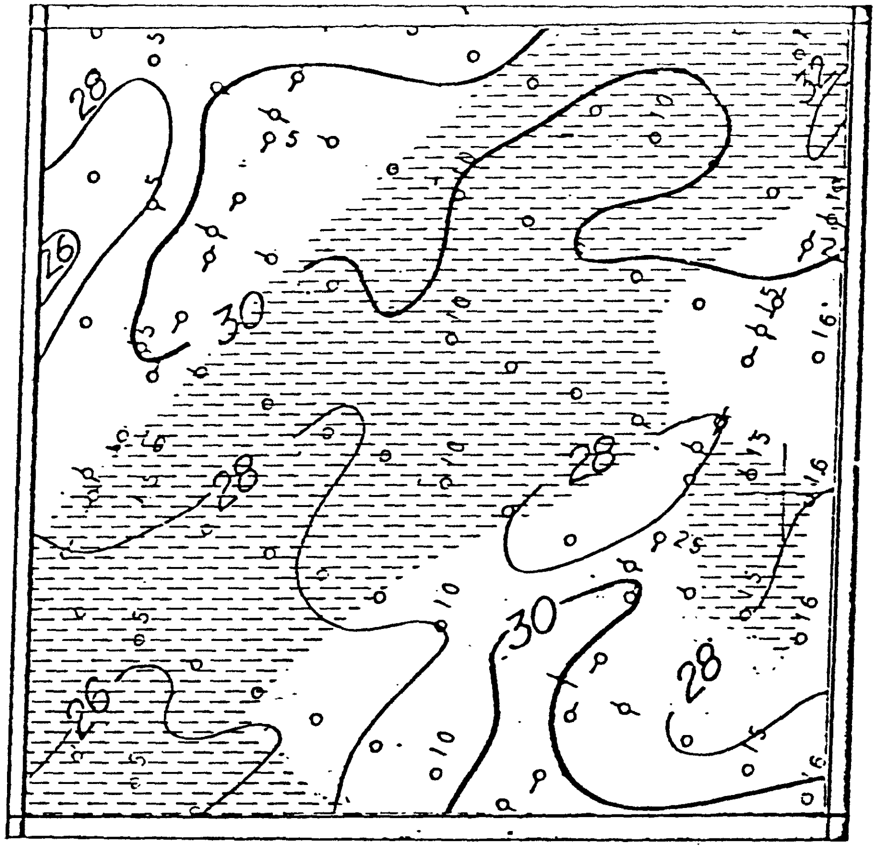
ISOBATHS IN METERS

CONSTRAINT

Filled Channel

Proposed
Lease Sale 56

Block
NH-17-2-911 *



Water Depth: max.32m , min26m
Slope Gradient: 2 m/km, DirectionSE
Surface Sediment Type: Sand

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

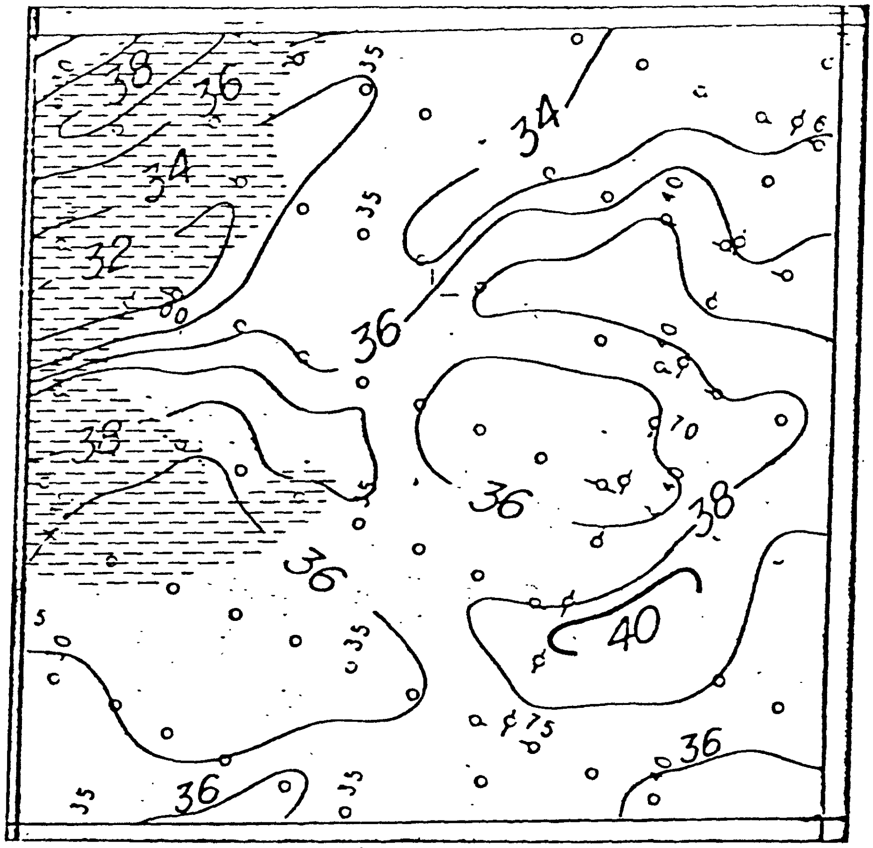
CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-2-914 *



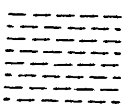
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 40m , min. 32m
Slope Gradient: 4 m/km, Direction: SE
Surface Sediment Type: Sand

CONSTRAINT

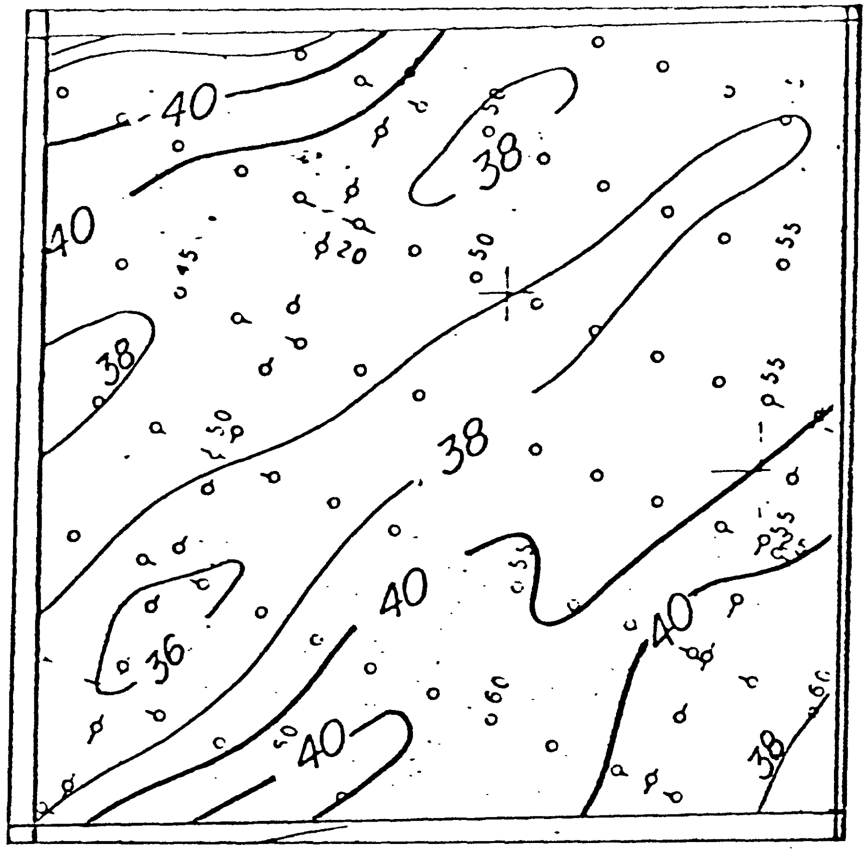


Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-2-916*

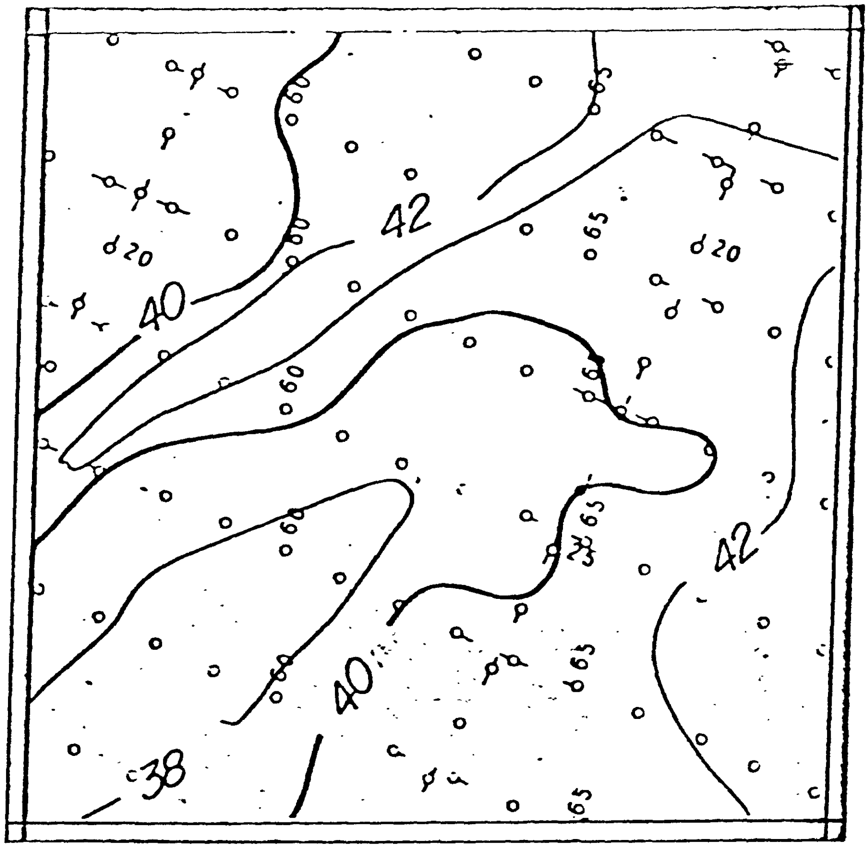


Water Depth: max. 40m , min.36m
Slope Gradient: 2 m/km, Direction:SE&NW
Surface Sediment Type: Sand

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

* Also included in Lease Sale 43

Proposed
Lease Sale 56



Block
NH 17-2-917 *

SCALE 1:48000

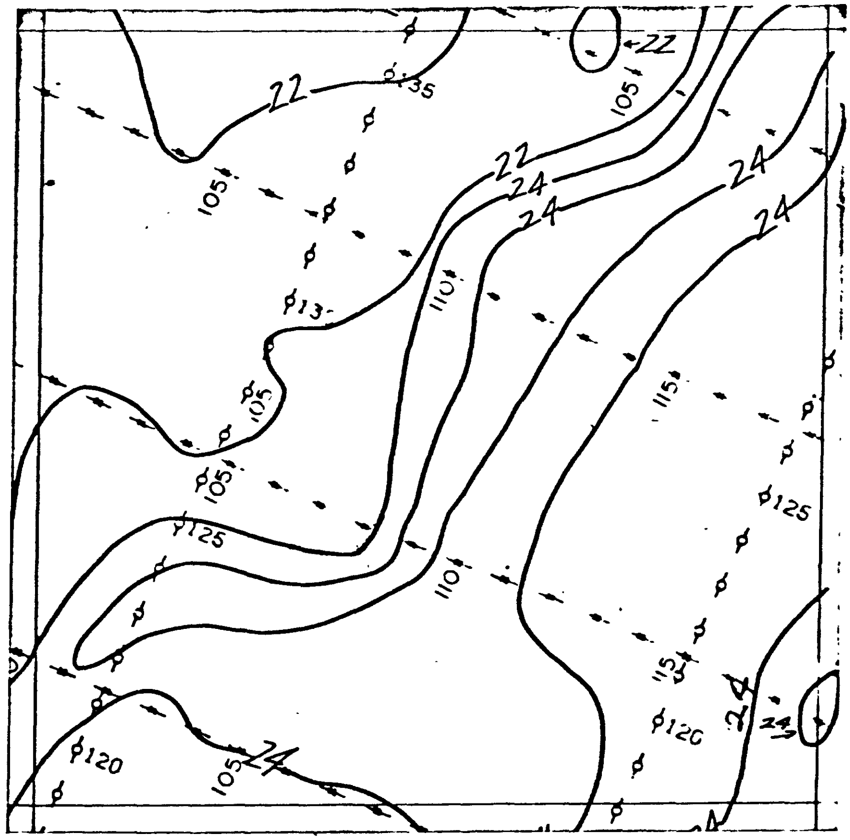
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 42m , min. 38m
Slope Gradient: 1 m/km, Direction: SE
Surface Sediment Type: Sand

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-2-952

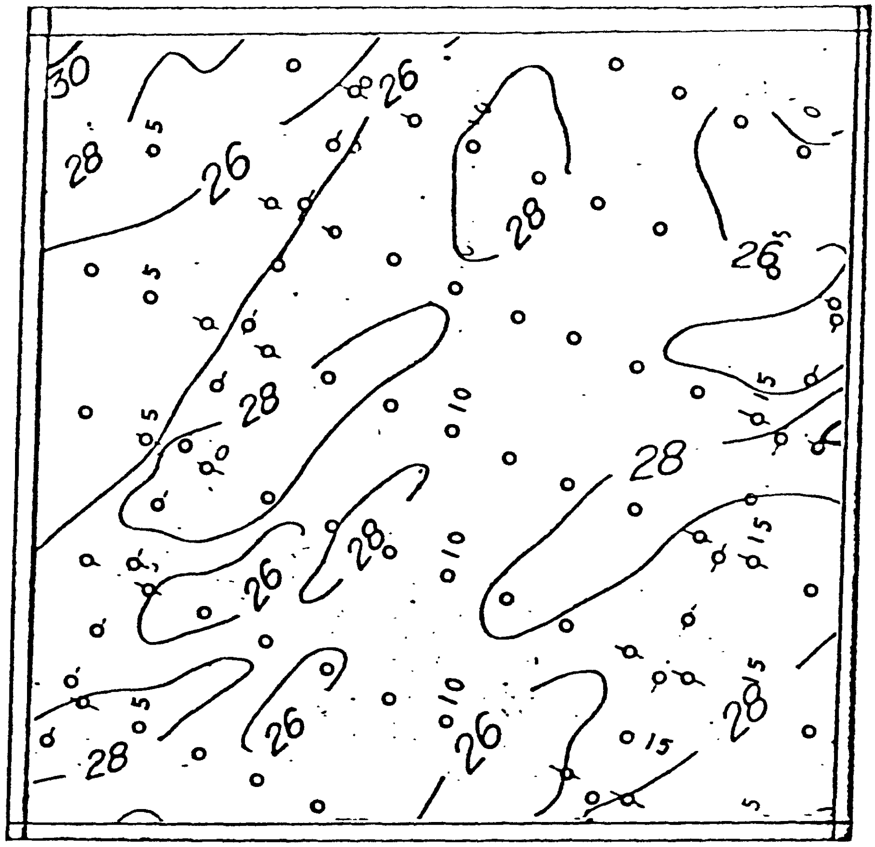


Water Depth: max. 25m , min. 21m
Slope Gradient: 1 m/km, Direction: SE
Surface Sediment Type: Sand

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NH 17-2-953 *



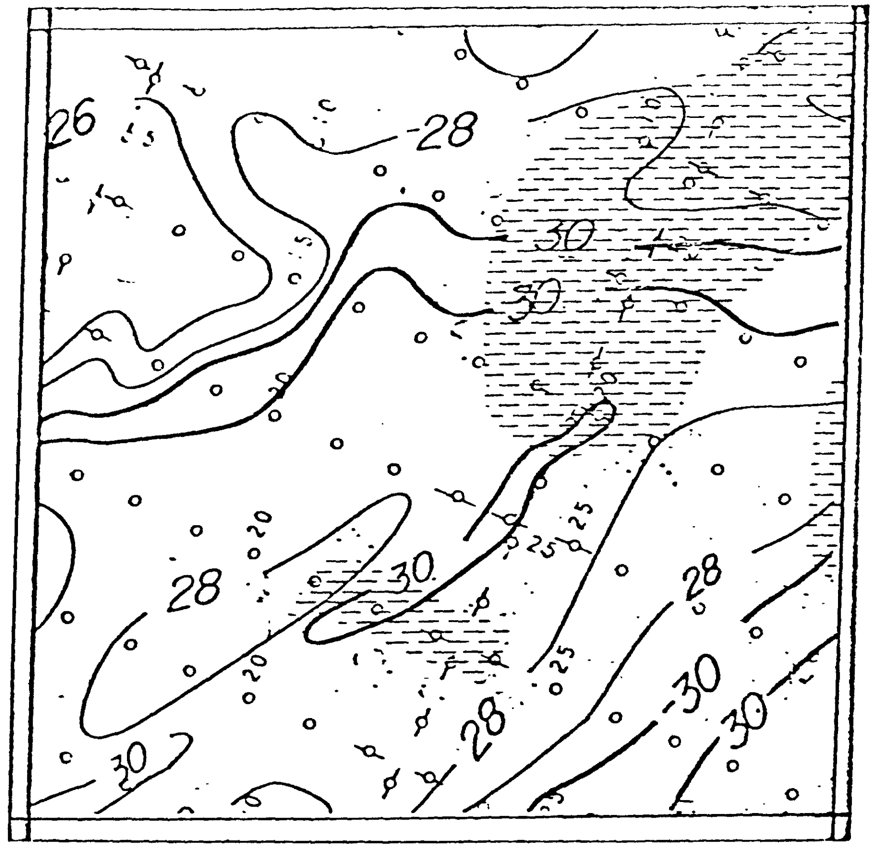
Water Depth: max.30m , min.26m
Slope Gradient: 2 m/km, Direction: SE&NW
Surface Sediment Type: Sand

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17–2–954*



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 30m , min. 26m
Slope Gradient: 2 m/km, Direction: SE&S
Surface Sediment Type: Sand

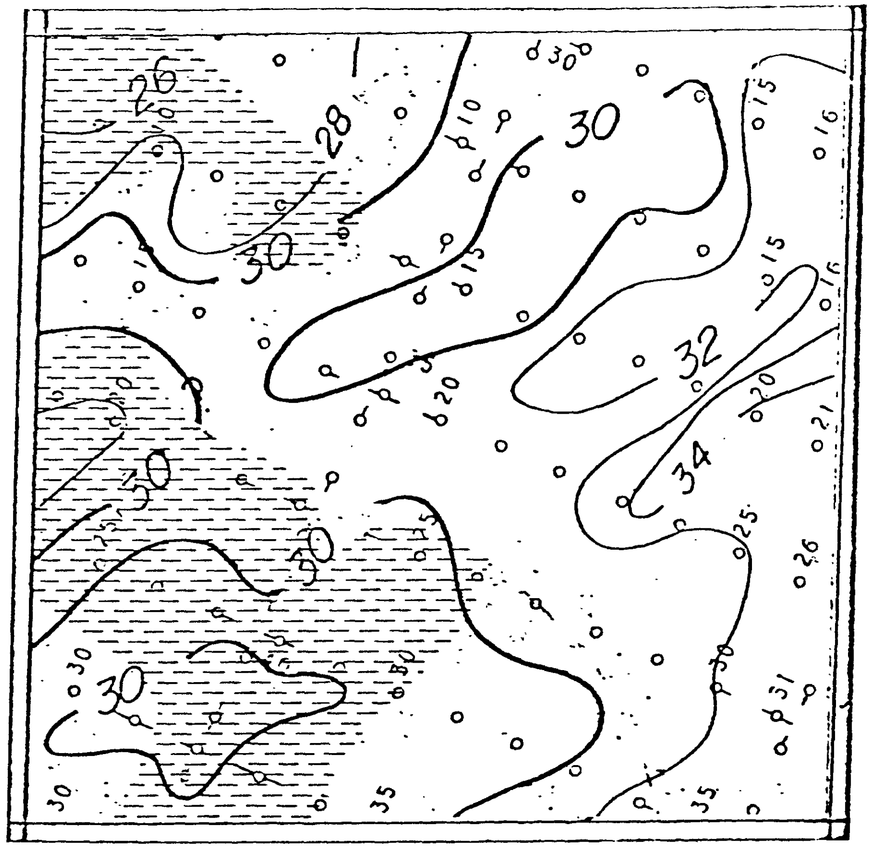
CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-2-955*



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 34m , min. 26m
Slope Gradient: 1 m/km, Direction: E
Surface Sediment Type: Sand

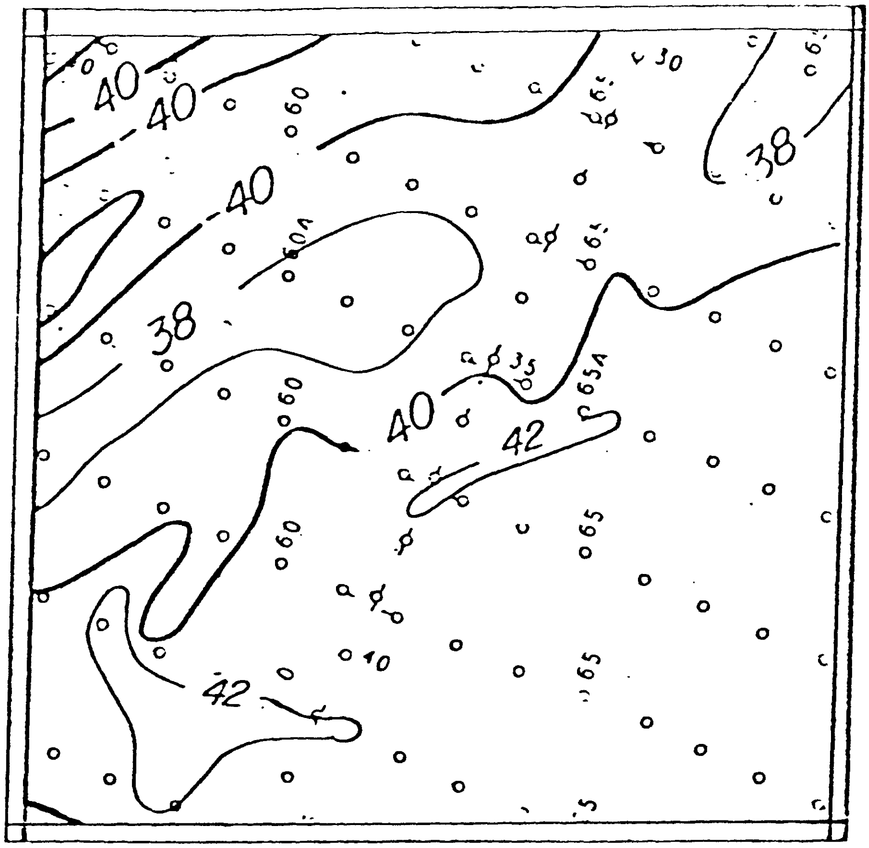
CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-2-960*



SCALE 1:48000

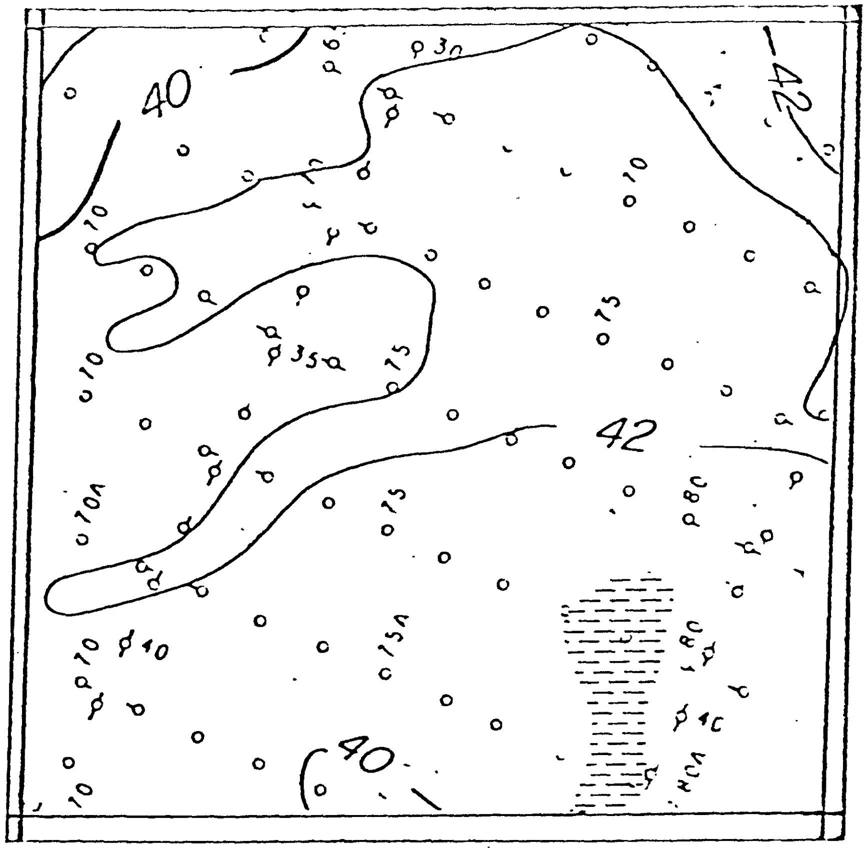
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 42m , min. 38m
Slope Gradient: 2 m/km, Direction: SE
Surface Sediment Type: Sand

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17–2–961*



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 42m , min.40m
Slope Gradient: 1 m/km, Direction:SE
Surface Sediment Type: Sand

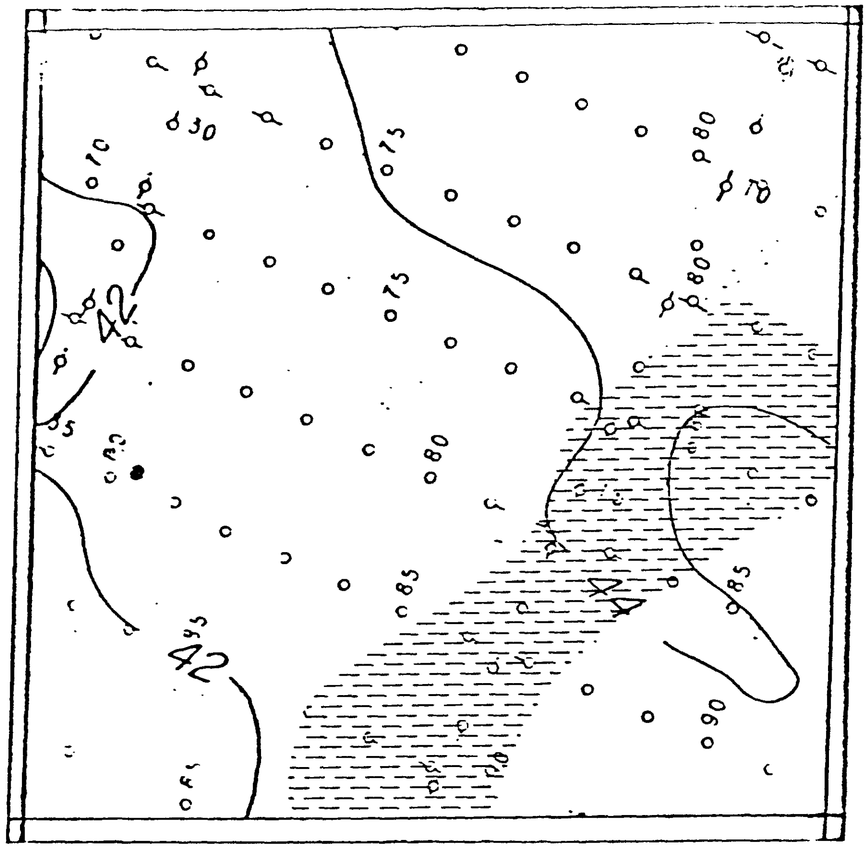
CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-2-962 *



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

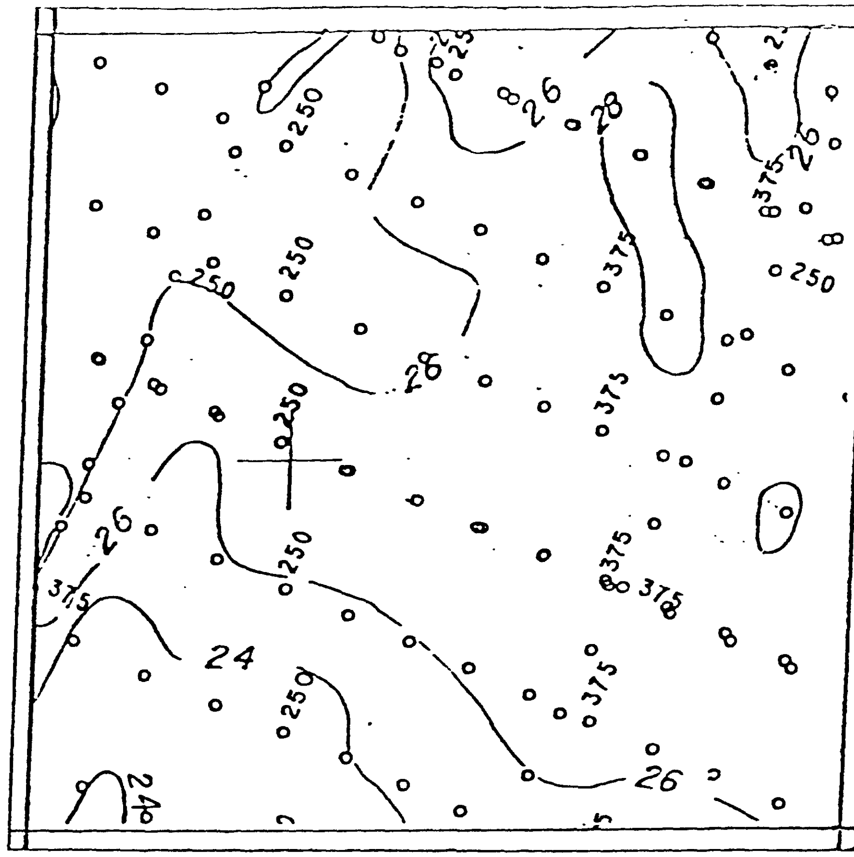
Water Depth: max. 44m , min. 42m
Slope Gradient: 1 m/km, Direction: E
Surface Sediment Type: Sand

CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56



Block
NH 17-2-993 *

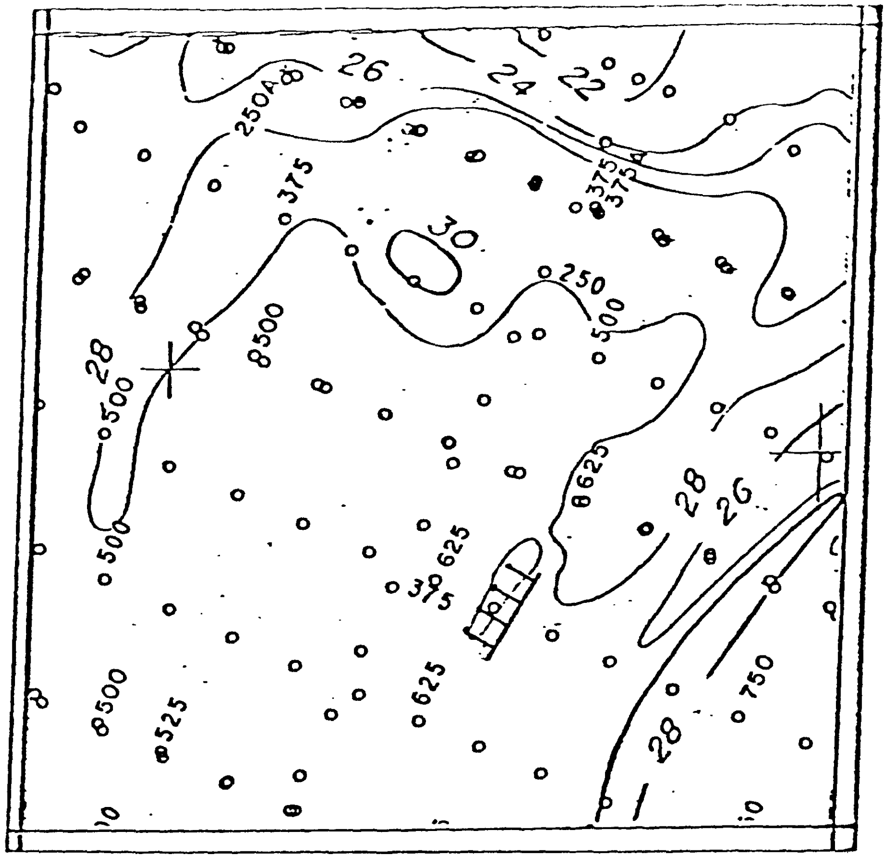
Water Depth: max. 28m , min.23m
Slope Gradient: 2 m/km, Direction: NE&E
Surface Sediment Type: Sand

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-2-994*



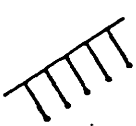
Water Depth: max. 30m , min.22m
Slope Gradient: 2 m/km, Direction:SE&SW
Surface Sediment Type:Sand

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

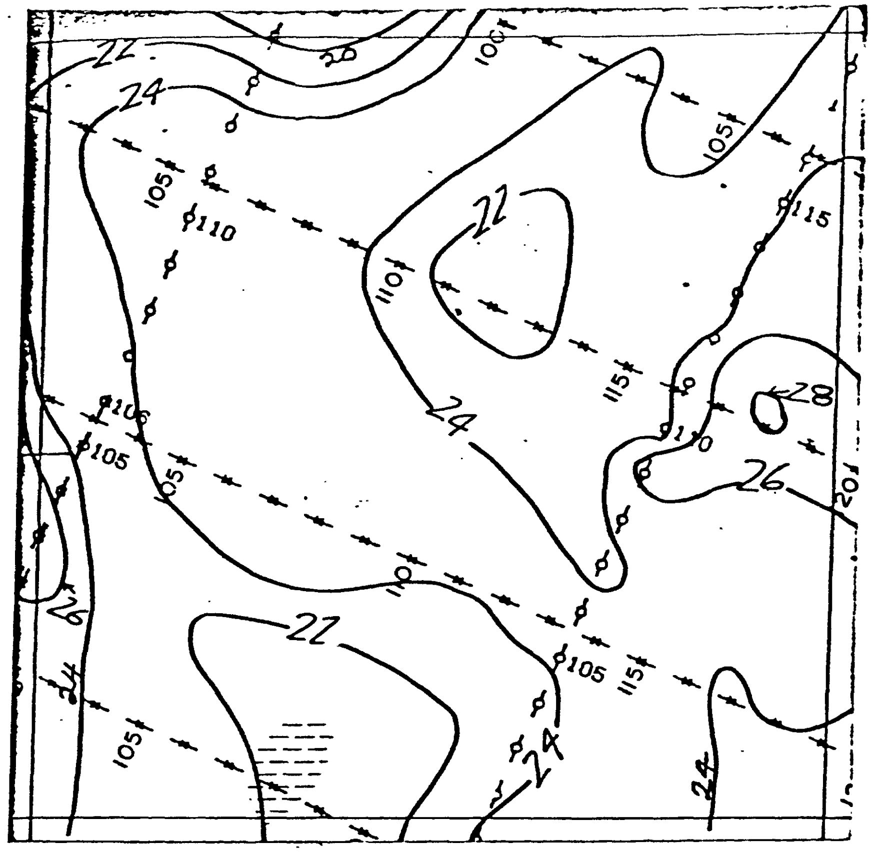
ISOBATHS IN METERS

CONSTRAINT


Fault

* Also included in Lease Sale 43

Proposed
Lease Sale 56



Block
NH 17-2-995

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

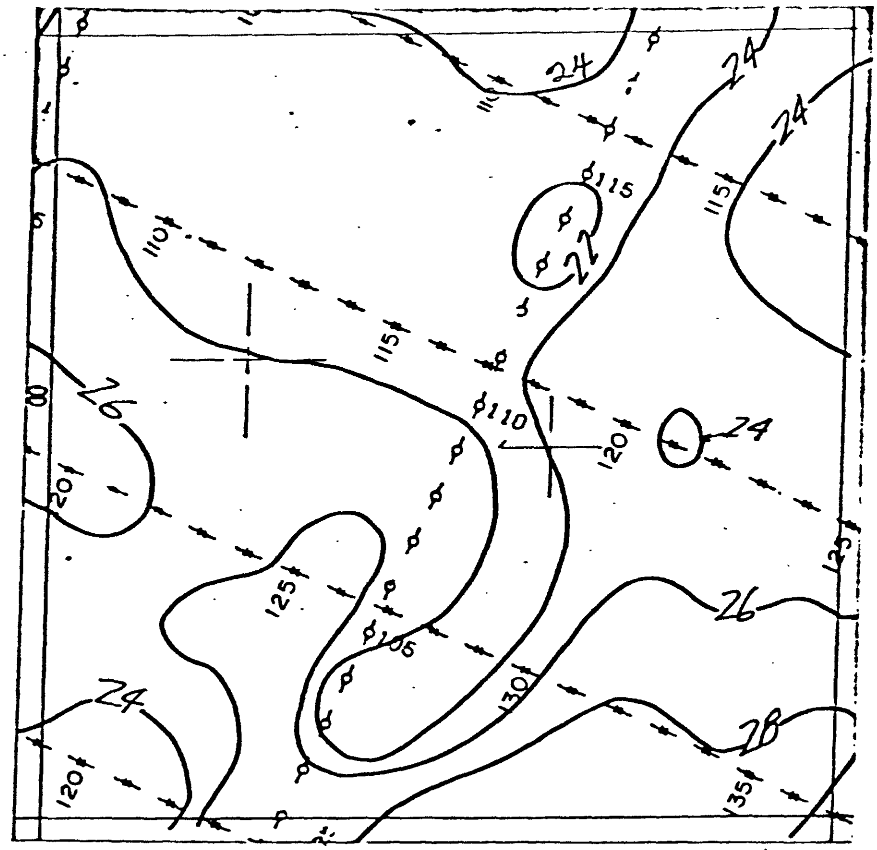
ISOBATHS IN METERS

Water Depth: max28m , min.19m
Slope Gradient: 1 m/km, Direction:E
Surface Sediment Type: Sand

CONSTRAINT

Filled Channel

Proposed
Lease Sale 56



Block
NH 17-2-996

SCALE 1:48000

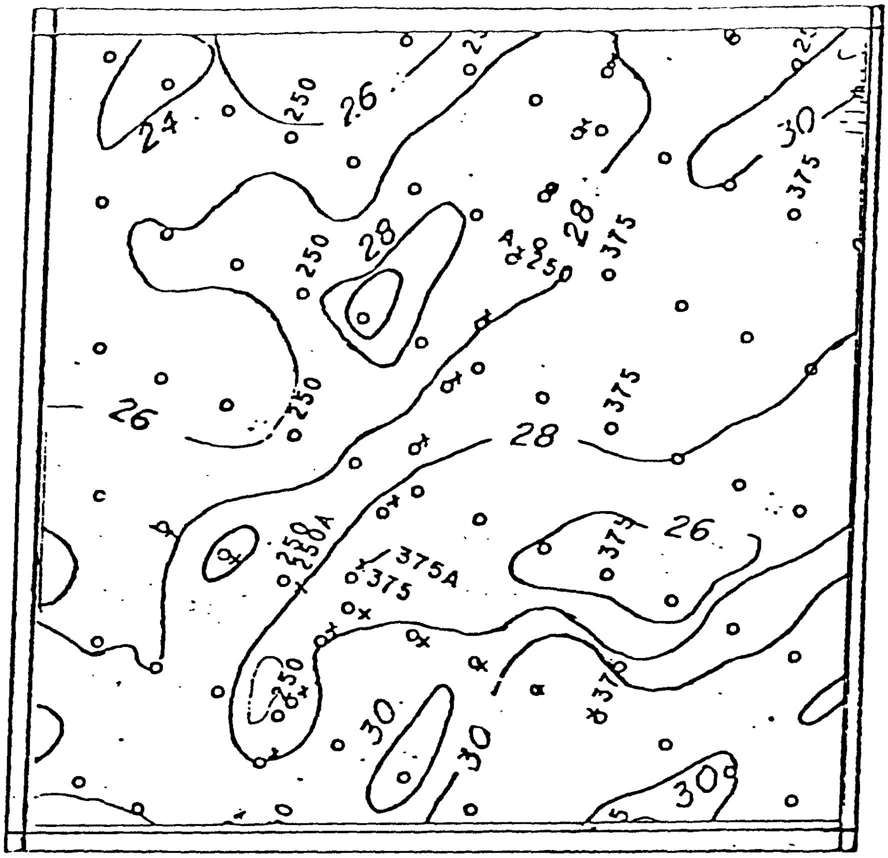
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 29m , min 21m .
Slope Gradient: 1 m/km, Direction: SE
Surface Sediment Type: Sand

Proposed
Leose Sale 56

Block
NH 17-2-997*



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 31m , min.24m
Slope Gradient: 2 m/km, Direction: SE
Surface Sediment Type: Sand

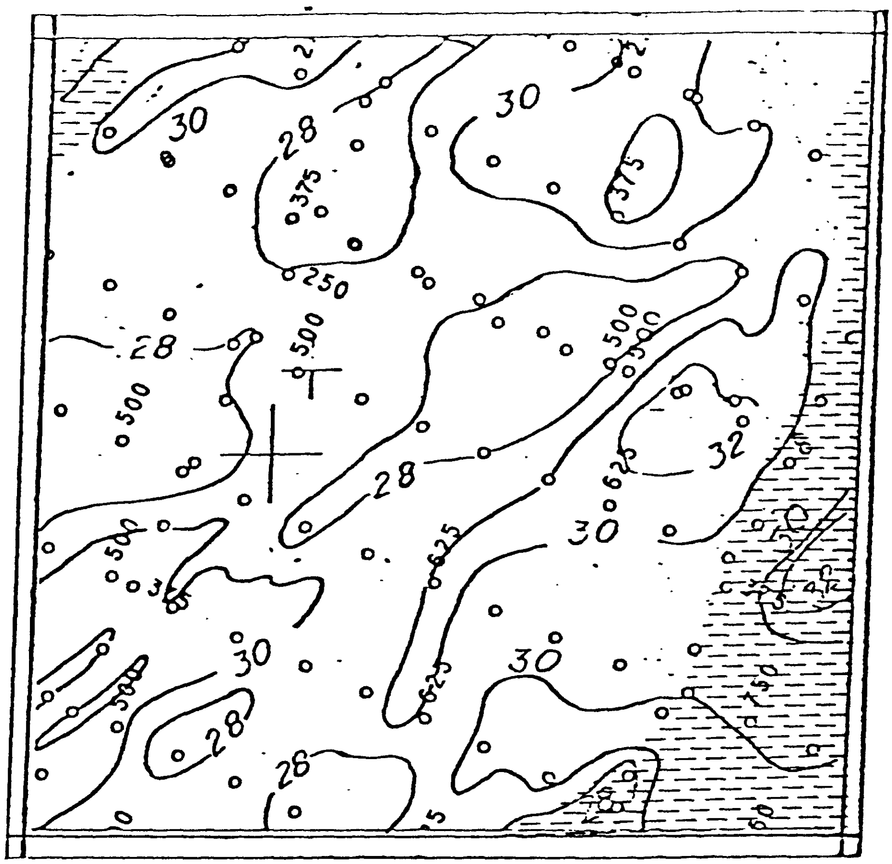
CONSTRAINT

Filled Channel

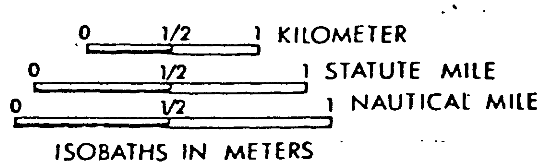
* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-2-998*

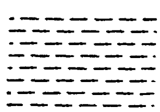


SCALE 1:48000



Water Depth: max. 32m , min. 28m
Slope Gradient: 2 m/km, Direction: SE
Surface Sediment Type: Sand

CONSTRAINT

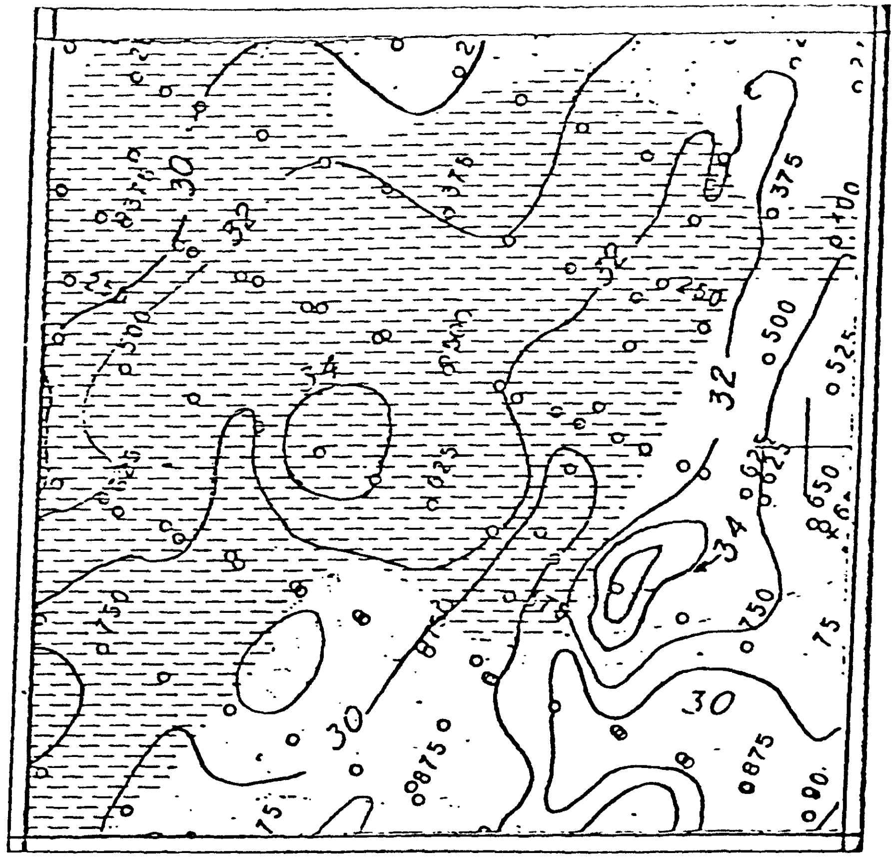


Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17–2–999 *



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 37m , min. 28m
Slope Gradient: 1 m/km, Direction: SE
Surface Sediment Type: Sand

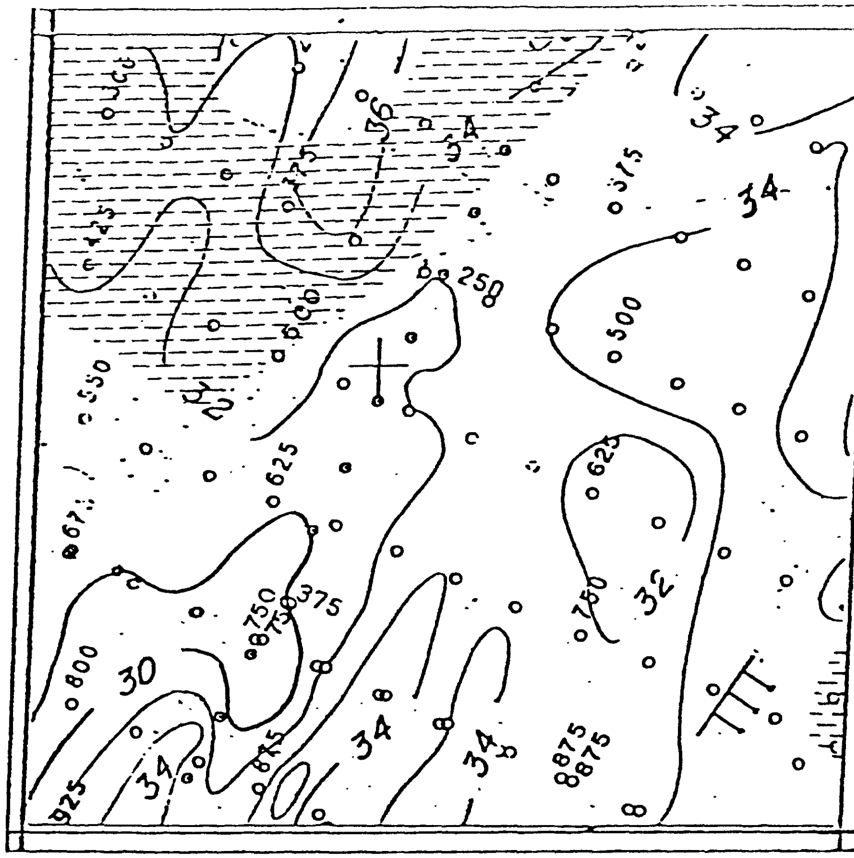
CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17–2–1000*



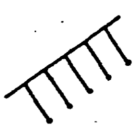
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

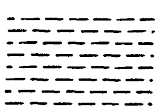
ISOBATHS IN METERS

Water Depth: max. 36m , min. 30m
Slope Gradient: 1 m/km, Direction SE
Surface Sediment Type: Sand

CONSTRAINTS



Fault

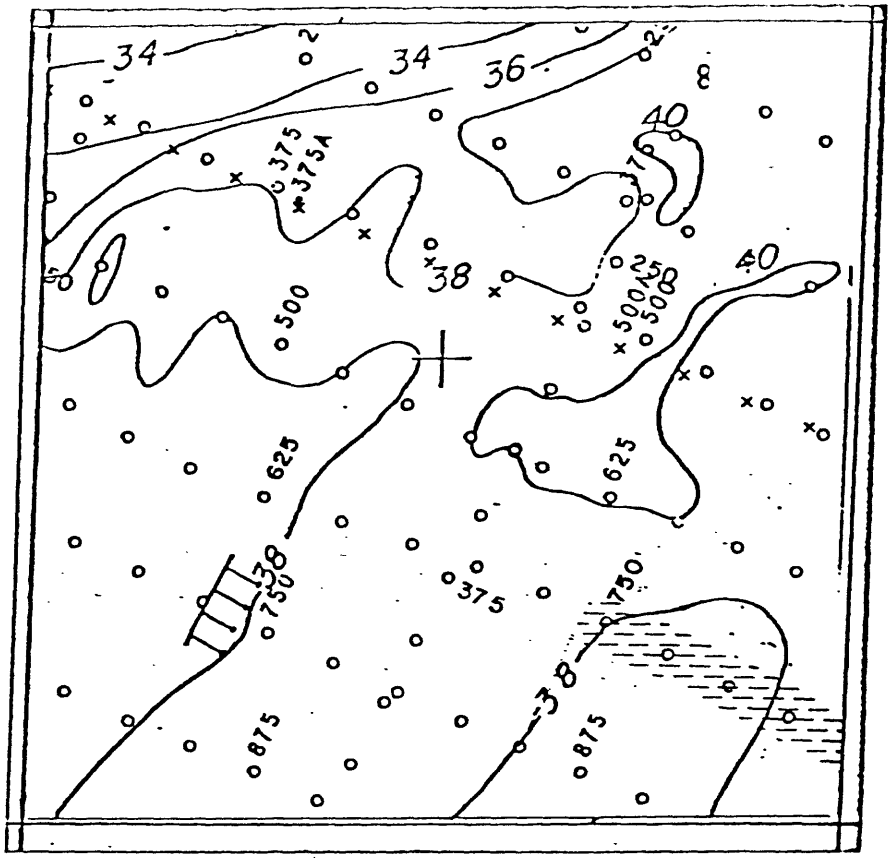


Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-2-1002 *

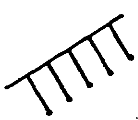


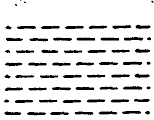
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 40m , min. 34m
Slope Gradient: 1 m/km, Direction: SE
Surface Sediment Type: Sand

CONSTRAINTS

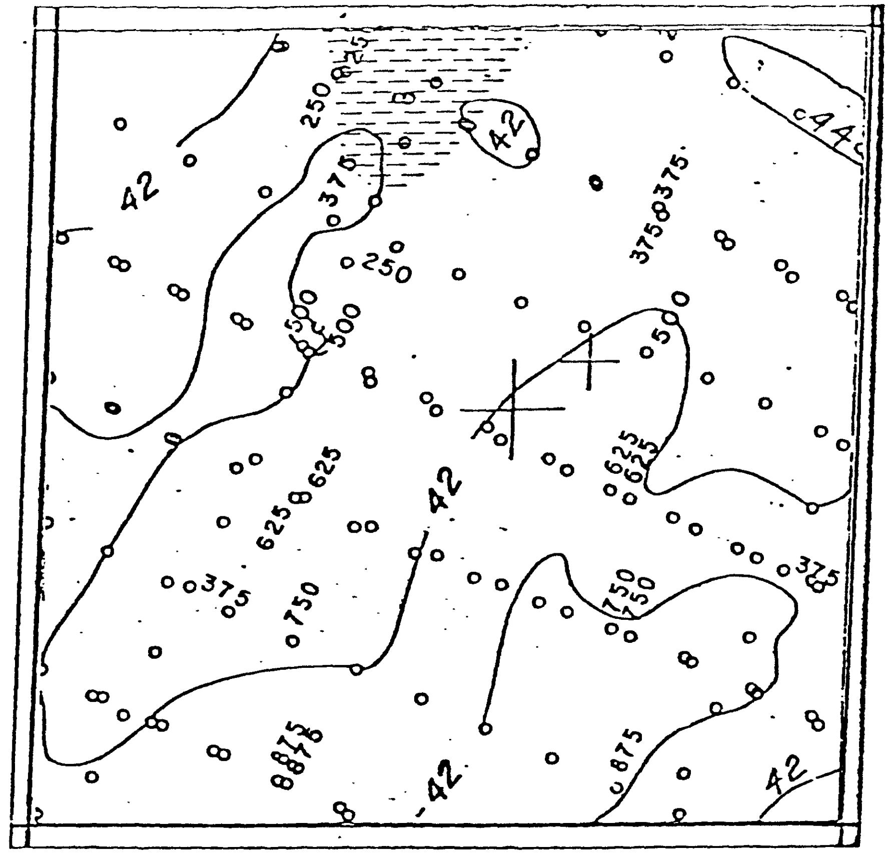

Fault


Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-2-1006*

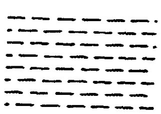


Water Depth: max. 44m , min. 42m
Slope Gradient: 1 m/km, Direction: NE
Surface Sediment Type: Sand

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

CONSTRAINT

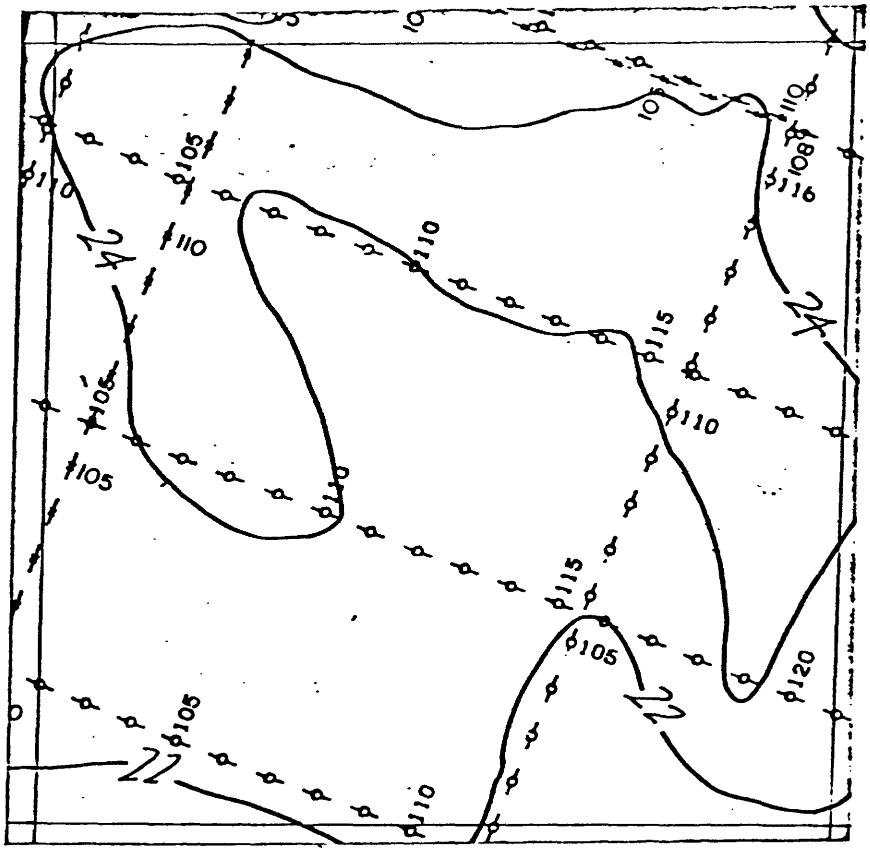


Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-5-24



SCALE 1:48000

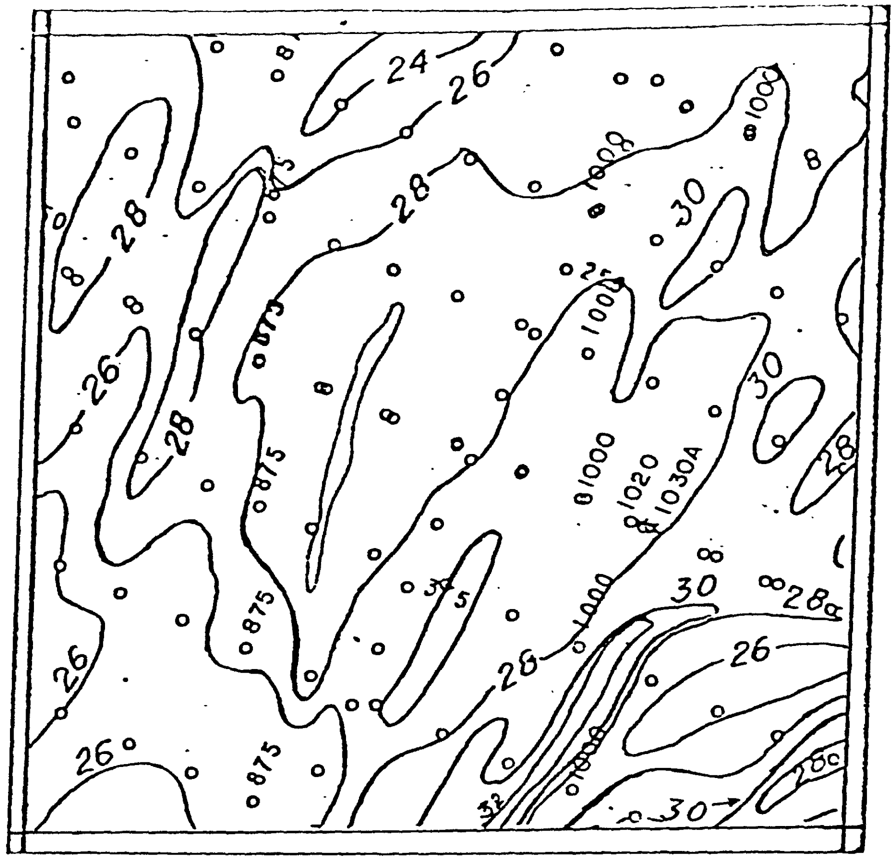
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 25m , min.21m
Slope Gradient: 1 m/km, Direction:Variable
Surface Sediment Type:Sand

Proposed
Lease Sale 56

Block
NH 17-5-27 *



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

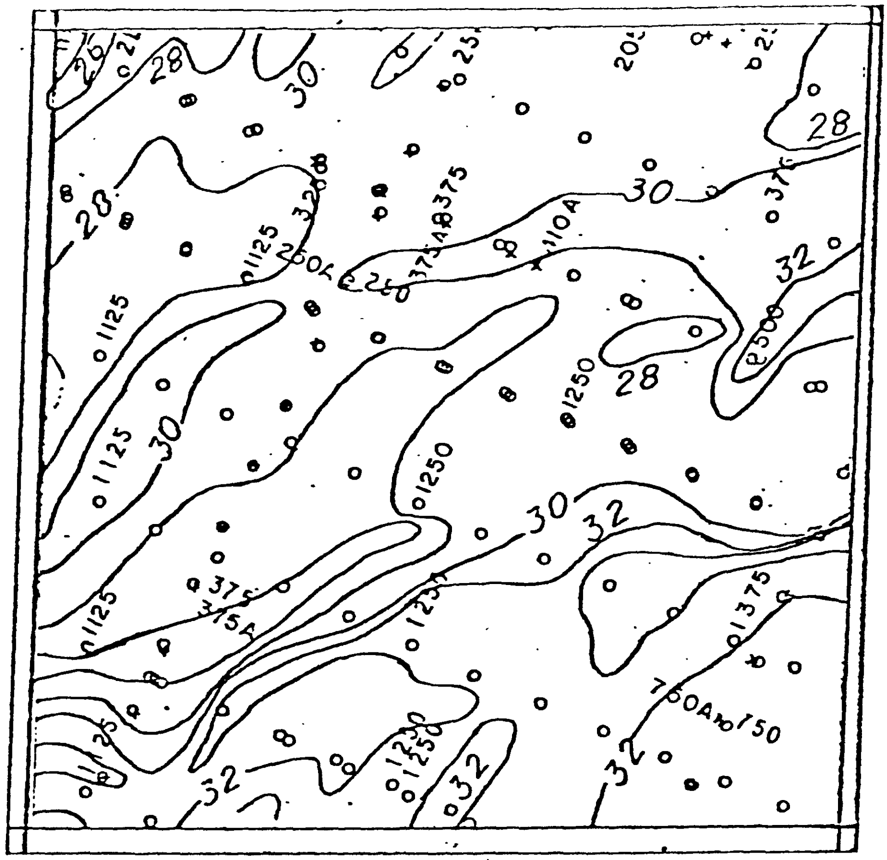
ISOBATHS IN METERS

Water Depth: max. 33m , min. 24m
Slope Gradient: 2 m/km, Direction:SE
Surface Sediment Type: Sand

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17–5–28 *



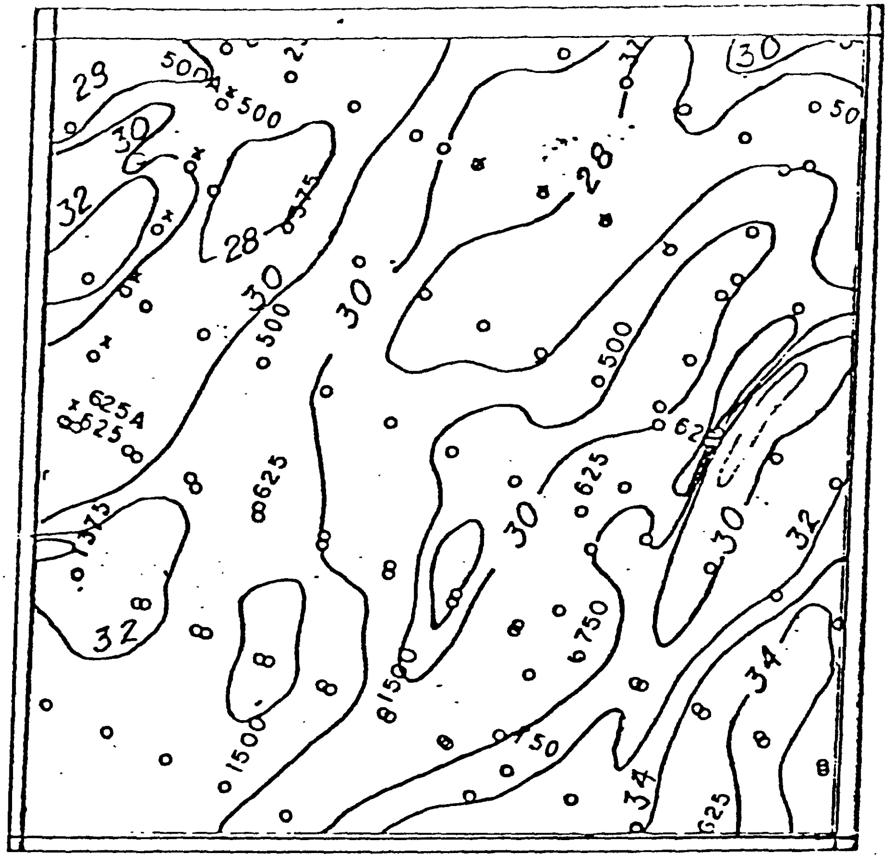
Water Depth: max. 33m , min. 25m
Slope Gradient: 2 m/km, Direction:SE
Surface Sediment Type: Sand

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-5-29*



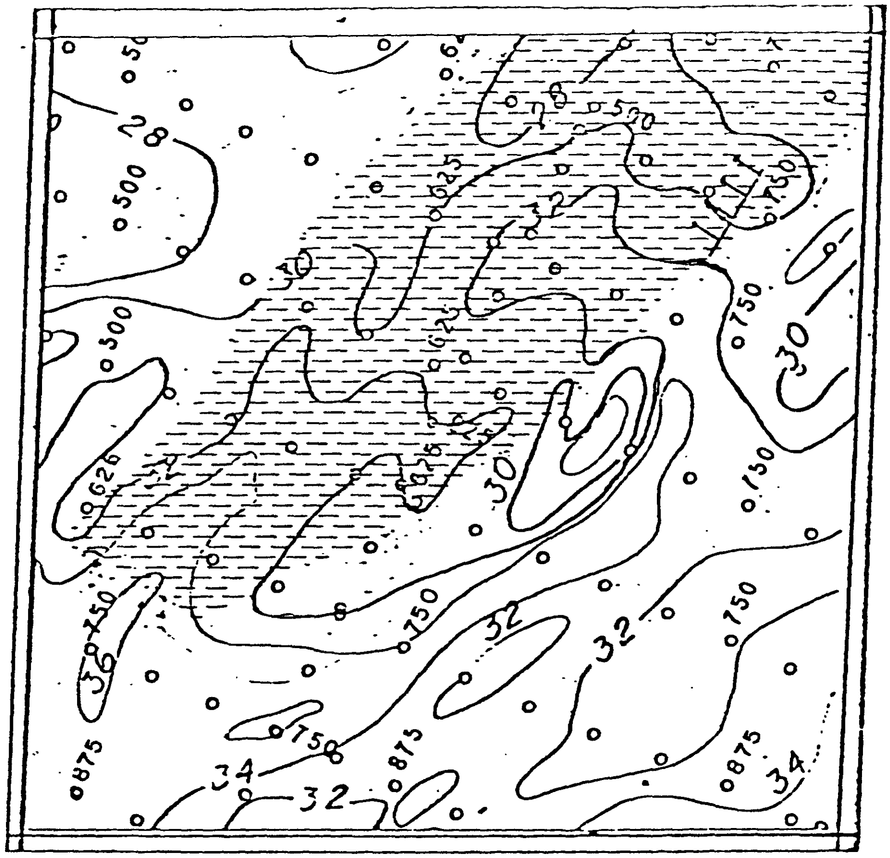
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 34m , min.27m
Slope Gradient: 2 m/km, Direction: SE
Surface Sediment Type:Sand

* Also included in Lease Sale 43

Proposed
Lease Sale 56



Block
NH 17–5–30 *

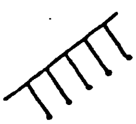
SCALE 1:48000

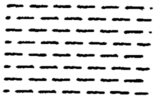
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 36m , min.27m
Slope Gradient: 2 m/km, Direction: SE
Surface Sediment Type: Sand

CONSTRAINTS

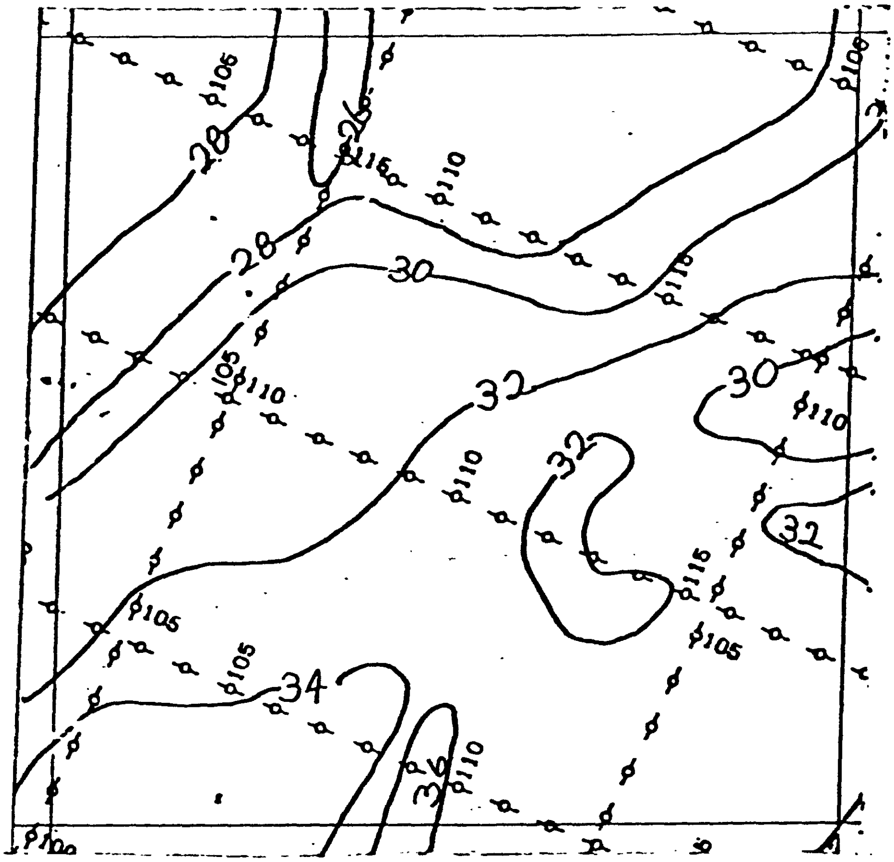

Fault


Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-5-31

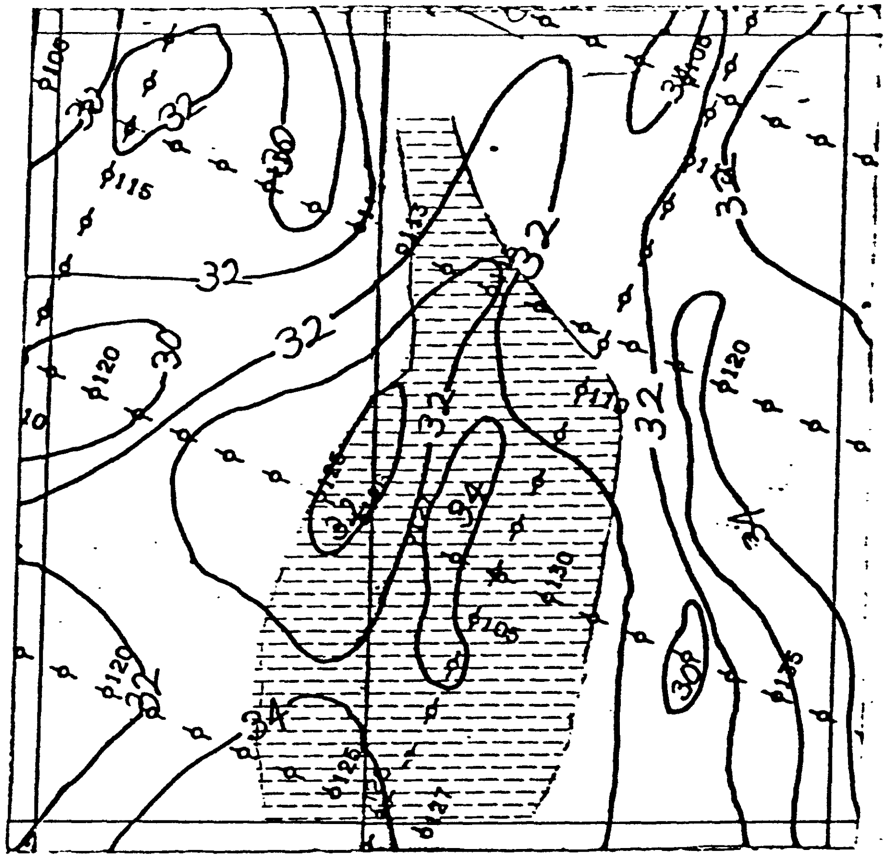


Water Depth: max. 37m , min.25m
Slope Gradient: 2 m/km, Direction:S
Surface Sediment Type: Sand

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NH 17-5-32



Water Depth: max. 34m , min. 29m
Slope Gradient: 1 m/km, Direction: E
Surface Sediment Type: Sand

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

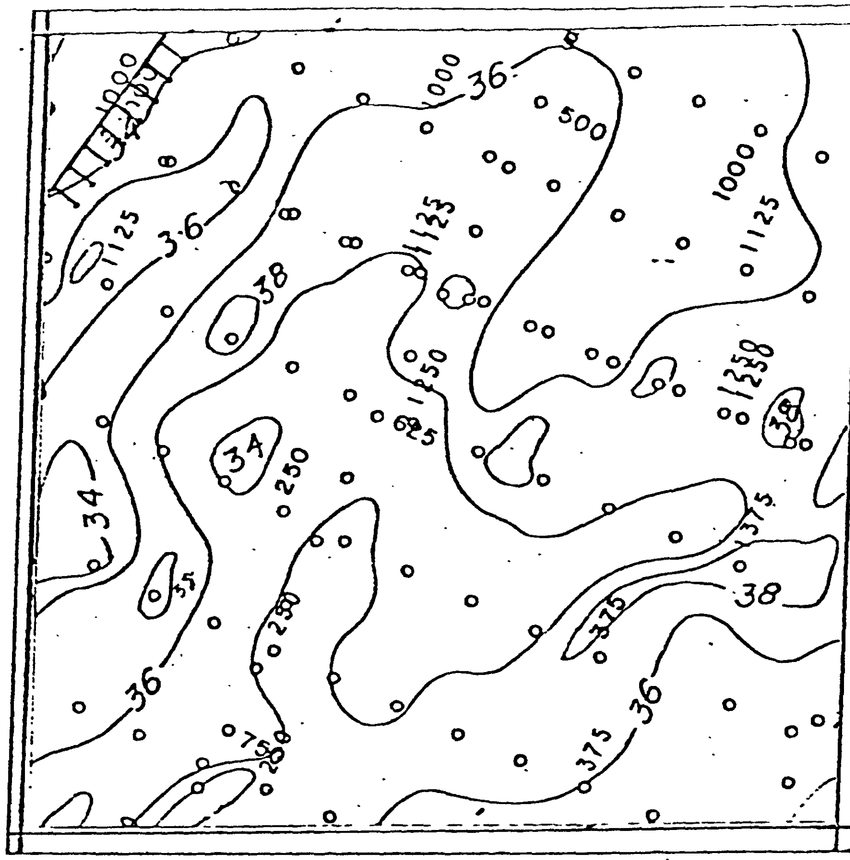
ISOBATHS IN METERS

CONSTRAINT

Filled Channel

Proposed
Lease Sale 56

Block
NH 17–5–33 *



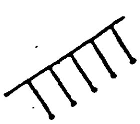
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 39m , min. 33m
Slope Gradient: 1 m/km, Direction:SE
Surface Sediment Type: Sand

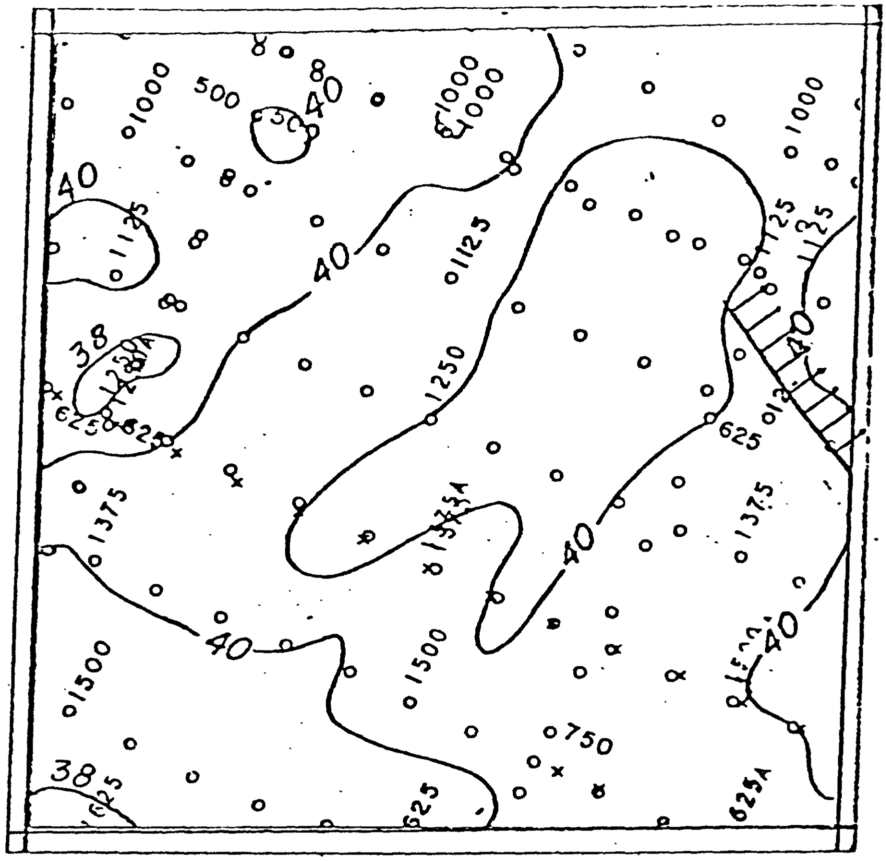
CONSTRAINT


Fault

* Also included in Lease Sale 43

Proposed
Lease Sale 56

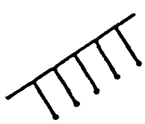
Block
NH 17-5-37*



SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 41m , min. 37m
Slope Gradient: 1 m/km, Direction: SE
Surface Sediment Type: Sand

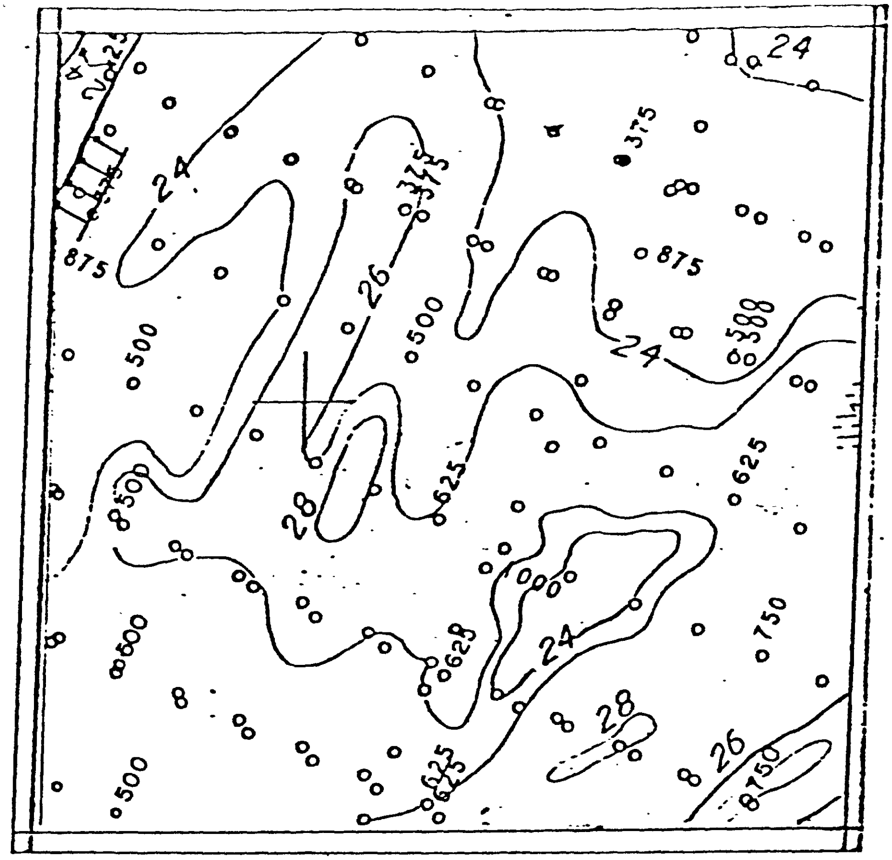
CONSTRAINT


Fault

* Also included in Lease Sale 43

Proposed
Lease Sale 56

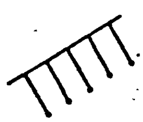
Block
NH 17-5-69 *

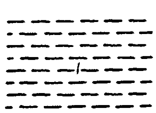


SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 28m , min.24m
Slope Gradient: 1 m/km, Direction:SE
Surface Sediment Type: Sand

CONSTRAINTS

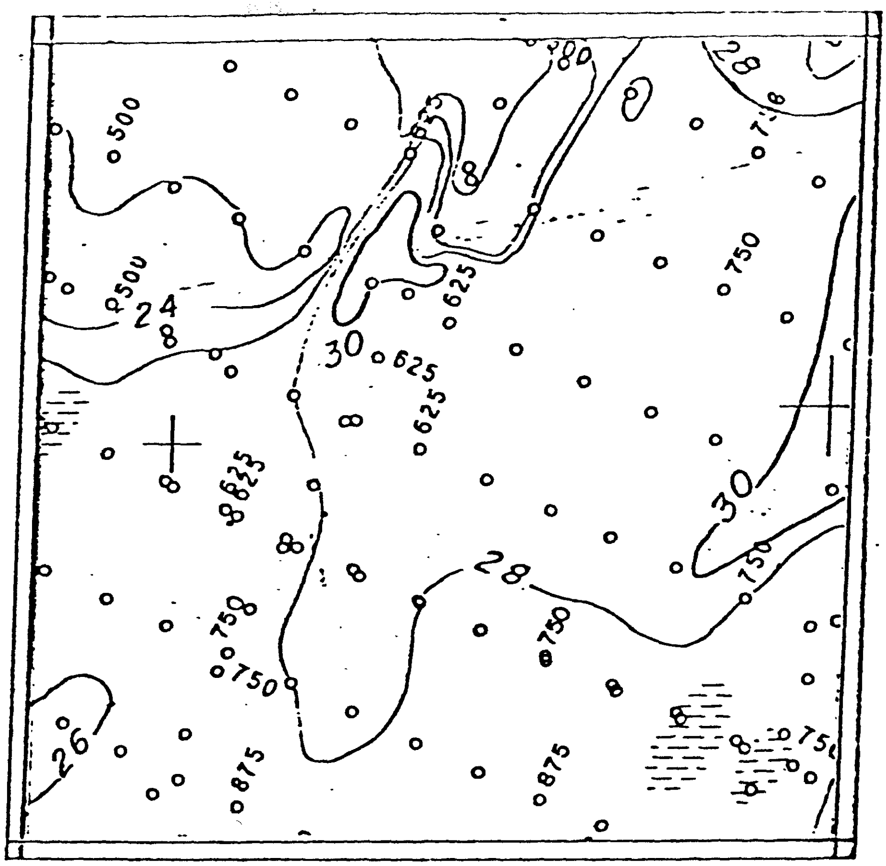

Fault


Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-5-70 *



Water Depth: max. 31m , min.23m
Slope Gradient: 2 m/km, Direction:SE
Surface Sediment Type: Sand

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

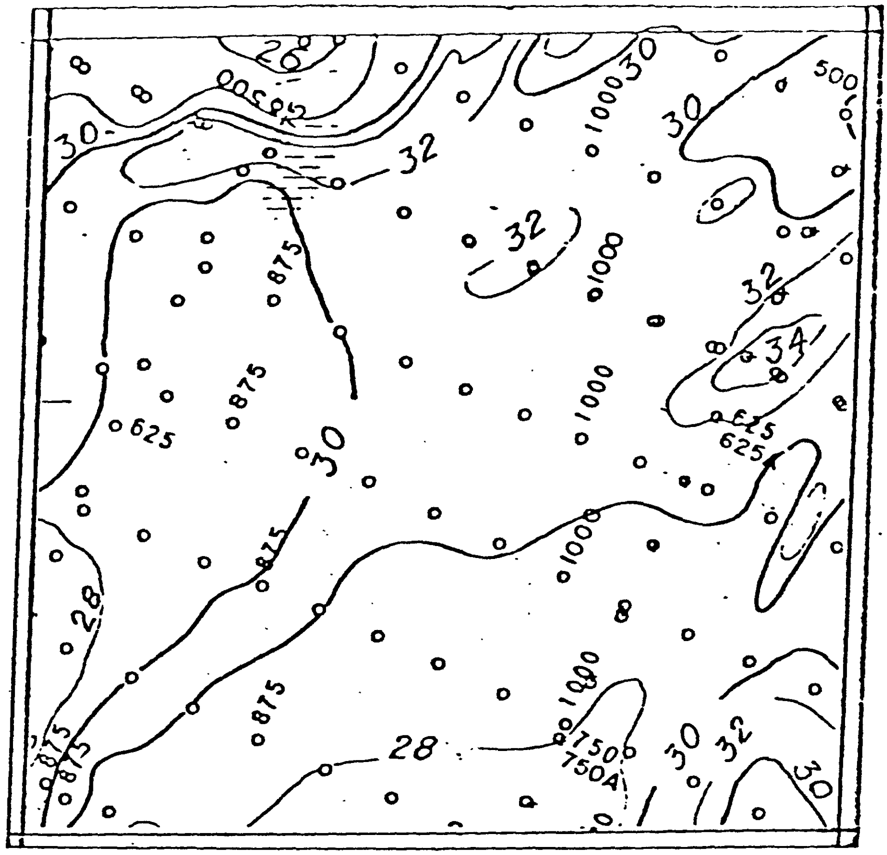
CONSTRAINT.

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-5-71*



Water Depth: max. 34m , min.26m
Slope Gradient: 1 m/km, Direction:NW&SE
Surface Sediment Type: Sand

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

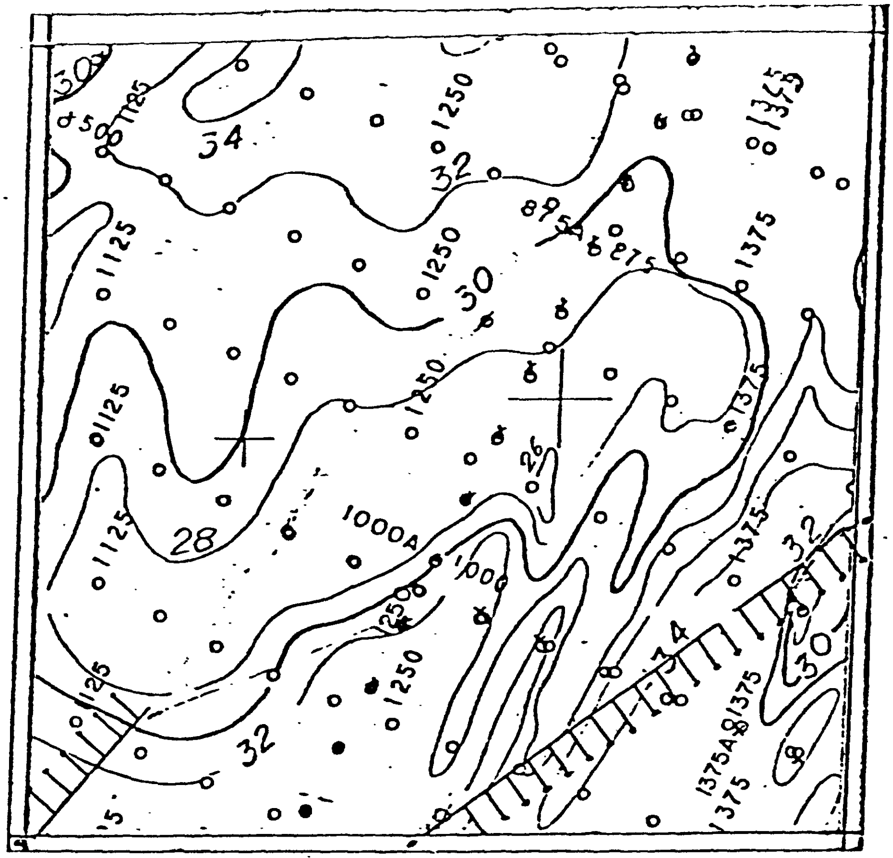
CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-5-72 *



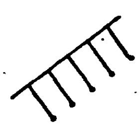
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 36m , min. 26m
Slope Gradient: 2 m/km, Direction: S
Surface Sediment Type: Sand

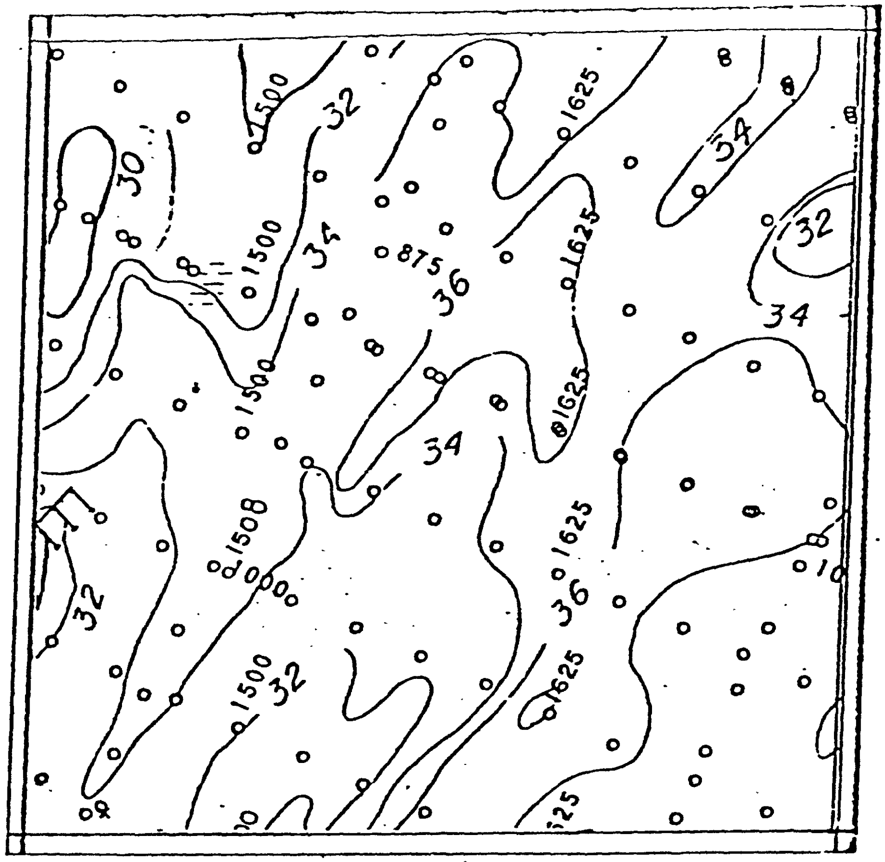
CONSTRAINT


Fault

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-5-73 *



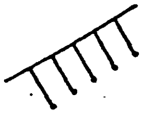
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

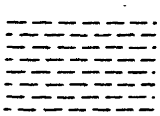
ISOBATHS IN METERS

Water Depth: max. 38m , min. 30m
Slope Gradient: 2 m/km, Direction: SE
Surface Sediment Type: Sand

CONSTRAINTS



Fault

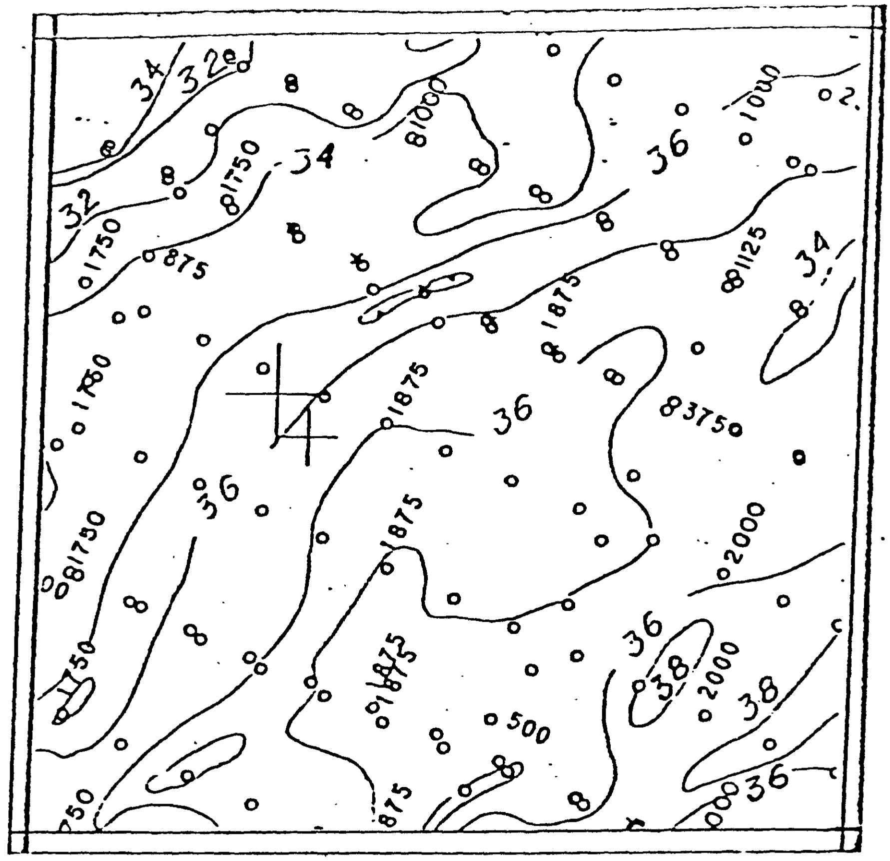


Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-5-74*



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

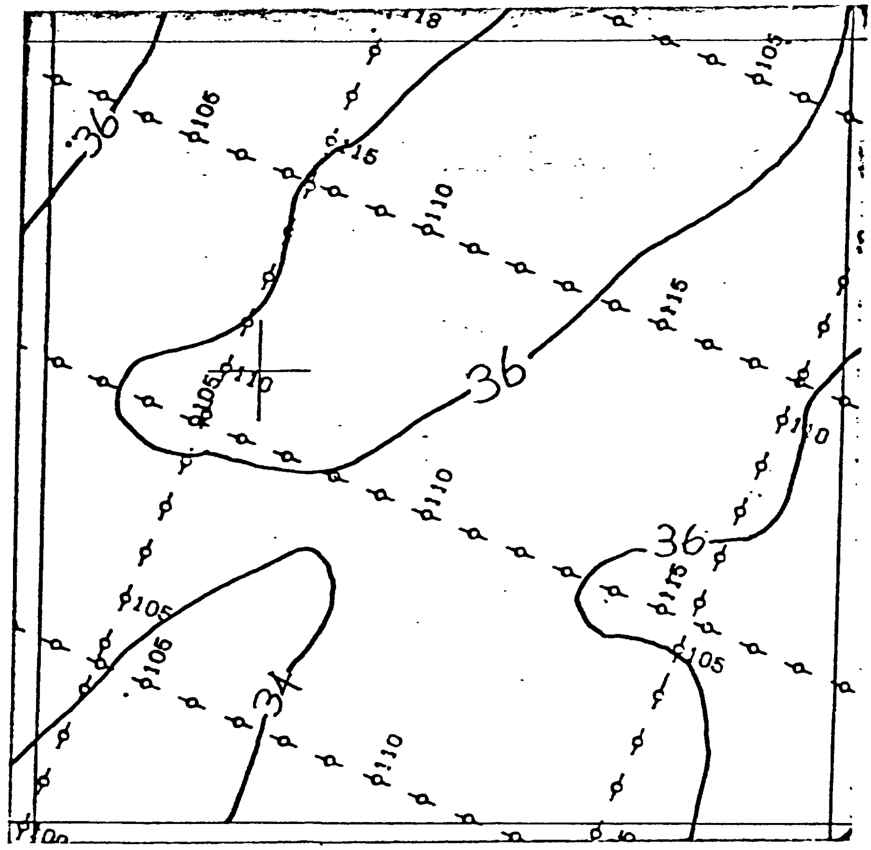
ISOBATHS IN METERS

Water Depth: max. 38m , min. 31m
Slope Gradient: 2 m/km, Direction: SE
Surface Sediment Type: Sand

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-5-79

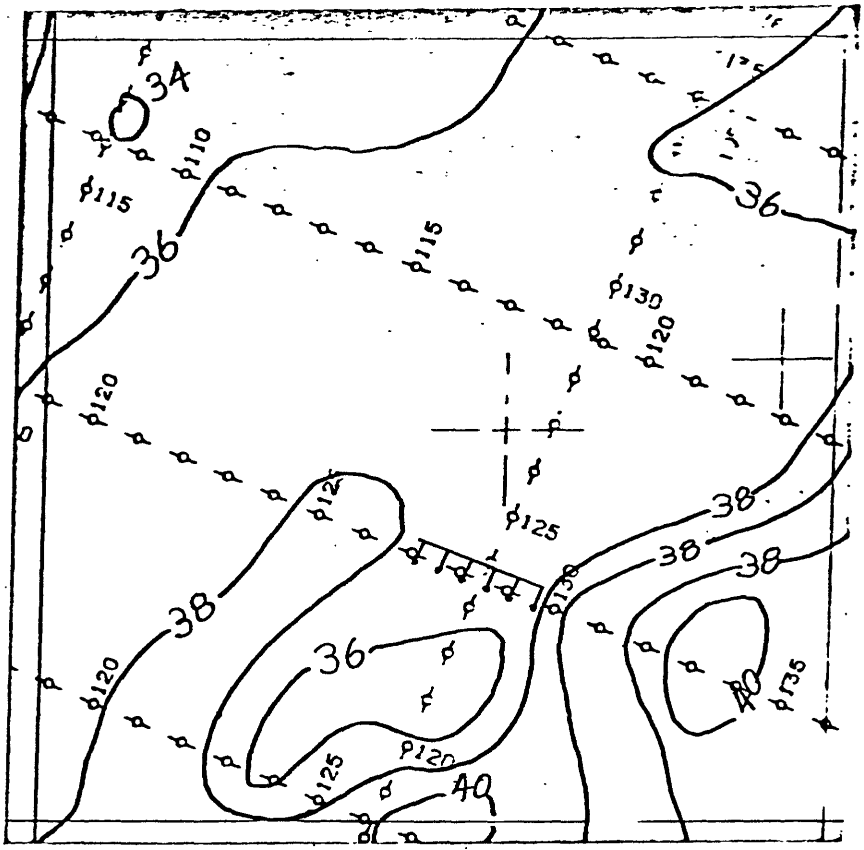


SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 37m , min. 33m
Slope Gradient: 1 m/km, Direction Variable
Surface Sediment Type: Sand

Proposed
Lease Sale 56

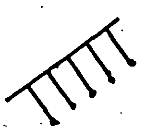
Block
NH 17-5-80



Water Depth: max. 40m , min. 34m
Slope Gradient: 1 m/km, Direction SE
Surface Sediment Type: Sand

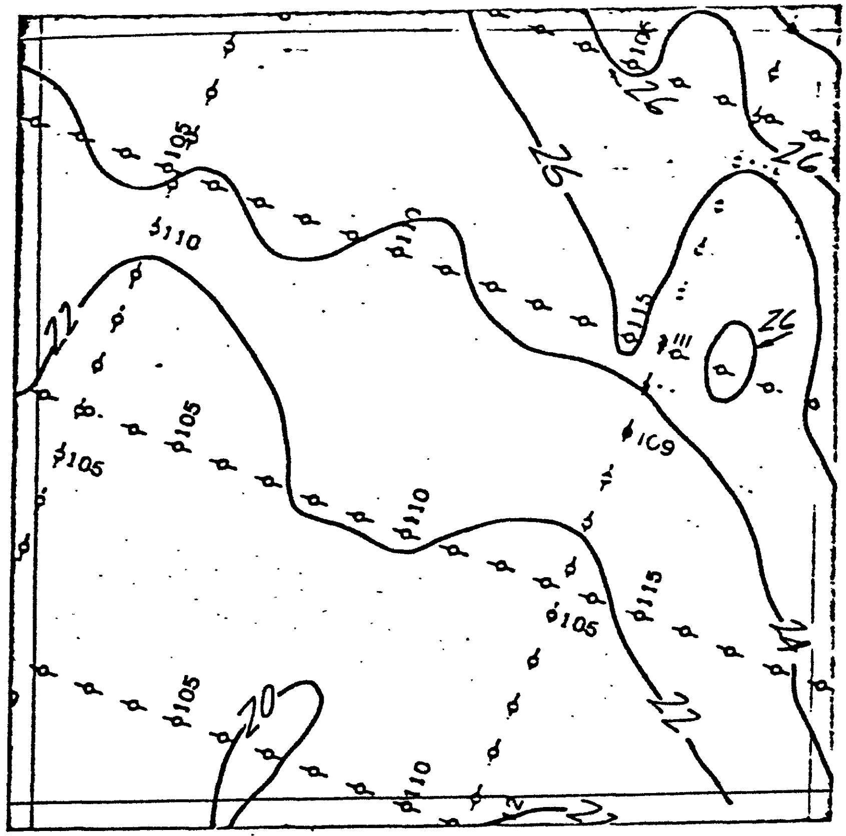
SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL-MILE
ISOBATHS IN METERS

CONSTRAINT


Fault

Proposed
Lease Sale 56

Block
NH 17-5-113



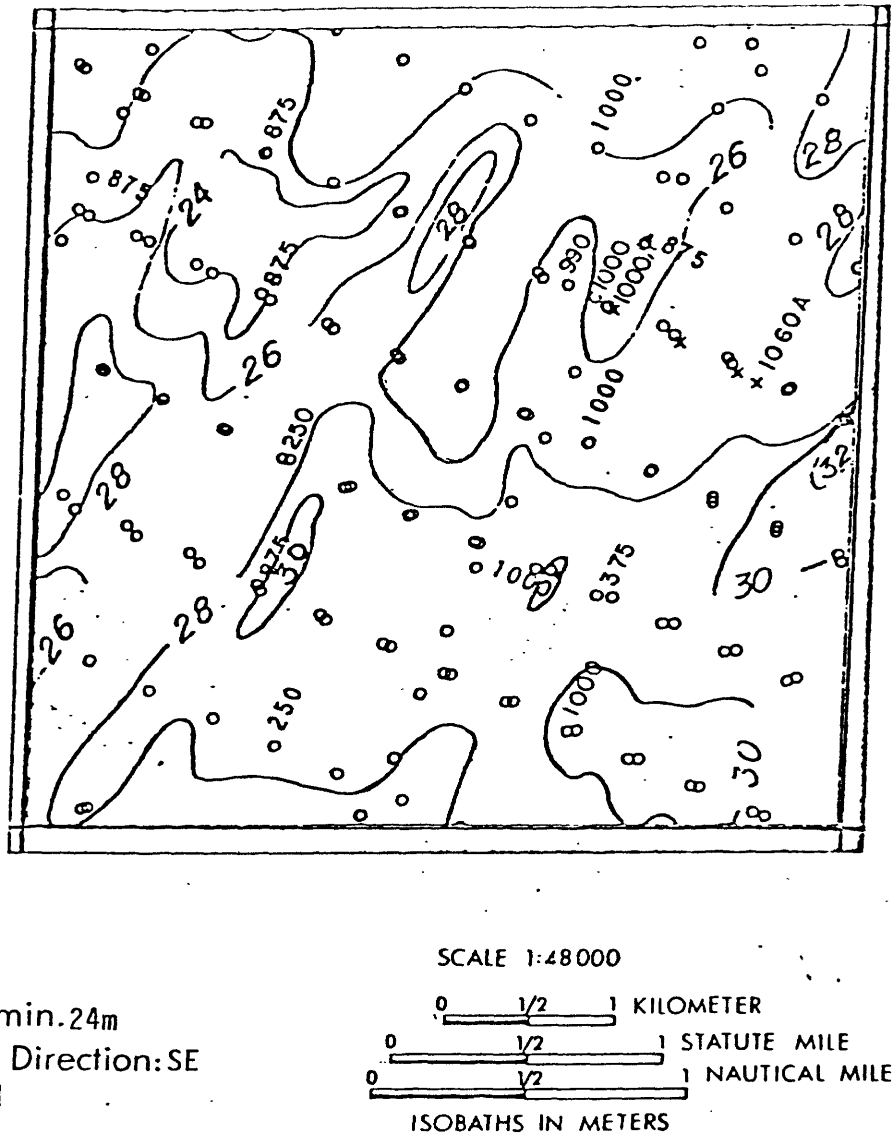
Water Depth: max. 27m , min. 20m
Slope Gradient: 1 m/km, Direction: NE
Surface Sediment Type: Sand

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NH 17–5–114*

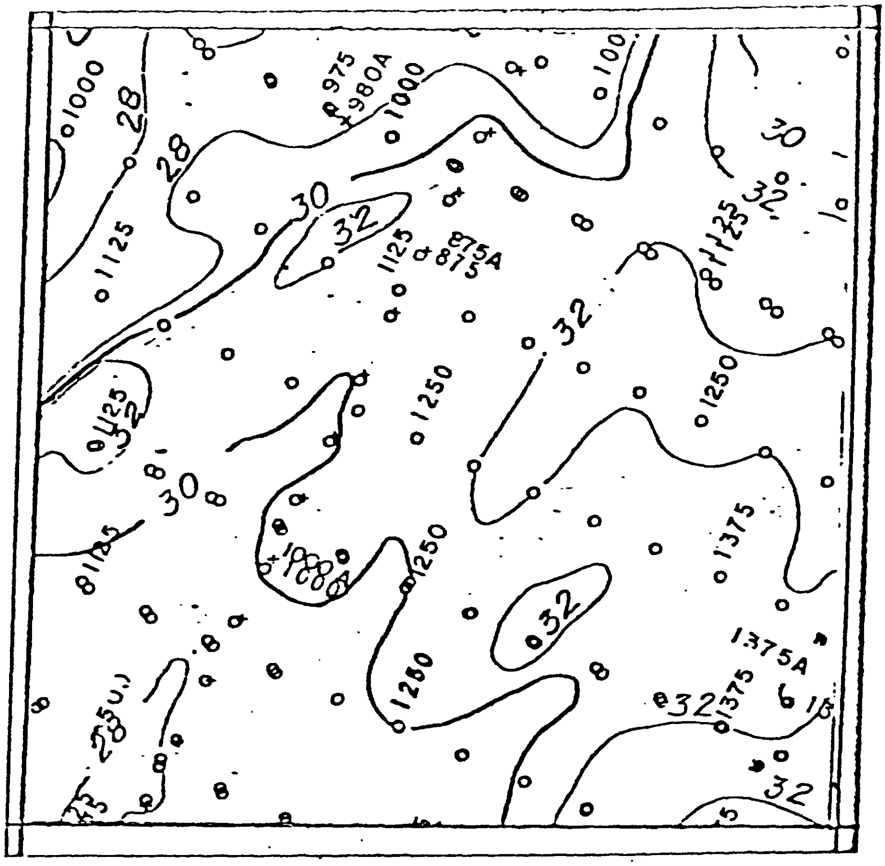


Water Depth: max.32m , min.24m
Slope Gradient: 2 m/km, Direction: SE
Surface Sediment Type: Sand

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-5-115*



Water Depth: max 33m , min 27m
Slope Gradient: 2 m/km, Direction: SE
Surface Sediment Type: Sand

SCALE 1:48000

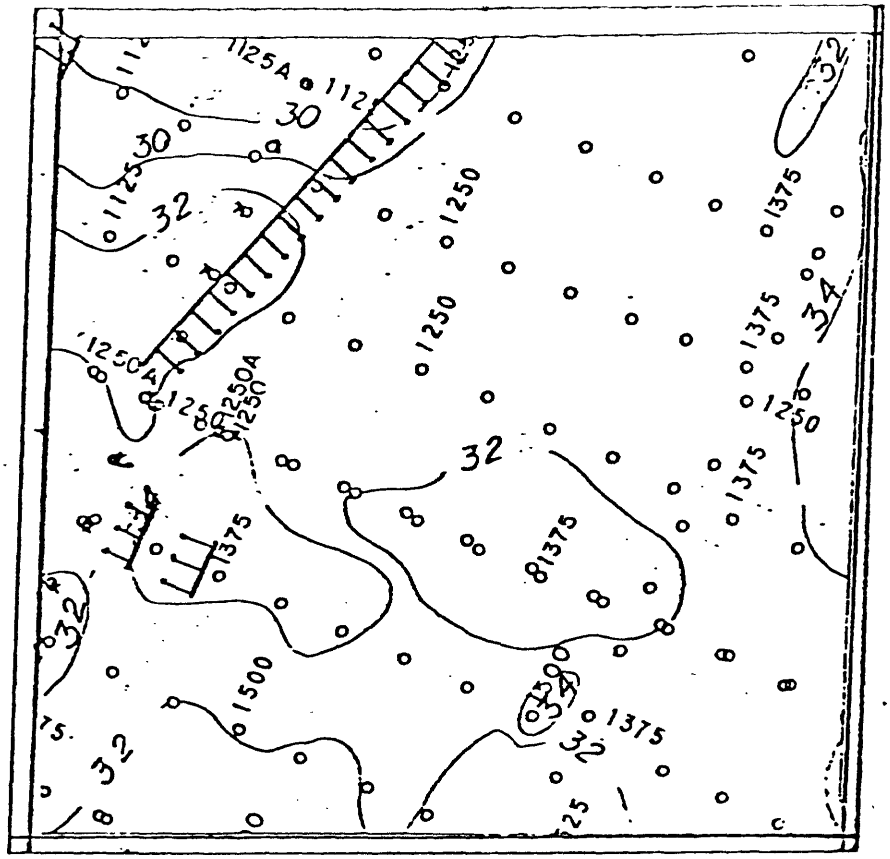
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-5-116 *



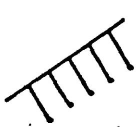
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max.34m , min.30m
Slope Gradient: 2 m/km, Direction:SE
Surface Sediment Type:Sand

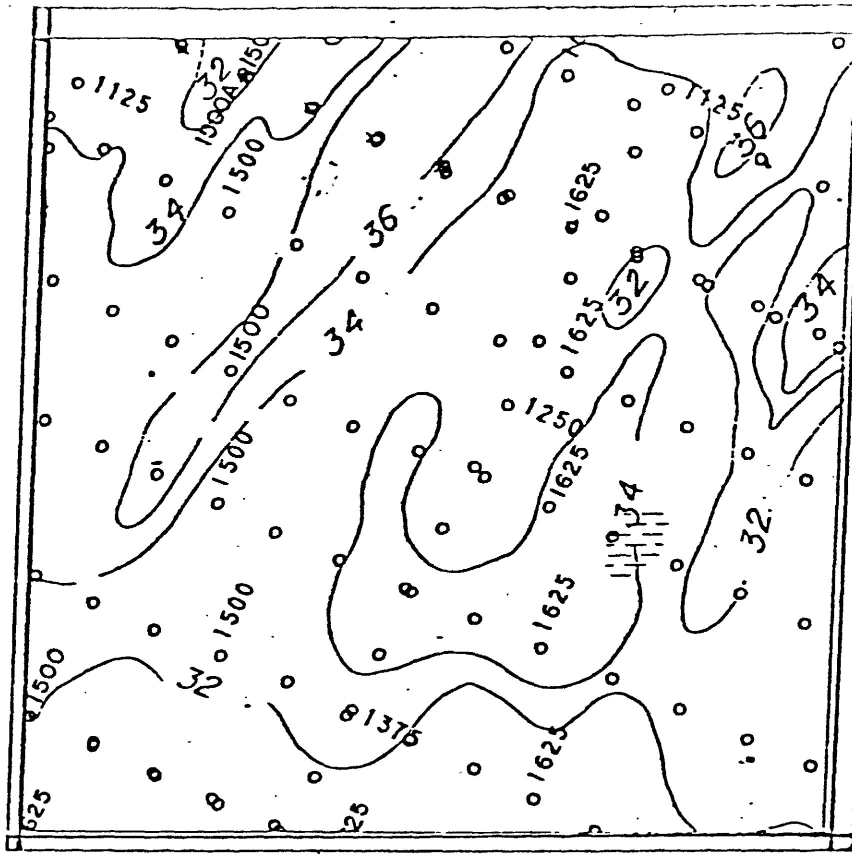
CONSTRAINT



Fault

* Also included in Lease Sale 43

Proposed
Lease Sale 56



Block
NH 17–5–117*

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max.37m , min.31m
Slope Gradient: 1 m/km, Direction:NW
Surface Sediment Type:Sand

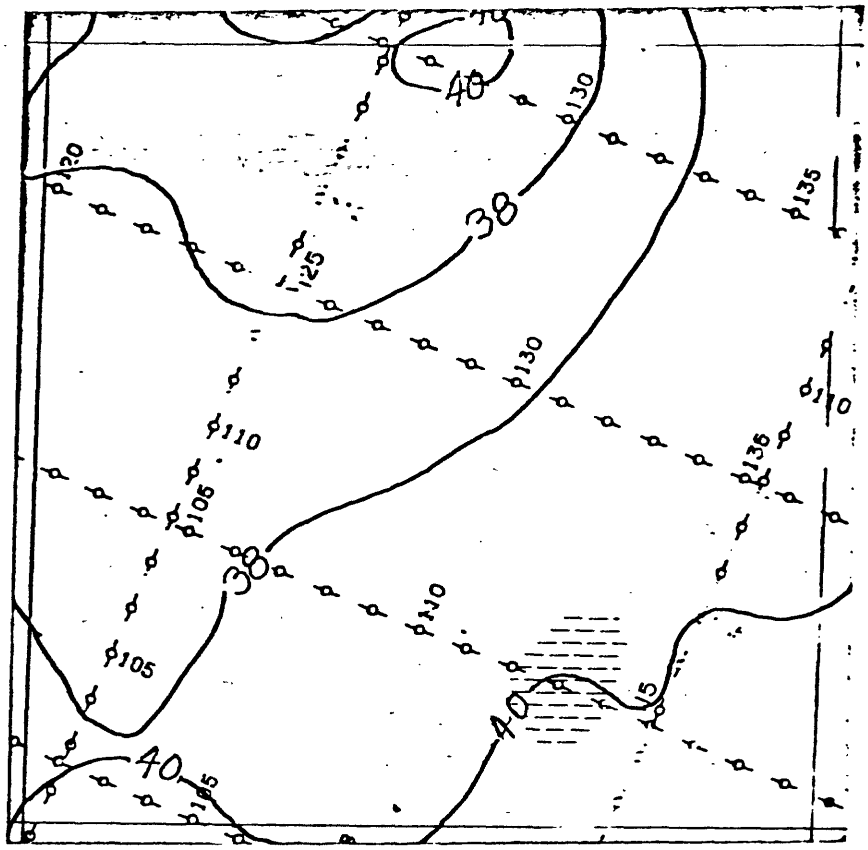
CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-5-124



SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

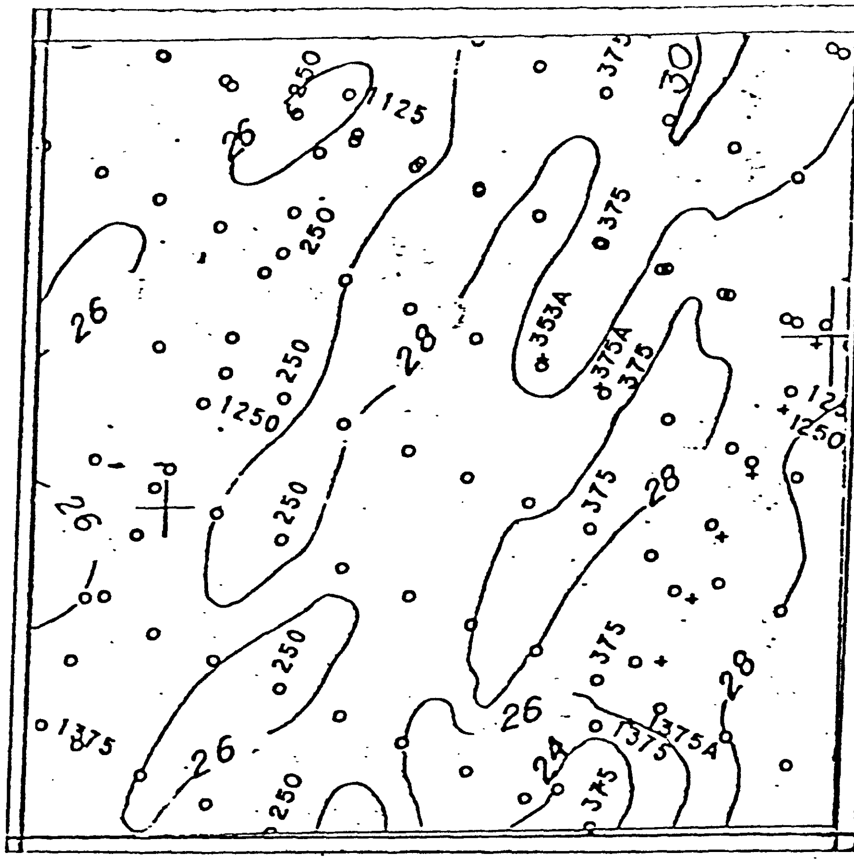
Water Depth: max. 40m , min. 38m
Slope Gradient: 1 m/km, Direction: Variable
Surface Sediment Type: Sand

CONSTRAINT

Filled Channel

Proposed
Lease Sale 56

Block
NH 17-5-158*



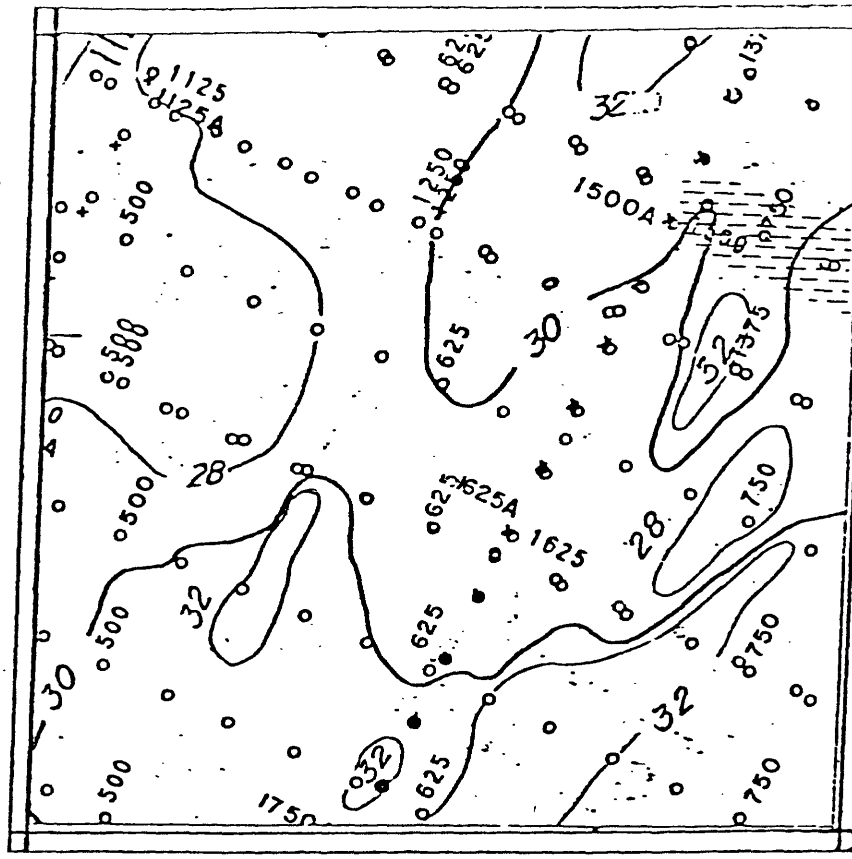
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max.30m , min.24m
Slope Gradient: 1 m/km, Direction:SE
Surface Sediment Type:Sand

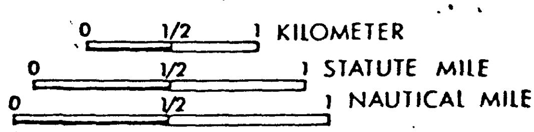
* Also included in Lease Sale 43

Proposed
Lease Sale 56



Block
NH 17-5-159 *

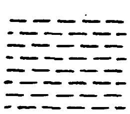
SCALE 1:48000



ISOBATHS IN METERS

Water Depth: max. 33m , min. 26m
Slope Gradient: 1 m/km, Direction SE
Surface Sediment Type: Sand

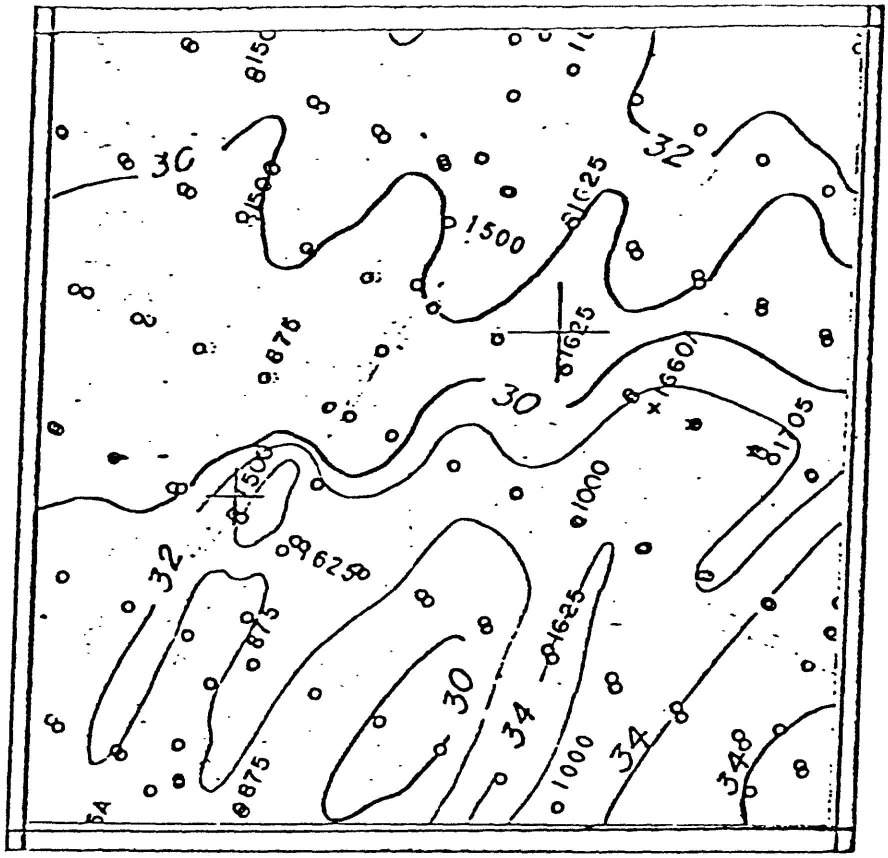
CONSTRAINT



Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56



Block
NH 17–5–160*

SCALE 1:48000

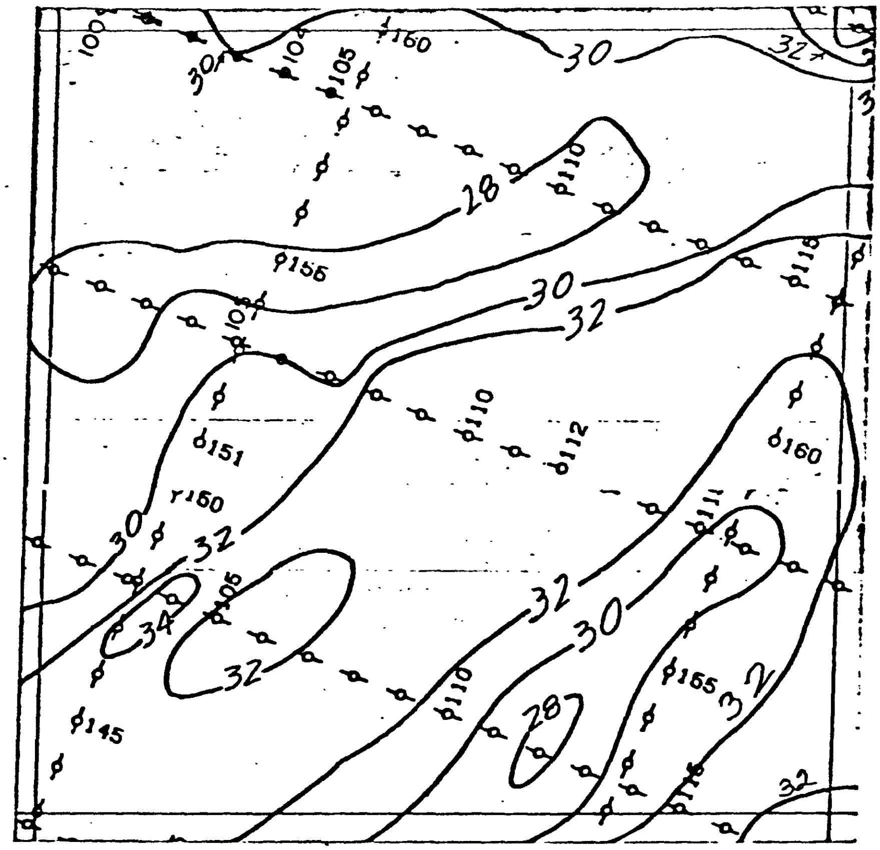
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max 34m , min. 30m
Slope Gradient: 2 m/km, Direction: SE
Surface Sediment Type: Sand

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-5-161



Water Depth: max. 34m , min. 27m
Slope Gradient: 2 m/km, Direction: Variable
Surface Sediment Type: Sand

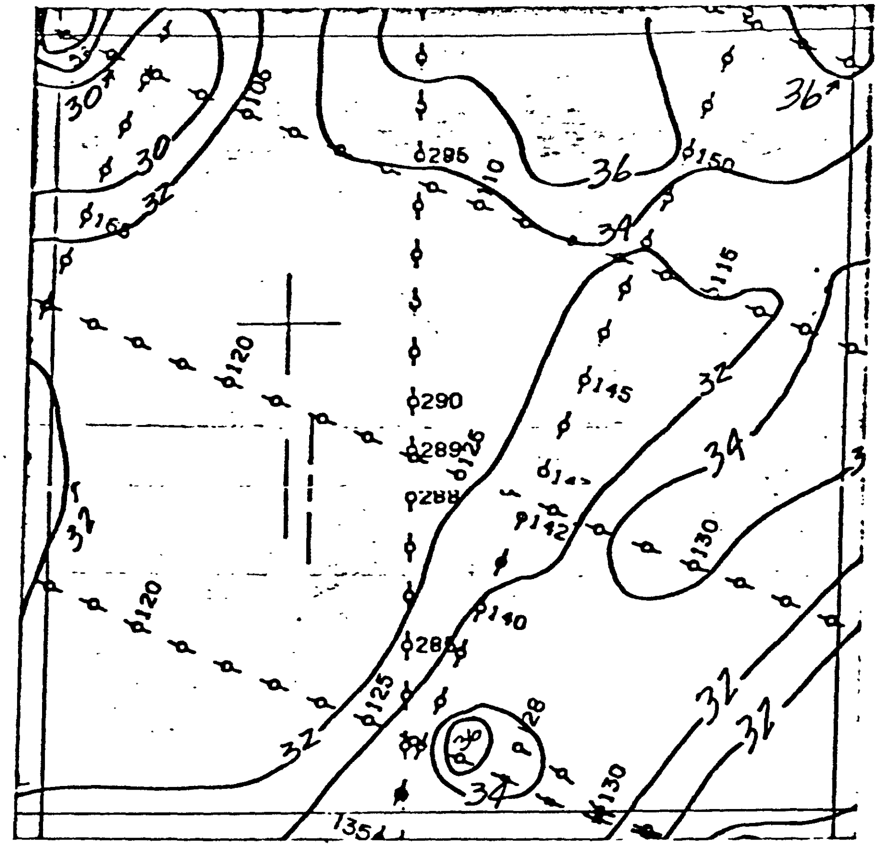
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NH 17-5-162



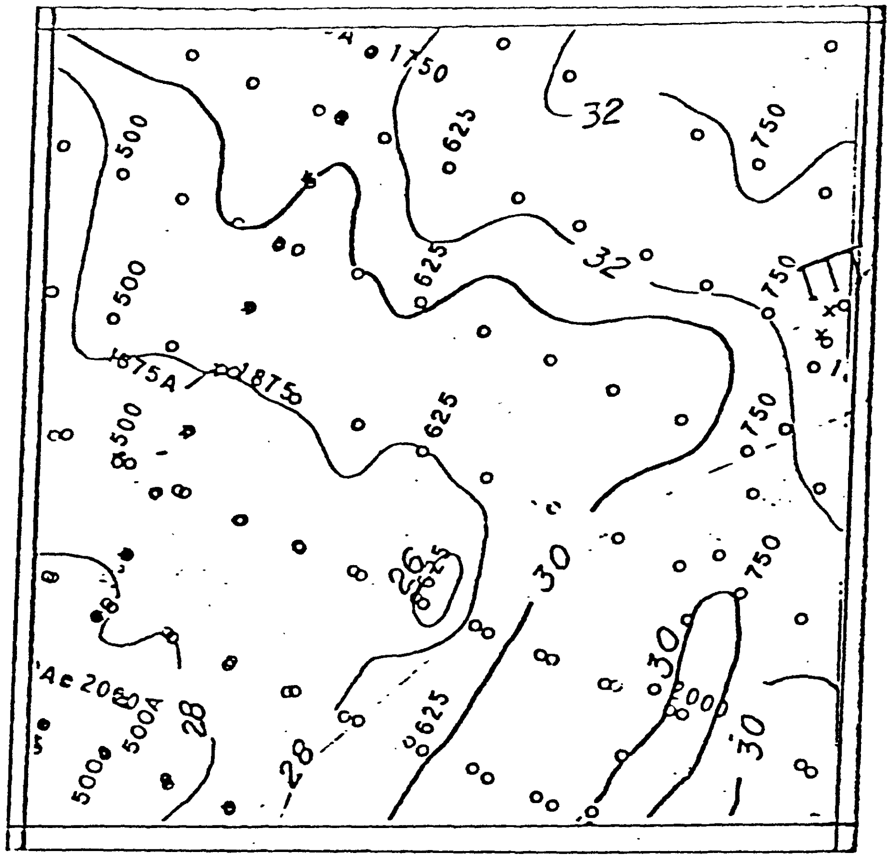
Water Depth: max. 36m , min. 29m.
Slope Gradient: 1 m/km, Direction: Variable
Surface Sediment Type: Sand

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Proposed
Lease Sale 56



Block
NH 17–5–203 *

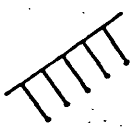
Water Depth: max.32m , min.25m
Slope Gradient: 1 m/km, Direction: SE&NE
Surface Sediment Type: Sand

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

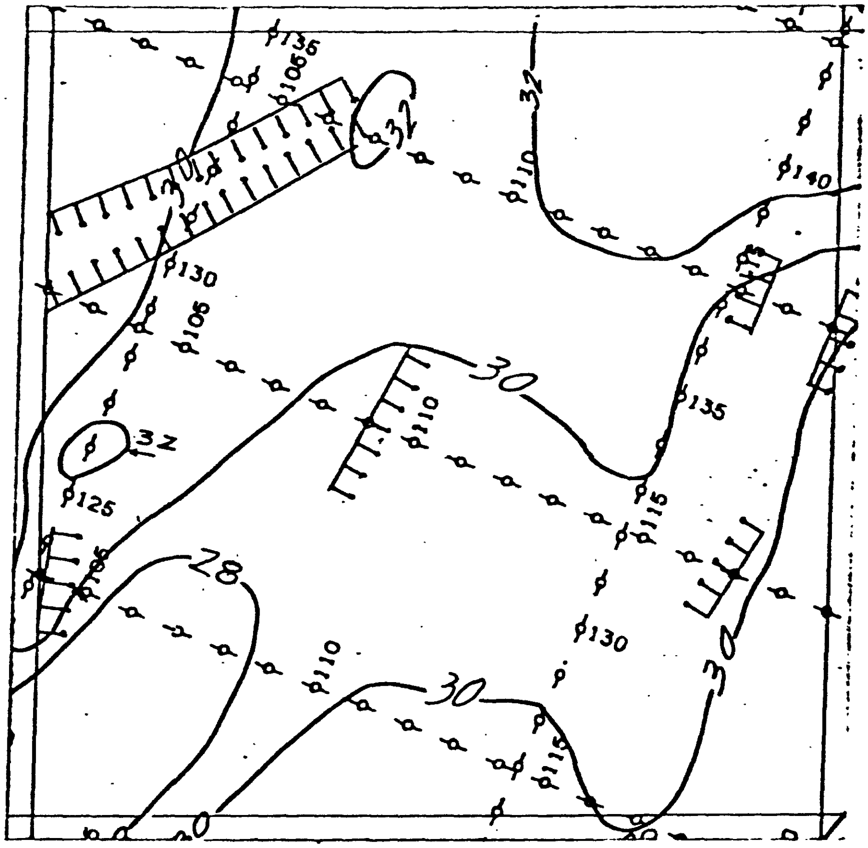
CONSTRAINT



Fault

* Also included in Lease Sale 43

Proposed
Lease Sale 56



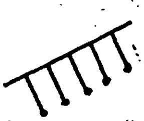
Block
NH 17-5-204

SCALE 1:48000

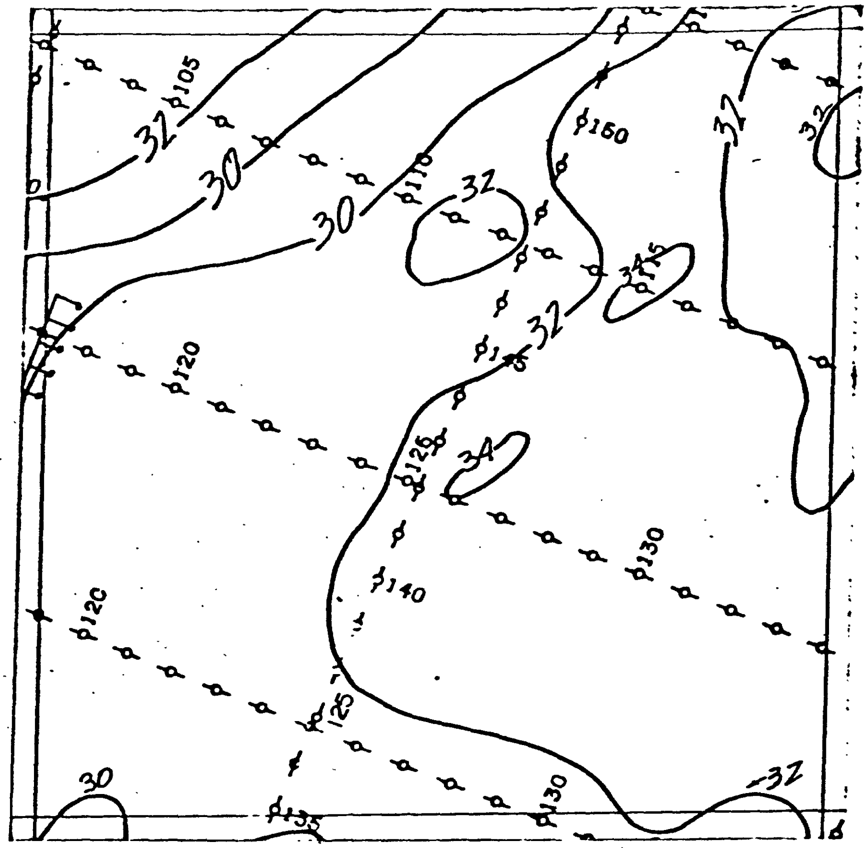
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 32m , min.27m
Slope Gradient: 1 m/km, Direction: NE
Surface Sediment Type: Sand

CONSTRAINT


Fault

Proposed
Lease Sale 56



Block
NH 17-5-205

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

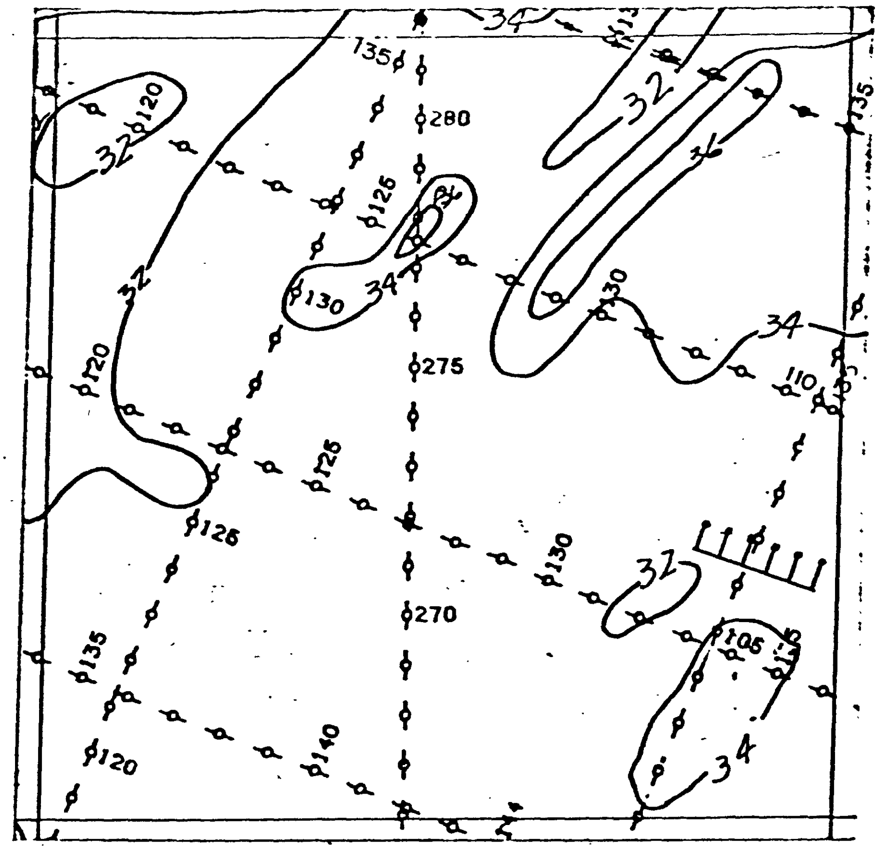
Water Depth: max. 34m , min. 29m
Slope Gradient: 1` m/km, Direction: Variable
Surface Sediment Type: Sand

CONSTRAINT

Fault

Proposed
Lease Sale 56

Block
NH 17-5-206

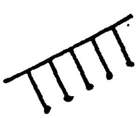


SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 36m , min 30m
Slope Gradient: 1 m/km, Direction: E
Surface Sediment Type: Sand

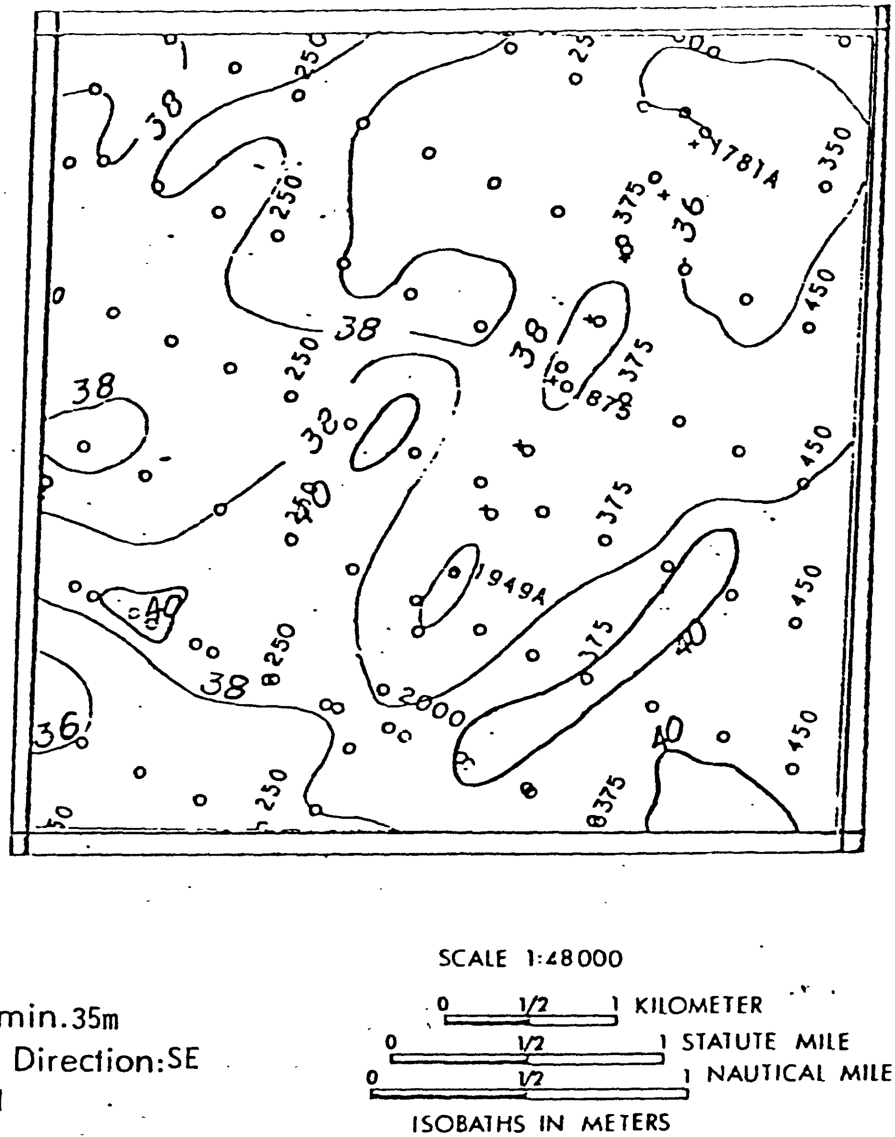
CONSTRAINT



Fault

Proposed
Lease Sale 56

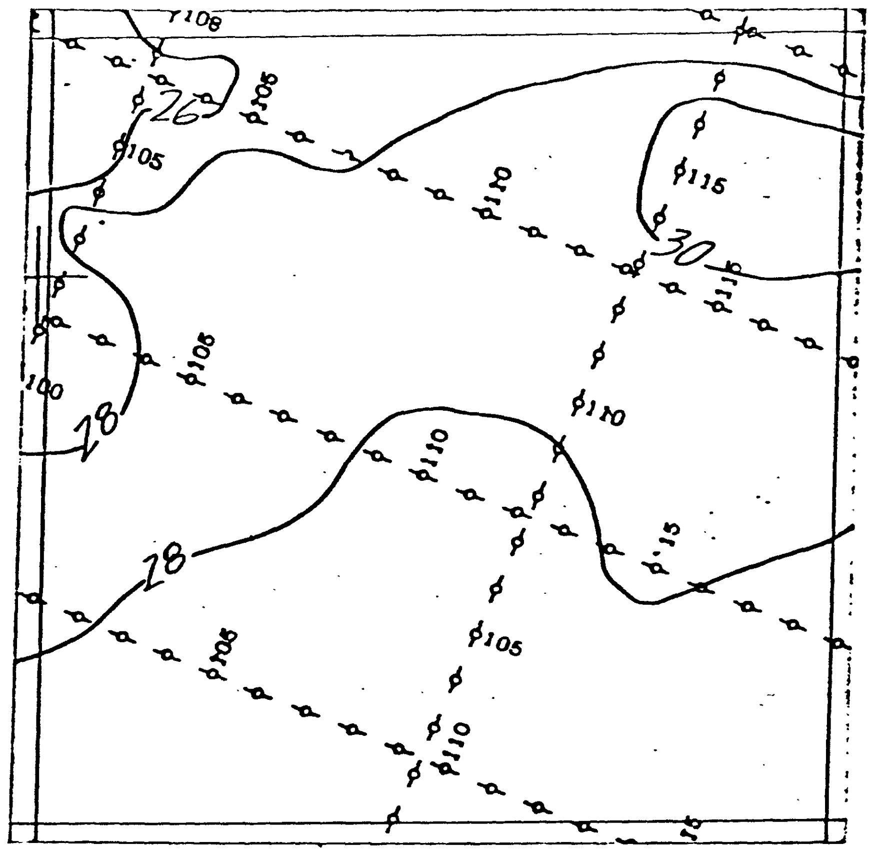
Block
NH 17-5-207*



Water Depth: max 41m , min. 35m
Slope Gradient: 1 m/km, Direction: SE
Surface Sediment Type: Sand

* Also included in Lease Sale 43

Proposed
Lease Sale 56



Block
NH 17-5-247

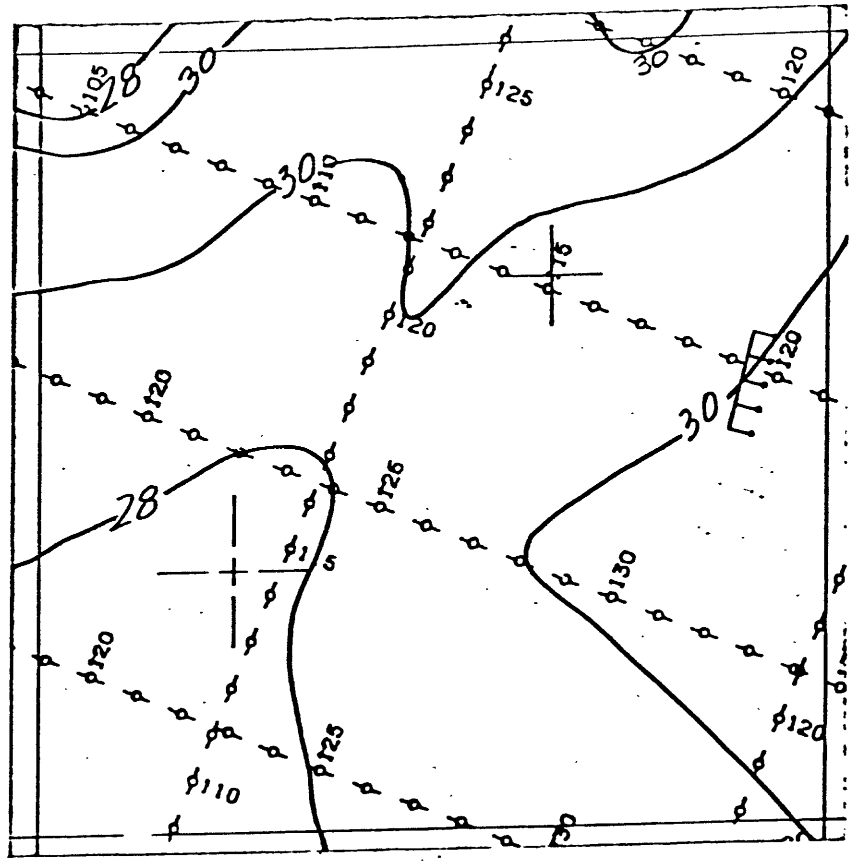
Water Depth: max. 30m , min. 26m
Slope Gradient: 1 m/km, Direction: E
Surface Sediment Type: Sand

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NH 17-5-248



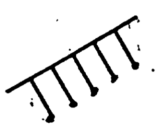
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 31m , min. 27m
Slope Gradient: 1 m/km, Direction: E
Surface Sediment Type: Sand

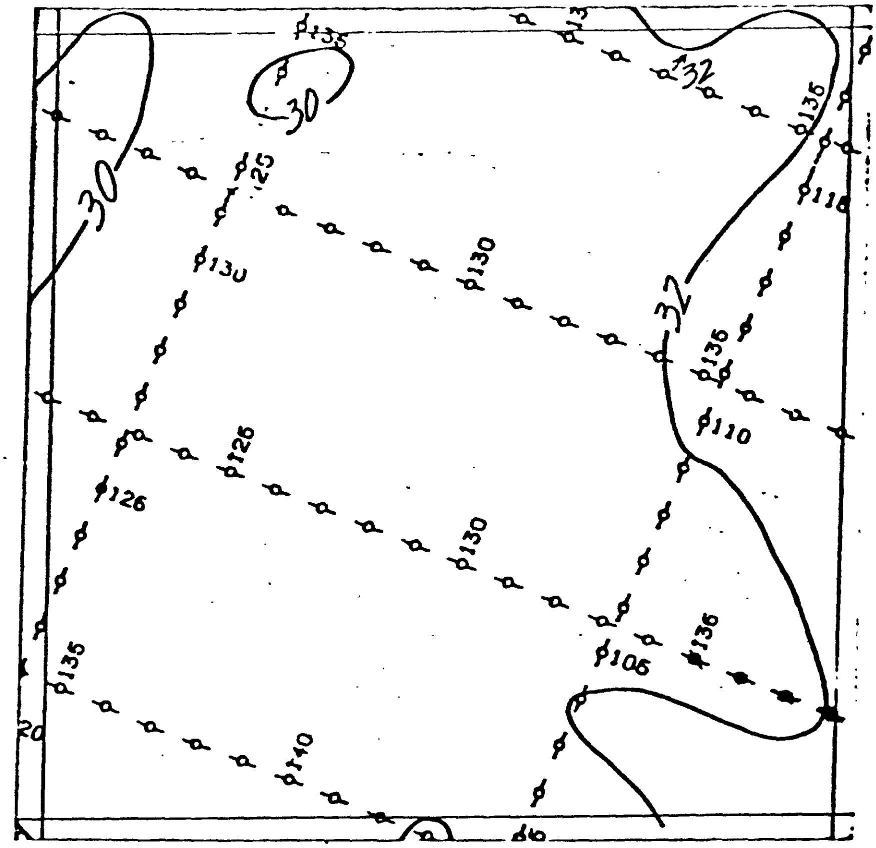
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NH 17-5-249

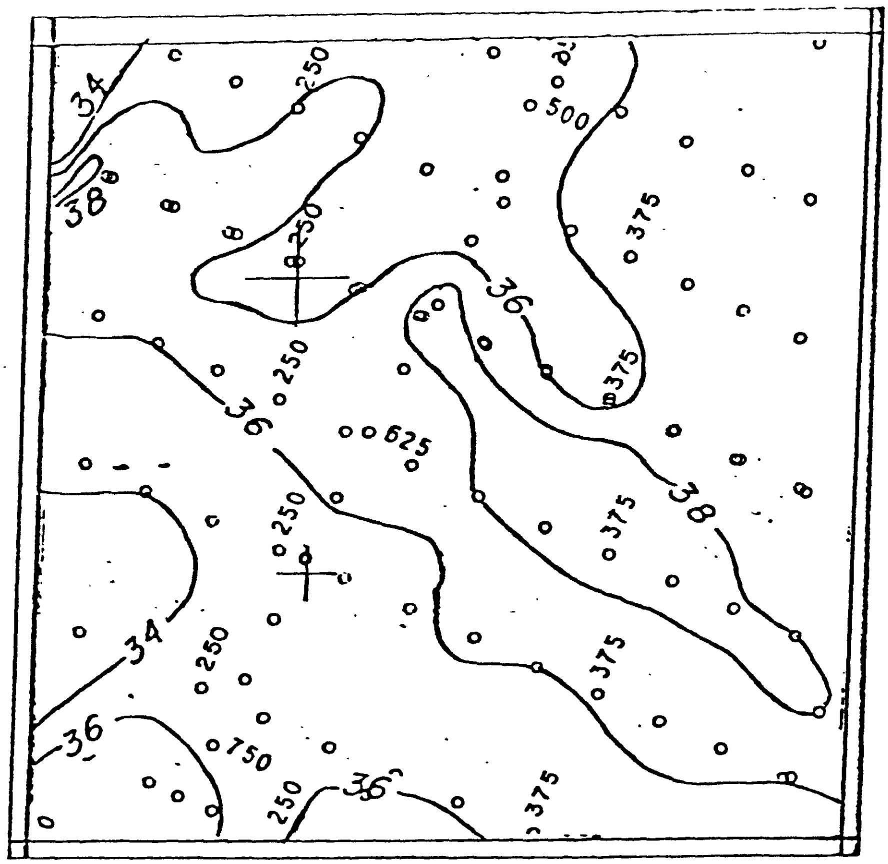


Water Depth: max. 33m , min. 30m
Slope Gradient: 1 m/km, Direction: E
Surface Sediment Type: Sand

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Proposed
Leose Sale 56

Block
NH 17–5–250 *



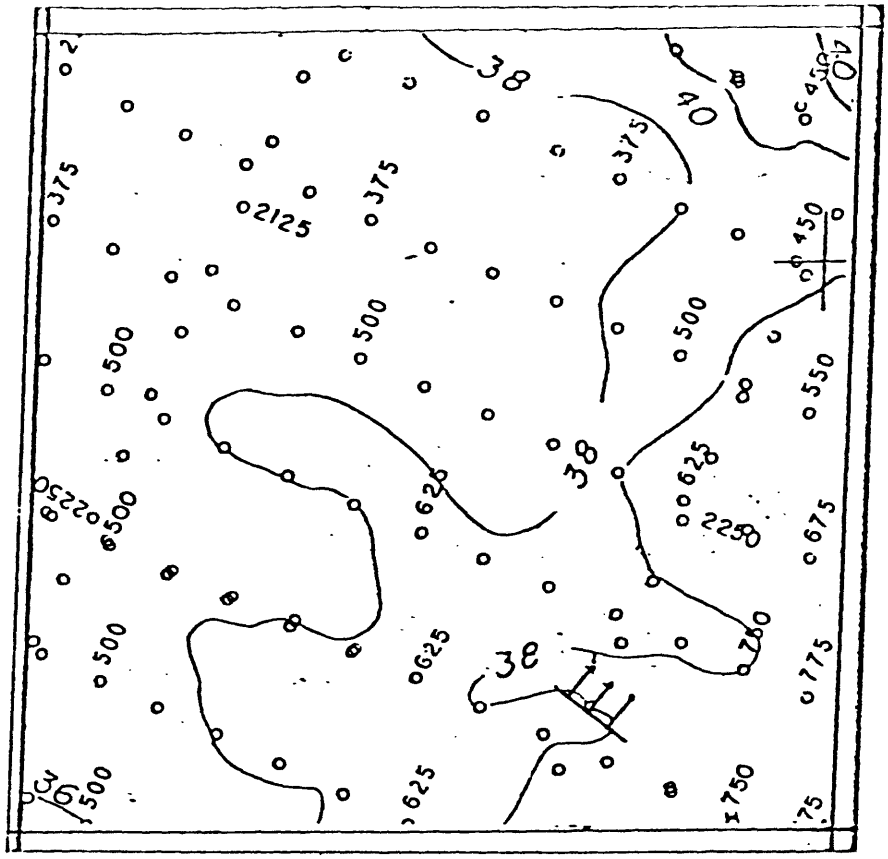
SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 38m , min.34m
Slope Gradient: 1-m/km, Direction:NE
Surface Sediment Type:Sand

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-5-251*

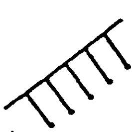


Water Depth: max. 40m , min. 36m
Slope Gradient: 1 m/km, Direction: NE
Surface Sediment Type: Sand

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

CONSTRAINT

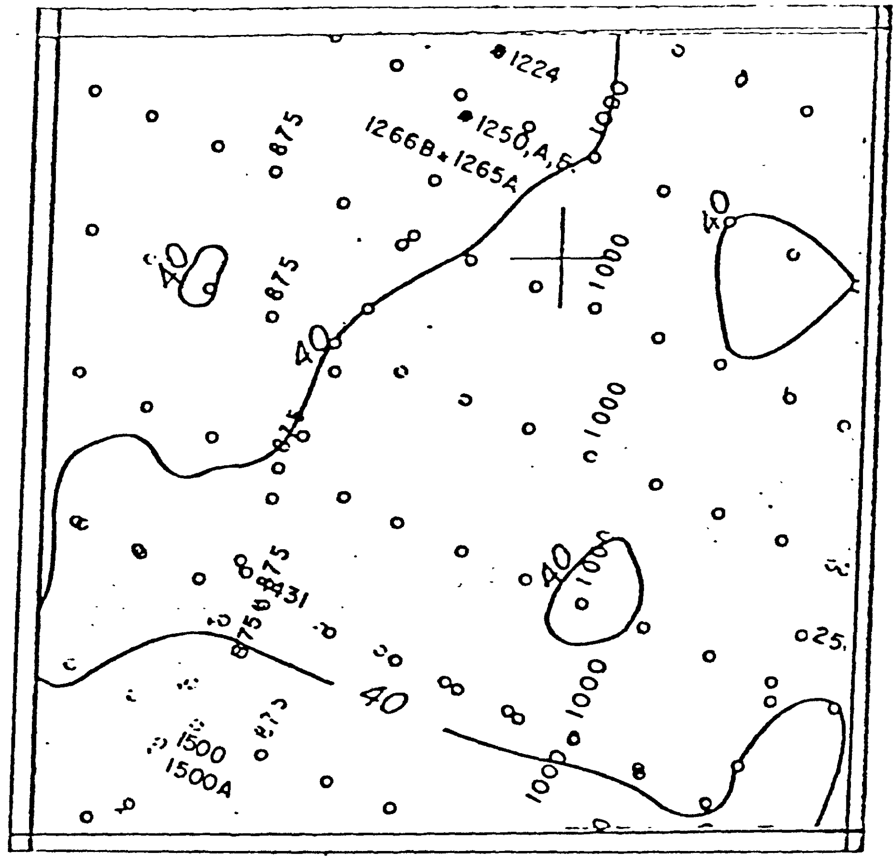


Fault

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-5-253*



SCALE 1:48000

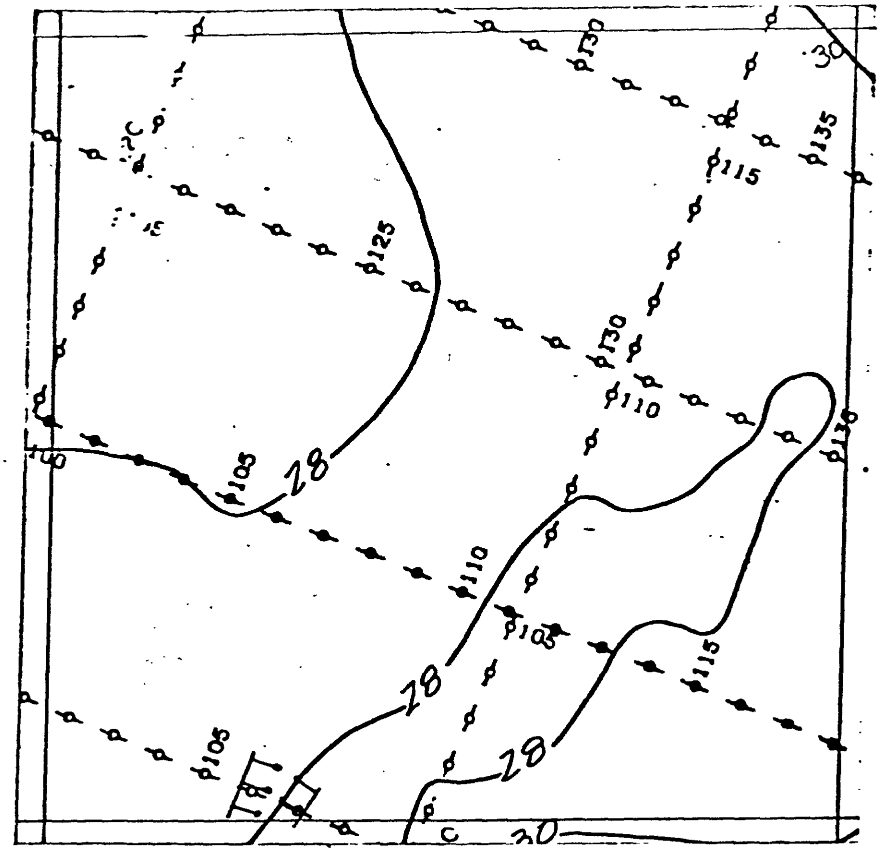
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 40m , min.39m
Slope Gradient: 1 m/km, Direction:E
Surface Sediment Type:Sand

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-5-292



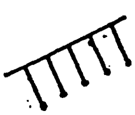
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

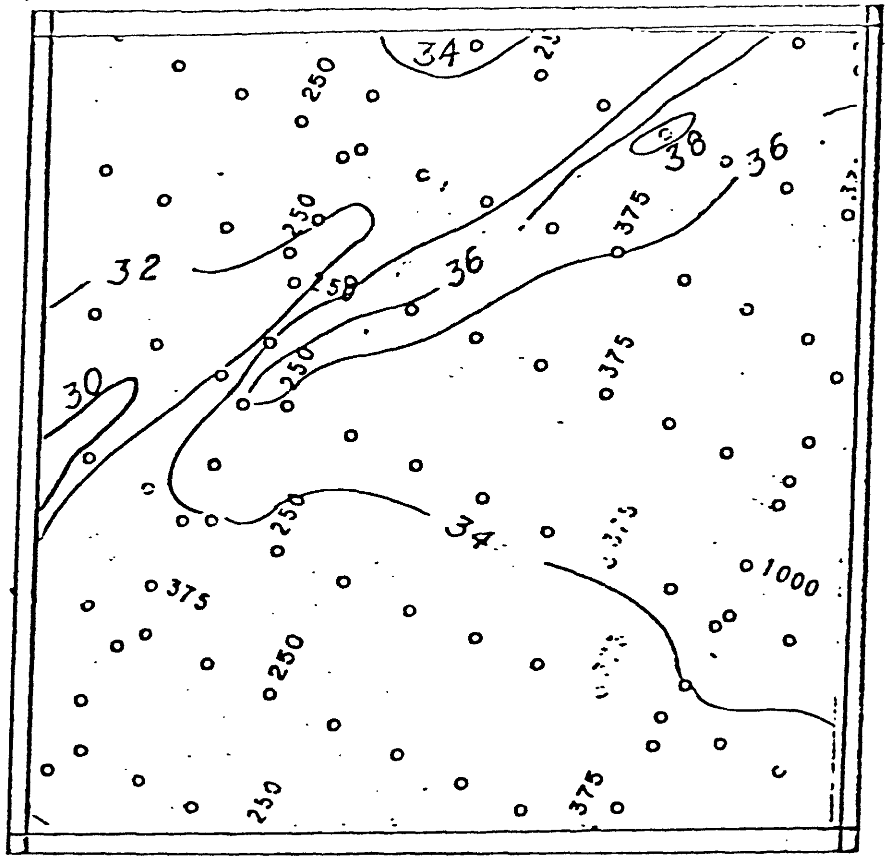
Water Depth: max. 30m , min. 27m
Slope Gradient: 1 m/km, Direction: E
Surface Sediment Type: Sand

CONSTRAINT



Fault

Proposed
Lease Sale 56



Block
NH 17-5-293*

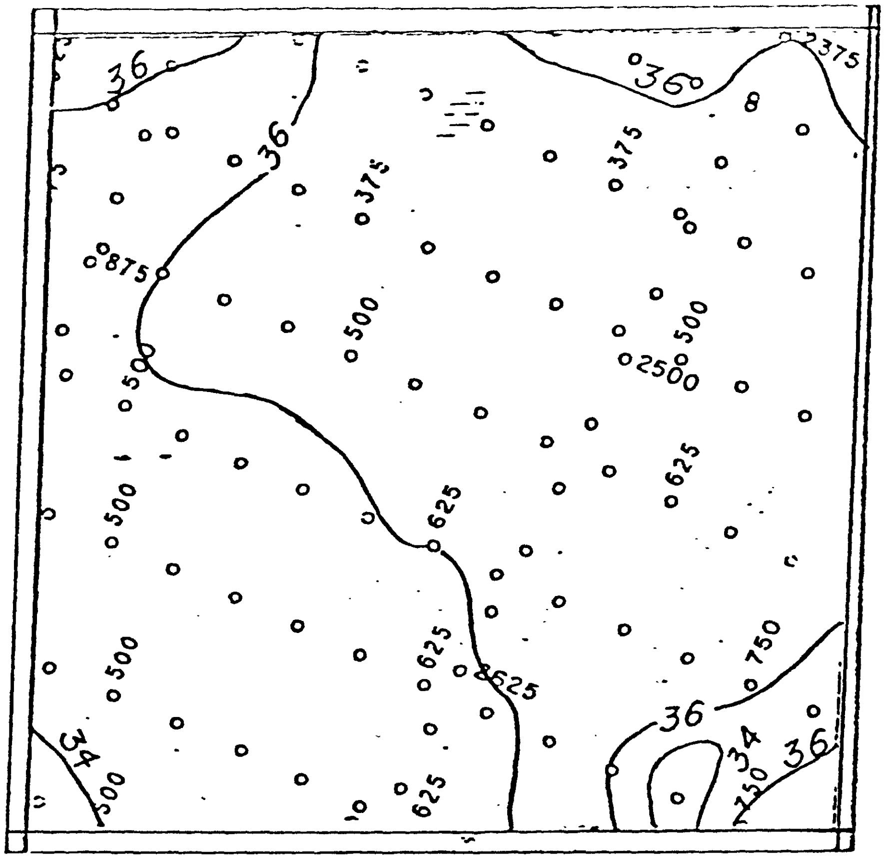
Water Depth: max. 38m , min. 29m
Slope Gradient: 2 m/km, Direction: E
Surface Sediment Type: Sand

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17–5–294 *



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 36m , min. 33m
Slope Gradient: 2 m/km, Direction: E
Surface Sediment Type: Sand

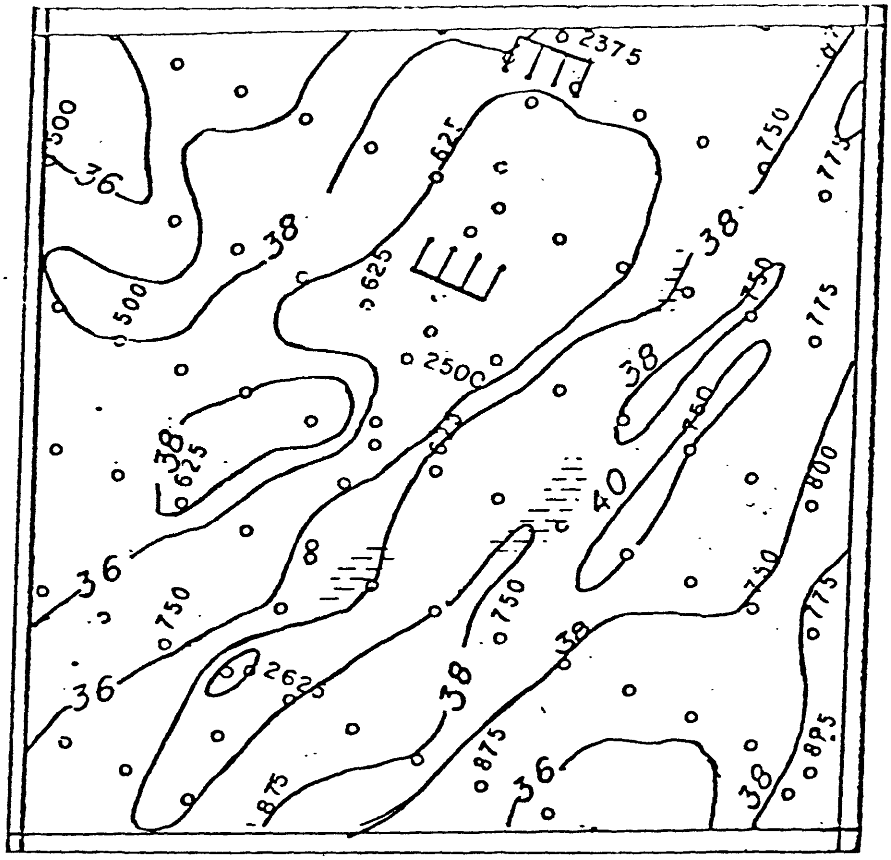
CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-5-295*

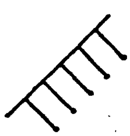


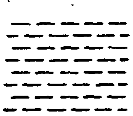
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 40m , min. 36m
Slope Gradient: 1 m/km, Direction: SE&NW
Surface Sediment Type: Sand

CONSTRAINTS

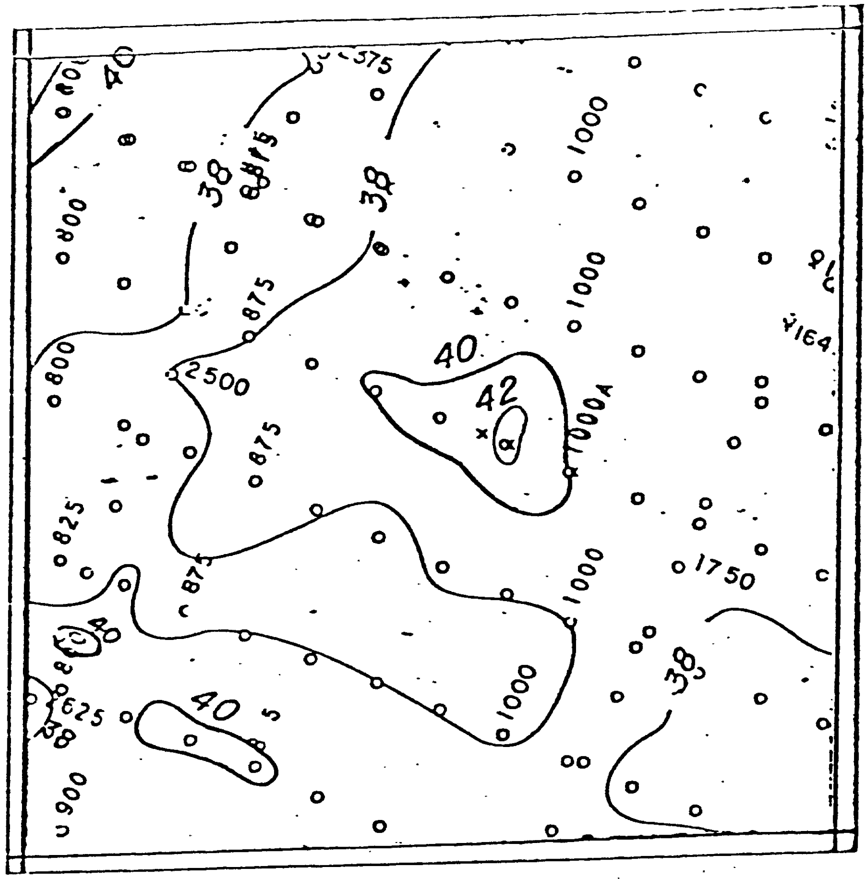

Fault


Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-5-296*



SCALE 1:48000

0 1/2 1 KILOMETER

0 1/2 1 STATUTE MILE

0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 42m , min. 37m

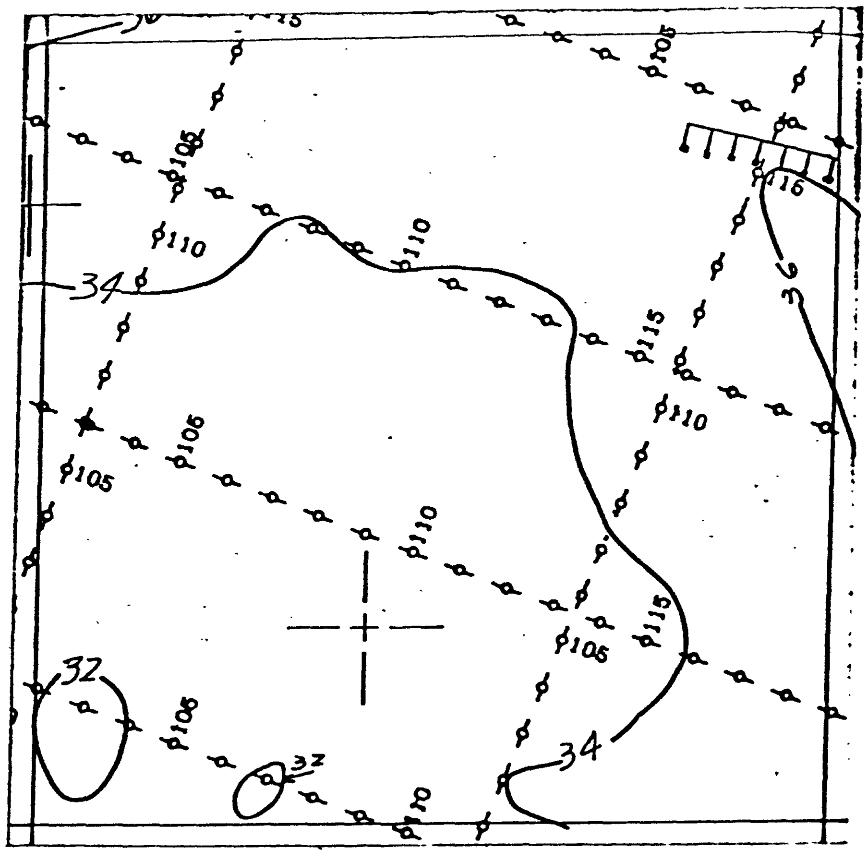
Slope Gradient: 1 m/km, Direction: SE

Surface Sediment Type: Sand

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-5-340



Water Depth: max. 36m , min. 32m
Slope Gradient: 1 m/km, Direction: Variable
Surface Sediment Type: Sand

SCALE 1:48000

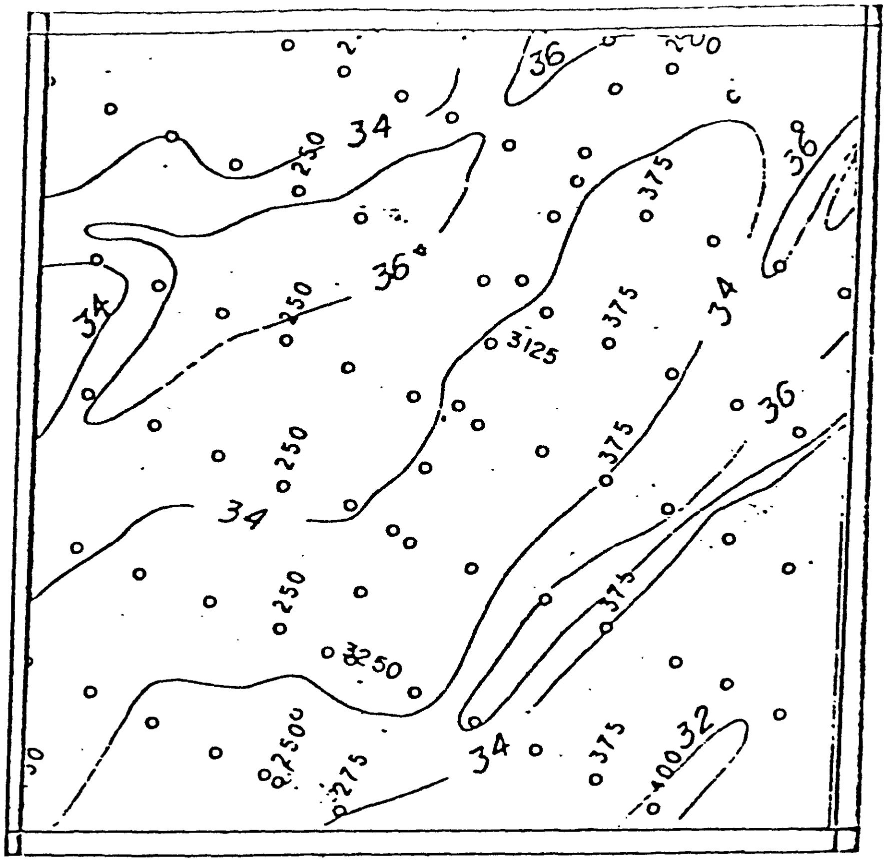
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

CONSTRAINT

Fault

Proposed
Lease Sale 56

Block
NH 17-5-382*



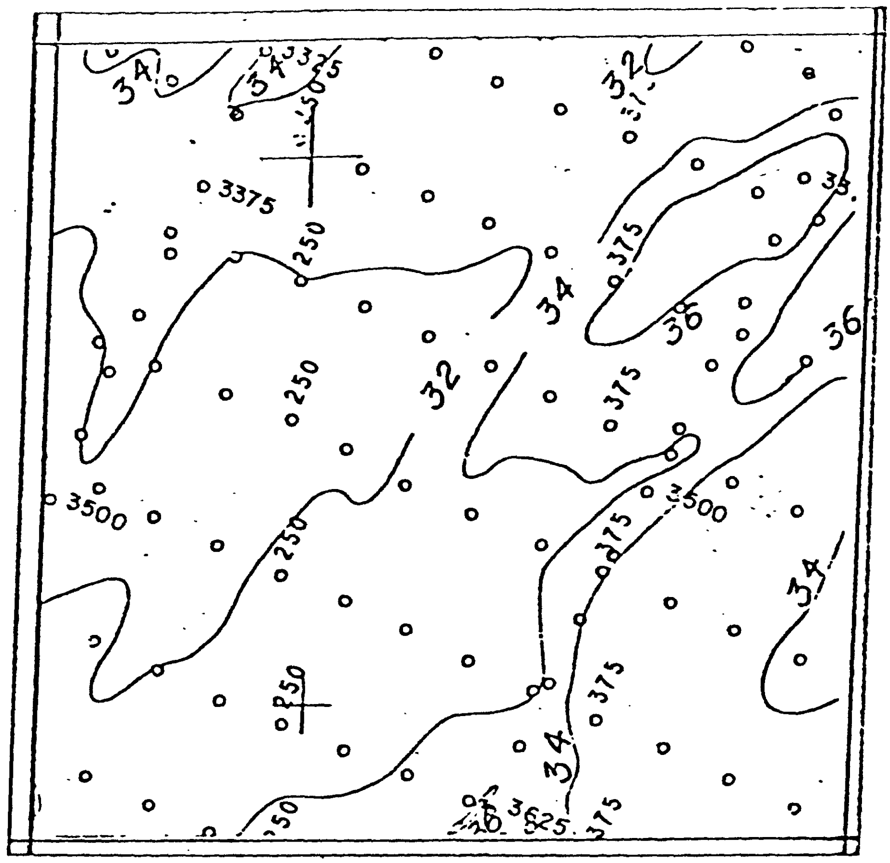
Water Depth: max. 37m , min. 32m
Slope Gradient: 2 m/km, Direction: SE&NW
Surface Sediment Type: Sand

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-5-426*



Water Depth: max. 36m , min. 31m
Slope Gradient: 2 m/km, Direction: SE
Surface Sediment Type: Sand

SCALE 1:48000

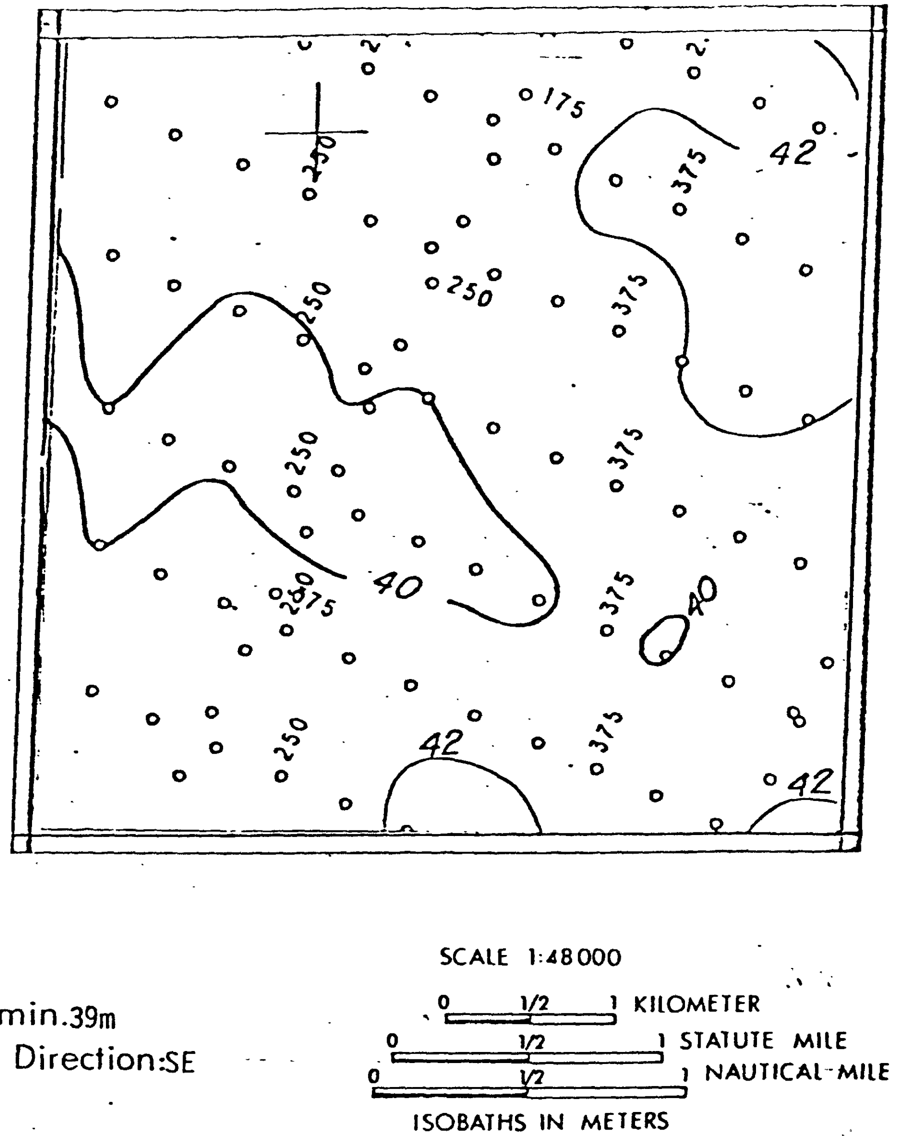
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17–5–431*

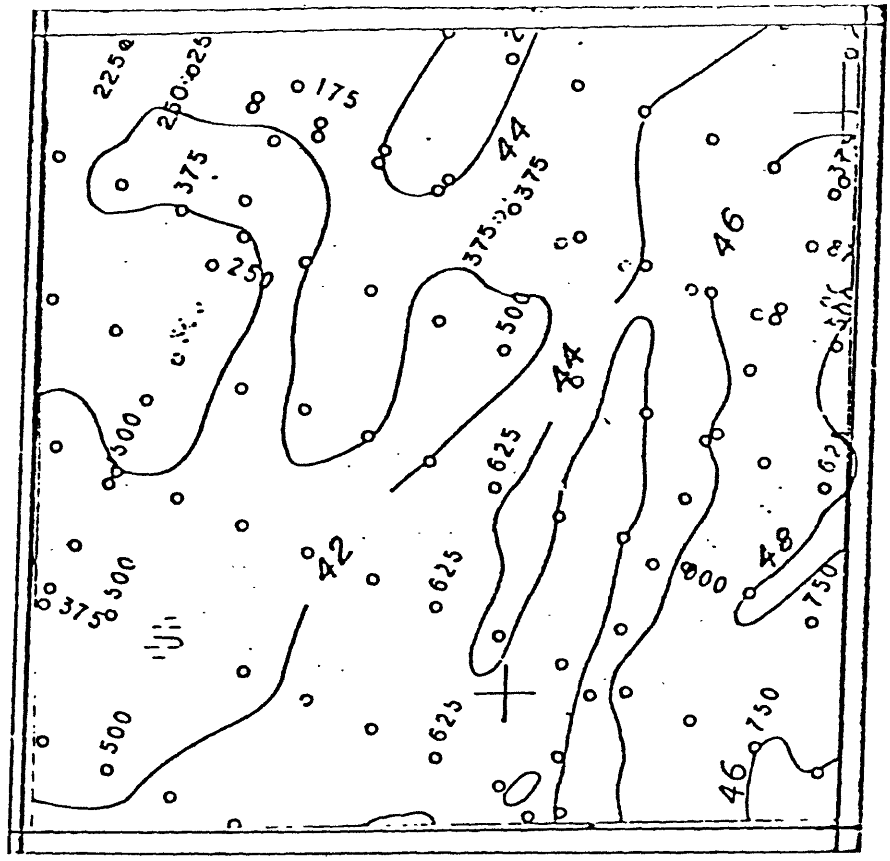


Water Depth: max. 43m , min.39m
Slope Gradient: 2 m/km, Direction:SE
Surface Sediment Type:Sand

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-5-432 *



SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 48m , min.42m
Slope Gradient: 2m/km, Direction:E
Surface Sediment Type:Sand

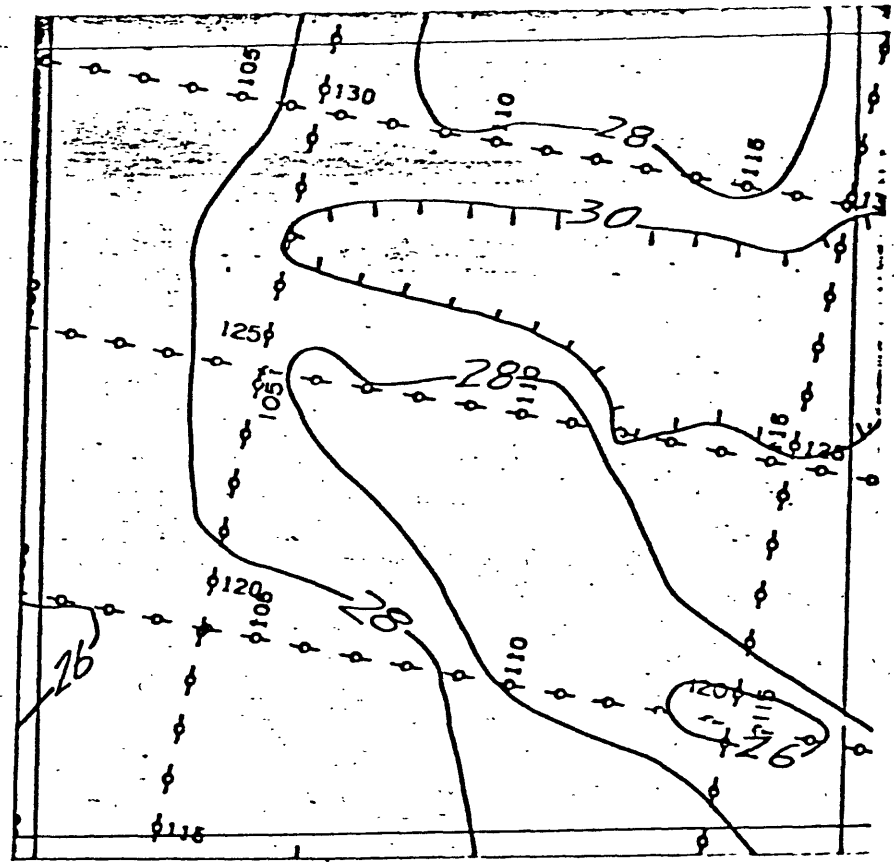
CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-5-465



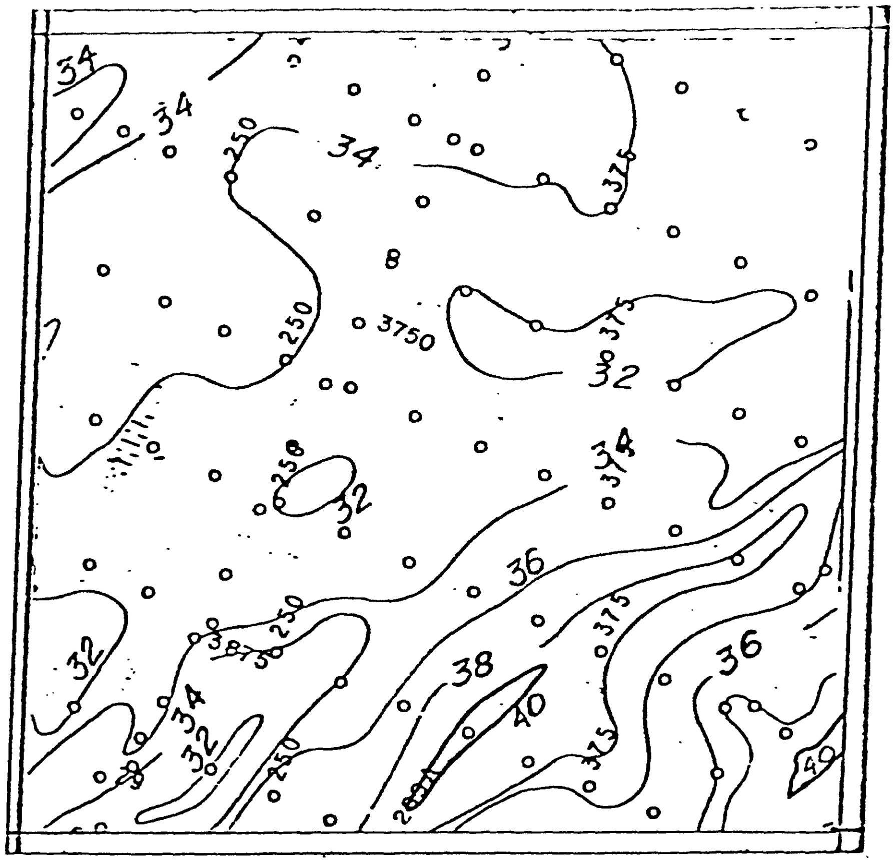
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 31m , min. 26m
Slope Gradient: 1 m/km, Direction: NE
Surface Sediment Type: Sand

Proposed
Lease Sale 56



Block
NH 17–5–470*

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 40m , min. 32m
Slope Gradient: 2 m/km, Direction: SE
Surface Sediment Type: Sand

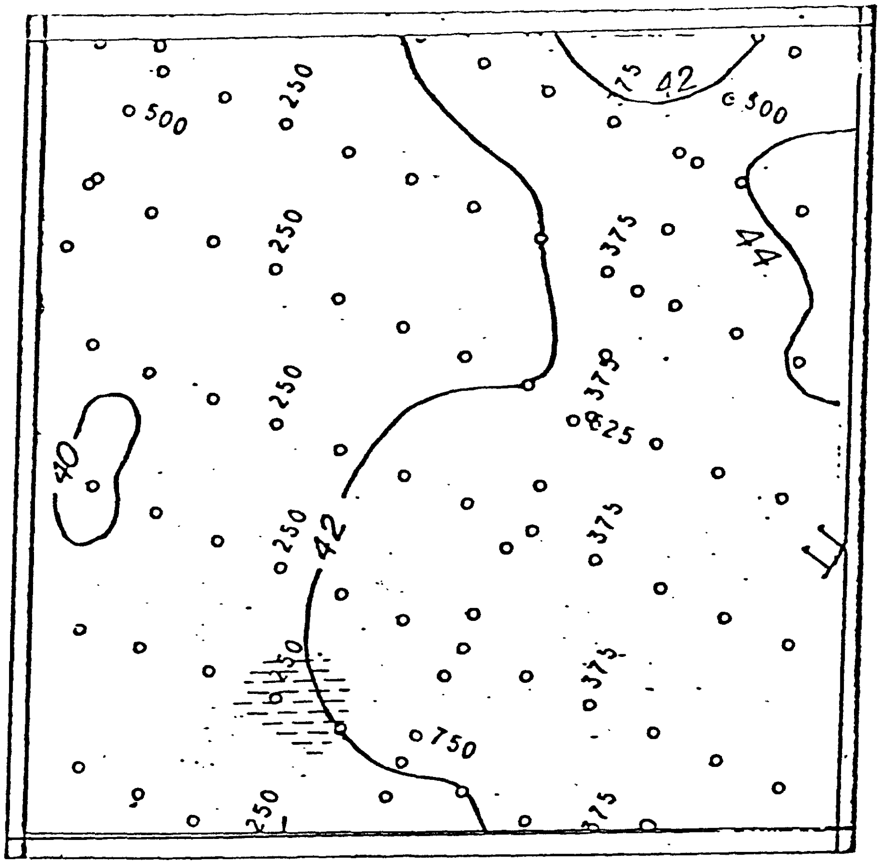
CONSTRAINT

Filled Channel

* Also included in Lease Sale 43

Proposed
Lease Sale 56

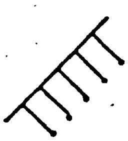
Block
NH 17–5–475 *

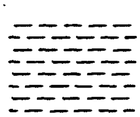


Water Depth: max. 44m , min. 39m
Slope Gradient: 1 m/km, Direction: E
Surface Sediment Type: Sand

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

CONSTRAINTS

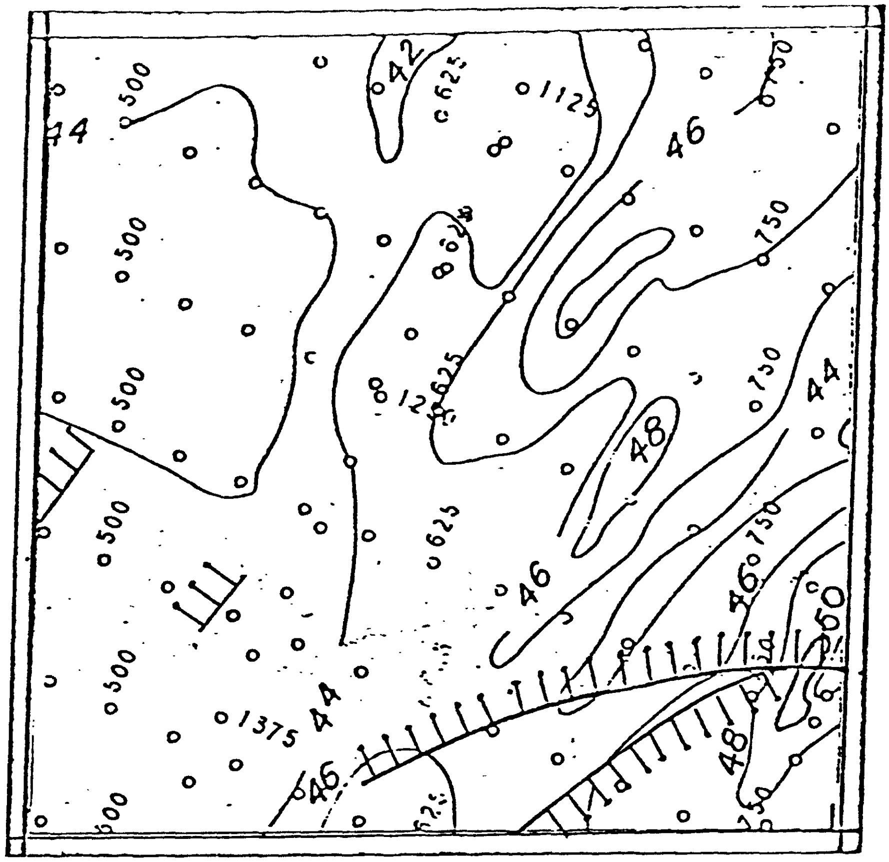

Fault


Filled Channel

*Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-5-476 *



Water Depth: max. 51m , min. 41m
Slope Gradient: 2 m/km, Direction: SE
Surface Sediment Type: Sand

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

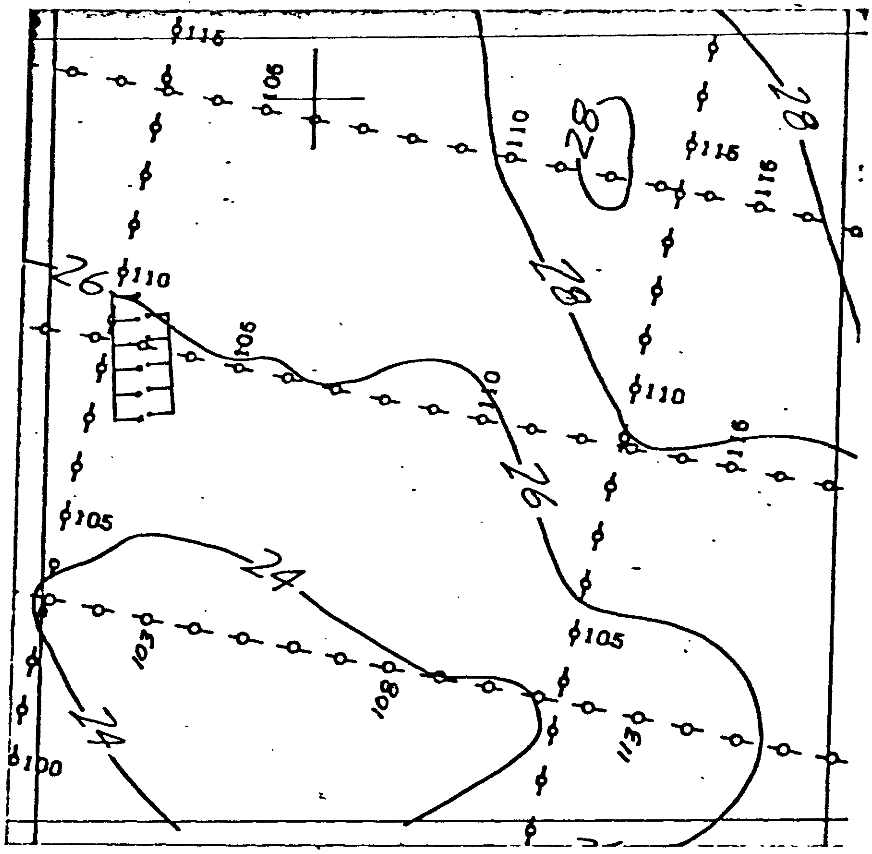
ISOBATHS IN METERS

CONSTRAINT

Fault

* Also included in Lease Sale 43

Proposed
Lease Sale 56



Block
NH 17-5-509

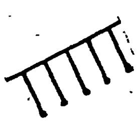
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 28m , min. 23m
Slope Gradient: 1 m/km, Direction: Variable
Surface Sediment Type: Sand

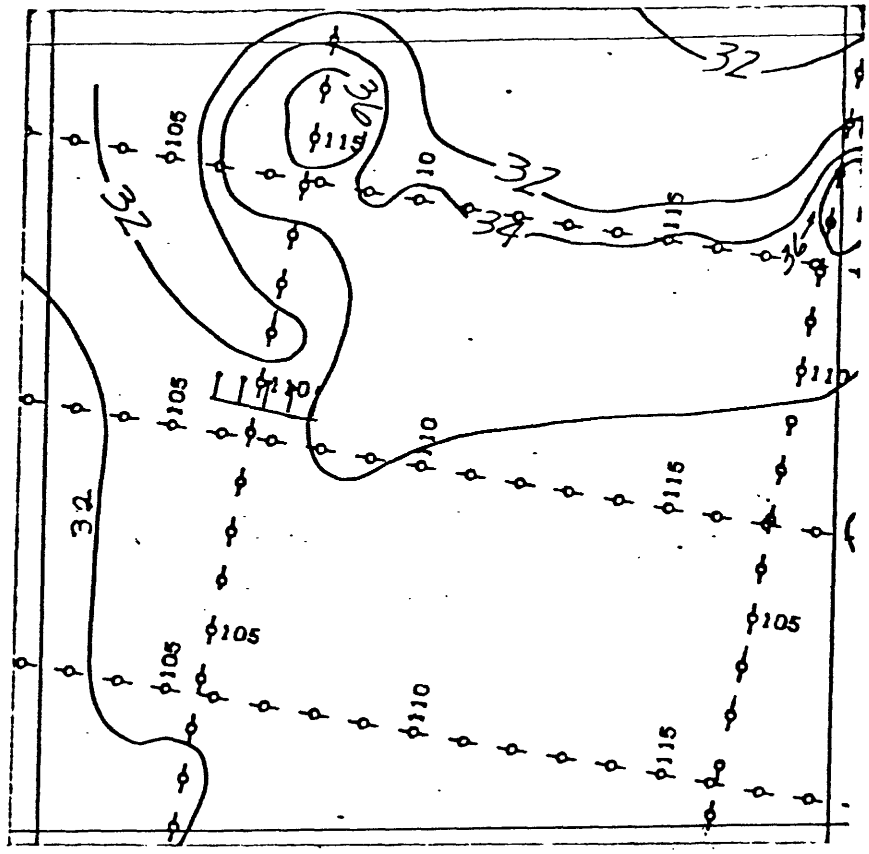
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NH 17-5-513

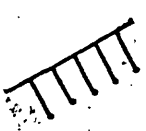


SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 36m , min. 31m
Slope Gradient: 1 m/km, Direction:Variable
Surface Sediment Type: Sand

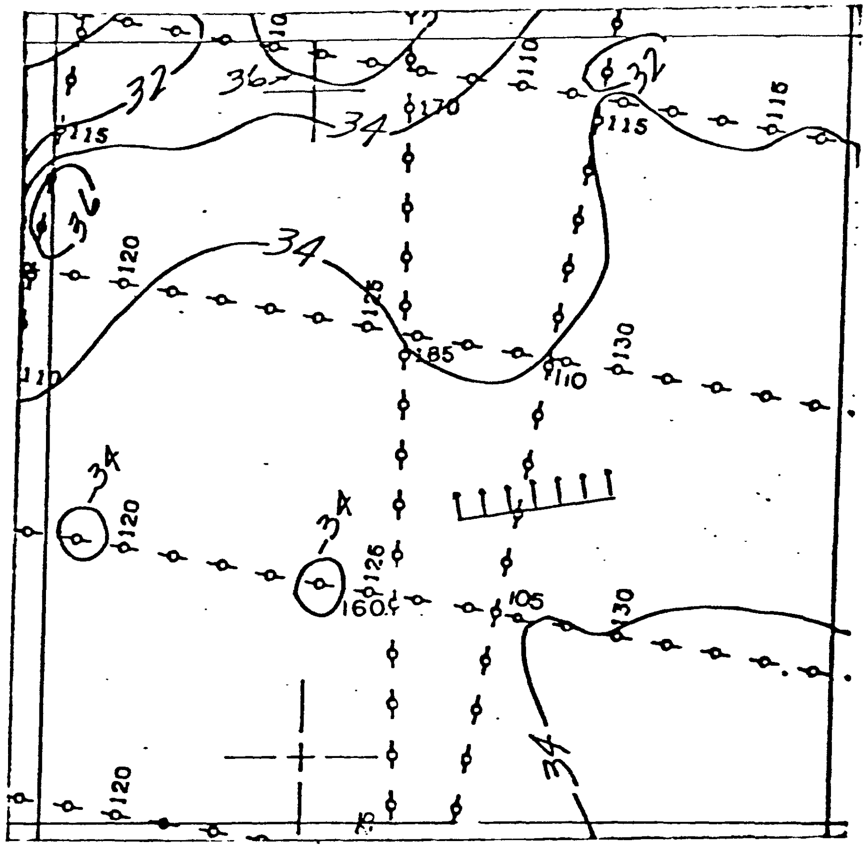
CONSTRAINT



Fault

Proposed
Lease Sale 56

Block
NH 17-5-514

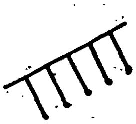


SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 36m , min. 32m
Slope Gradient: 1 m/km, Direction: Variable
Surface Sediment Type: Sand

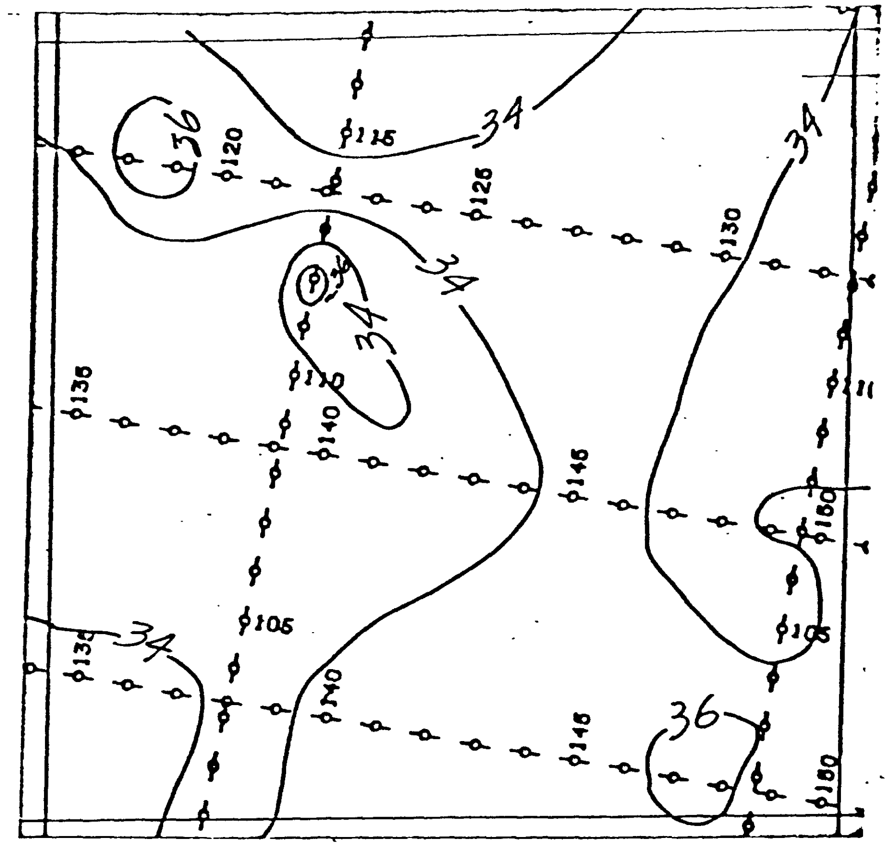
CONSTRAINT



Fault

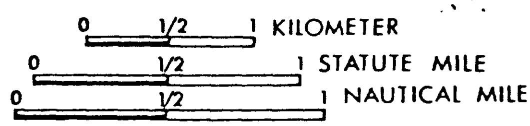
Proposed
Lease Sale 56

Block
NH 17-5-515



Water Depth: max. 36m , min. 33m
Slope Gradient: 1 m/km, Direction: Variable
Surface Sediment Type: Sand

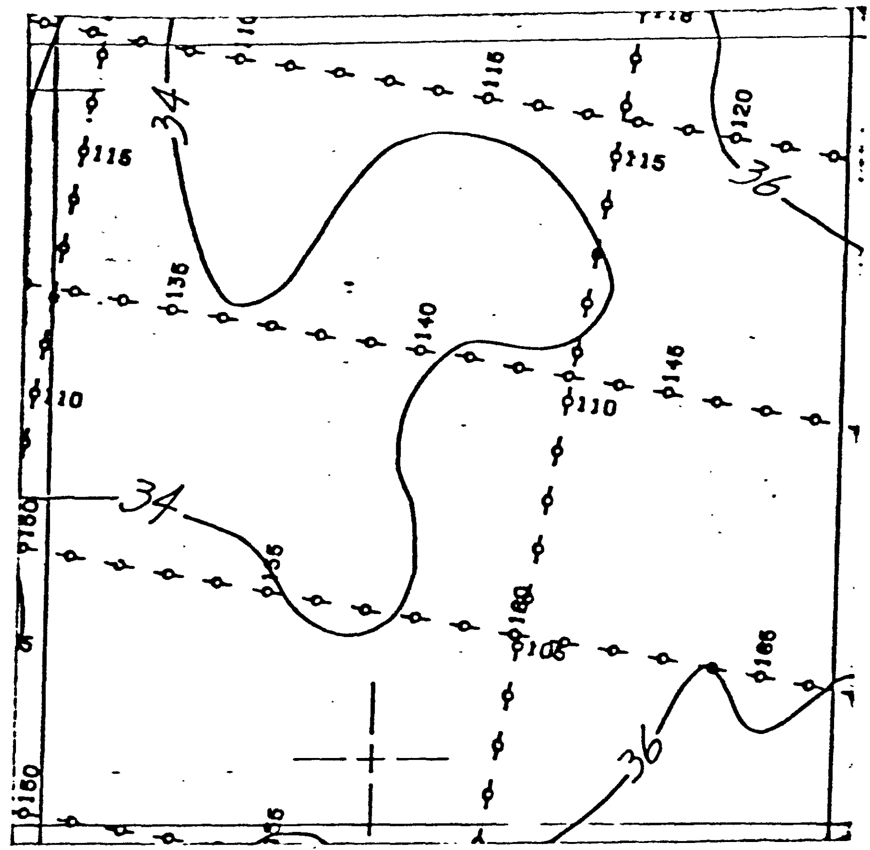
SCALE 1:48000



ISOBATHS IN METERS

Proposed
Lease Sale 56

Block
NH 17-5-516



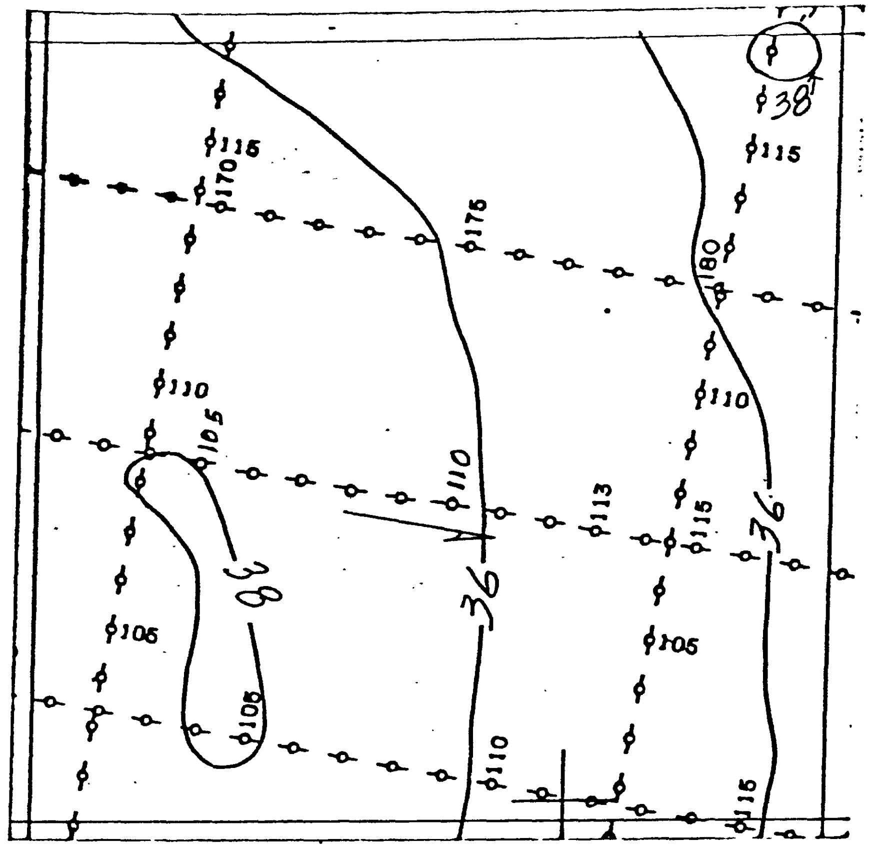
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 36m , min. 33m
Slope Gradient: 1 m/km, Direction: Variable
Surface Sediment Type: Sand

Proposed
Lease Sale 56

Block
NH 17-5-561



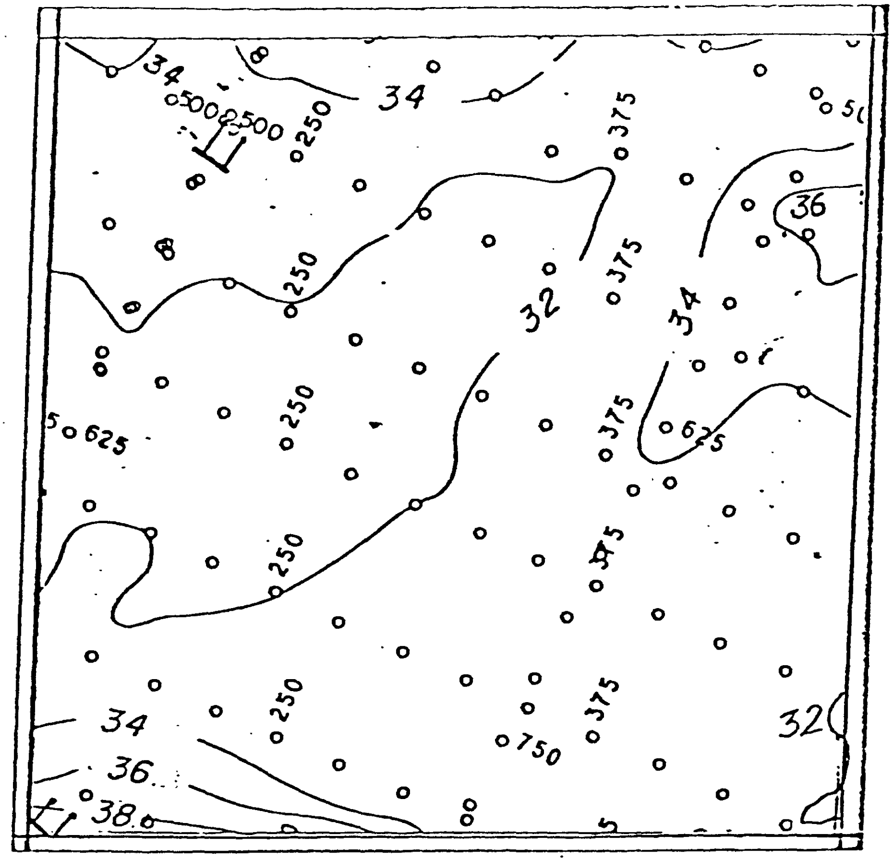
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 38m , min. 36m
Slope Gradient: 1 m/km, Direction: Variable
Surface Sediment Type: Sand

Proposed
Lease Sale 56

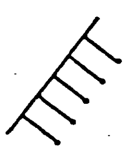
Block
NH 17-5-601 *



Water Depth: max. 39m , min. 31m
Slope Gradient: 2 m/km, Direction: S&E
Surface Sediment Type: Sand

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

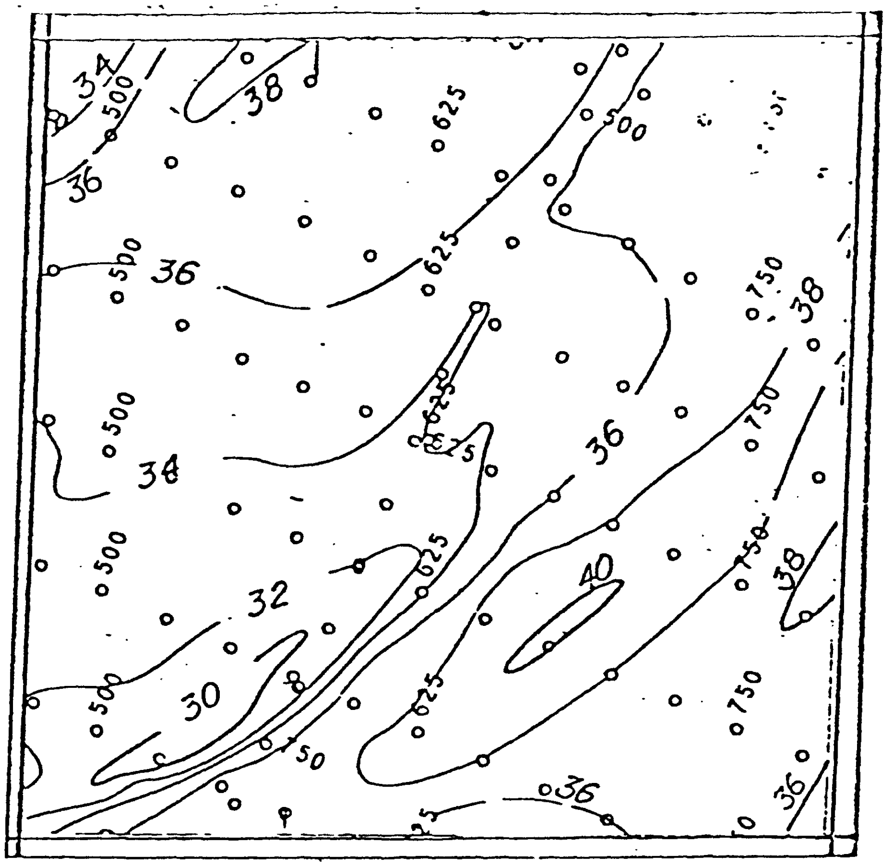
CONSTRAINT


Fault

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-5-602*



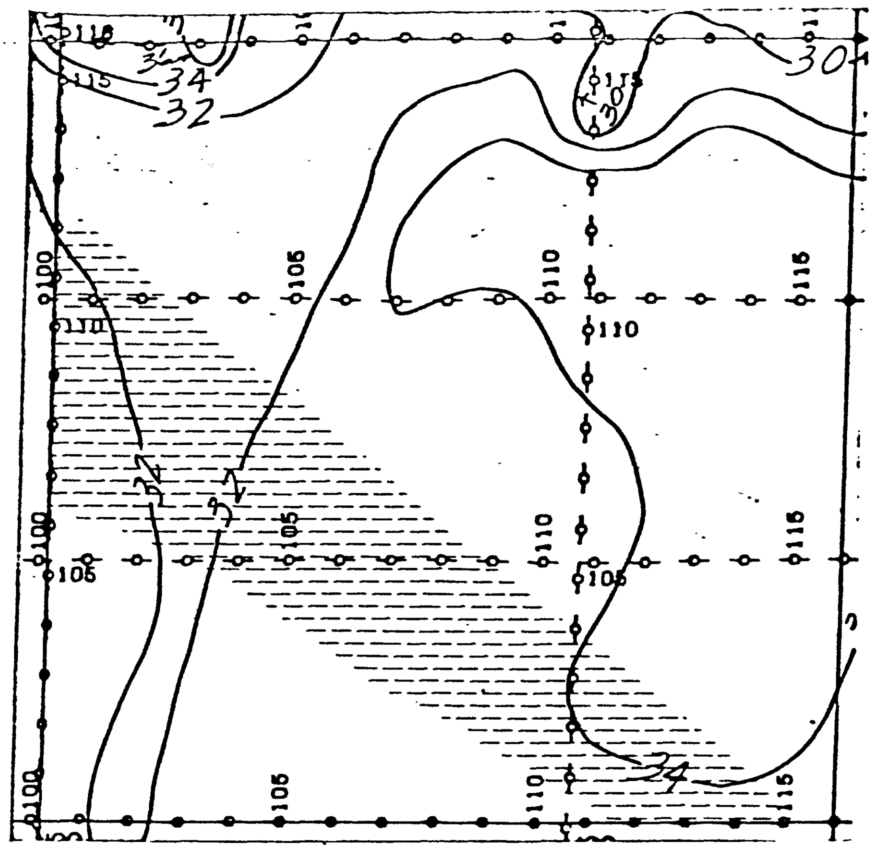
Water Depth: max. 40m , min. 29m
Slope Gradient: 2 m/km, Direction: NW&SE
Surface Sediment Type: Sand

SCALE 1:48000
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

* Also included in Lease Sale 43

Proposed
Lease Sale 56

Block
NH 17-5-645



SCALE 1:48000

0 1/2 1 KILOMETER

0 1/2 1 STATUTE MILE

0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 36m , min. 30m

Slope Gradient: 1 m/km, Direction: Variable

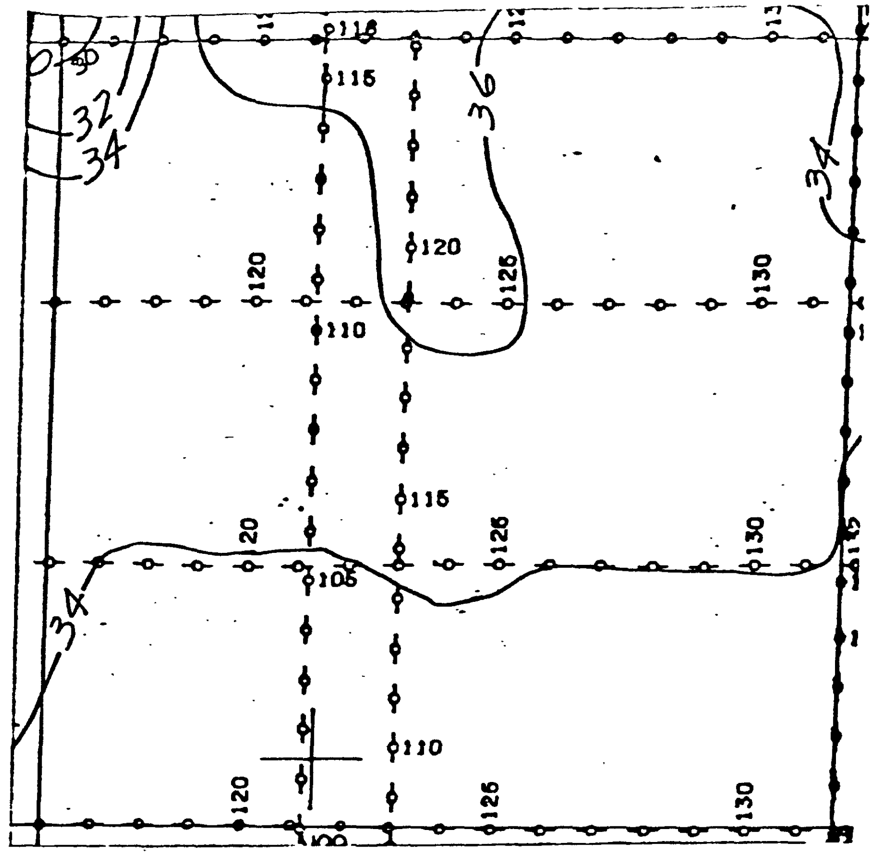
Surface Sediment Type: Sand

CONSTRAINT

Filled Channel

Proposed
Lease Sale 56

Block
NH 17-5-646



SCALE 1:48000

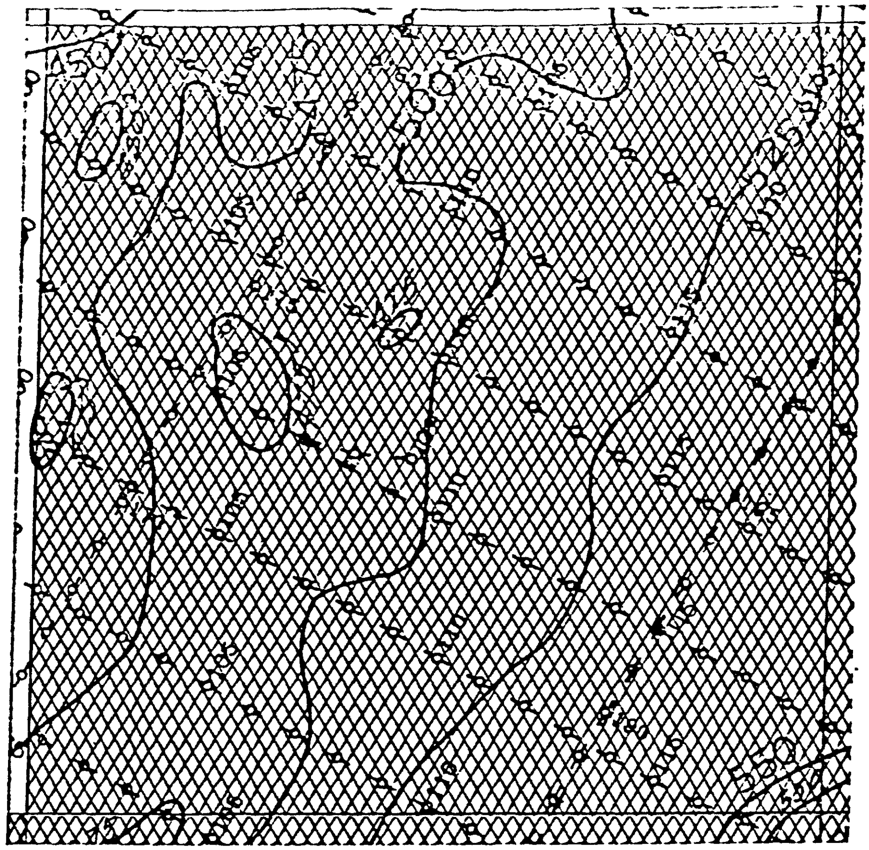
0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 37m , min. 30m
Slope Gradient: 2 m/km, Direction: Variable
Surface Sediment Type: Sand

Proposed
Lease Sale 56

Block
NH 17-6-181



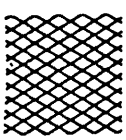
Water Depth: max. 550m , min. 448m
Slope Gradient: 15 m/km, Direction: SE
Surface Sediment Type: Sand

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

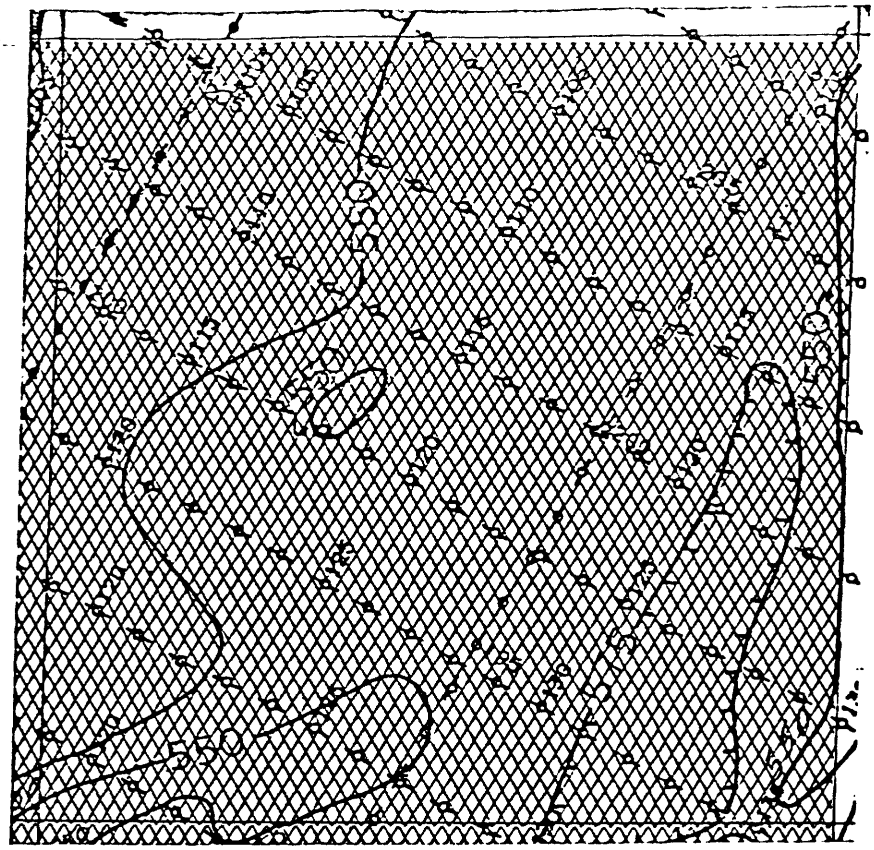
CONSTRAINT



Erosion/Scour

Proposed
Lease Sale 56

Block
NH 17-6-182



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

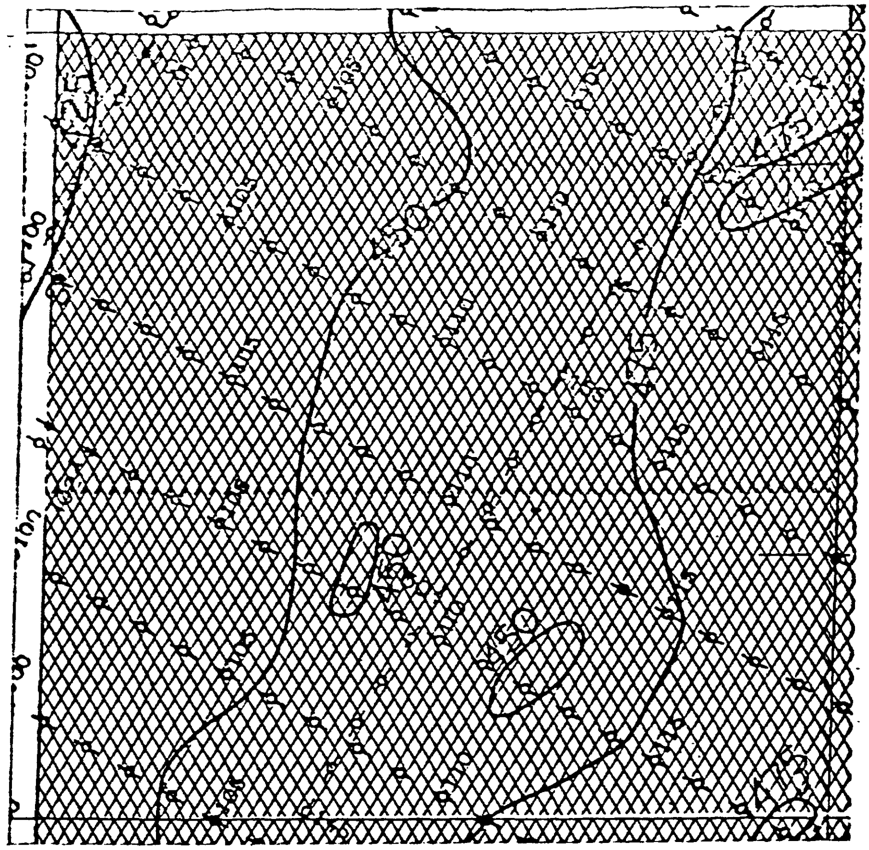
ISOBATHS IN METERS

Water Depth: max. 580m , min. 535m
Slope Gradient: 7 m/km, Direction: SE
Surface Sediment Type: Sand

CONSTRAINT

Erosion/Scour

Proposed
Lease Sale 56



Block
NH 17-6-224

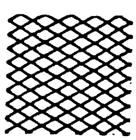
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 495m , min. 422m
Slope Gradient: 11 m/km, Direction: SE
Surface Sediment Type: Sand

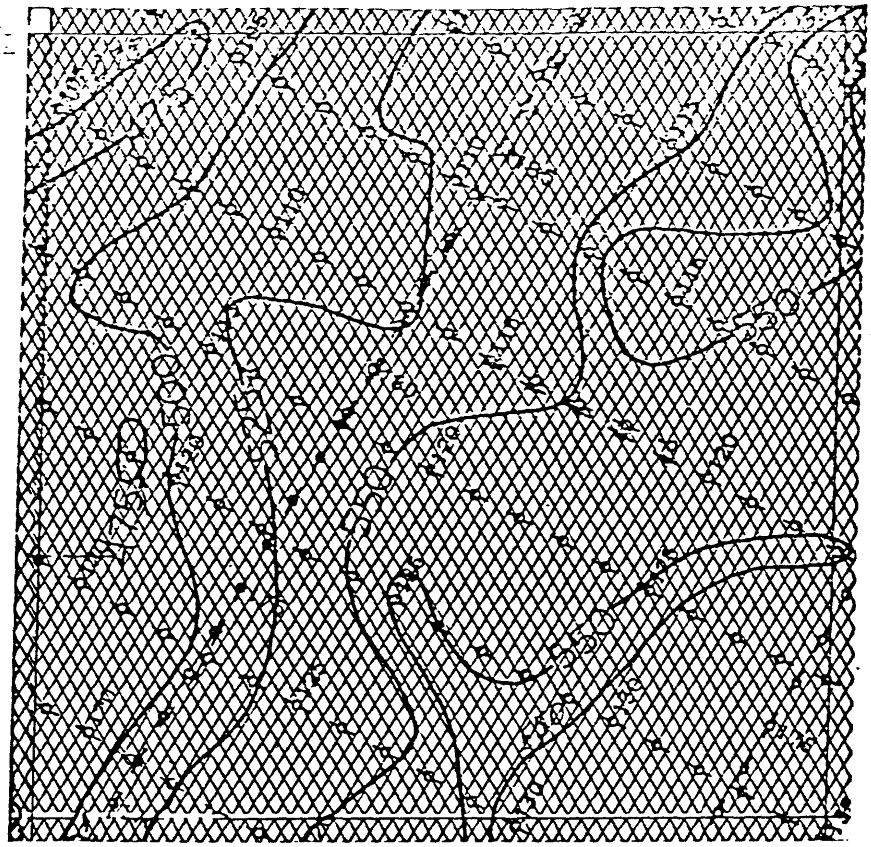
CONSTRAINT



Erosion/Scour

Proposed
Lease Sale 56

Block
NH 17-6-225

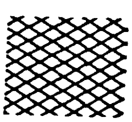


SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 573m , min. 456m
Slope Gradient: 17 m/km, Direction: SE
Surface Sediment Type: Sand

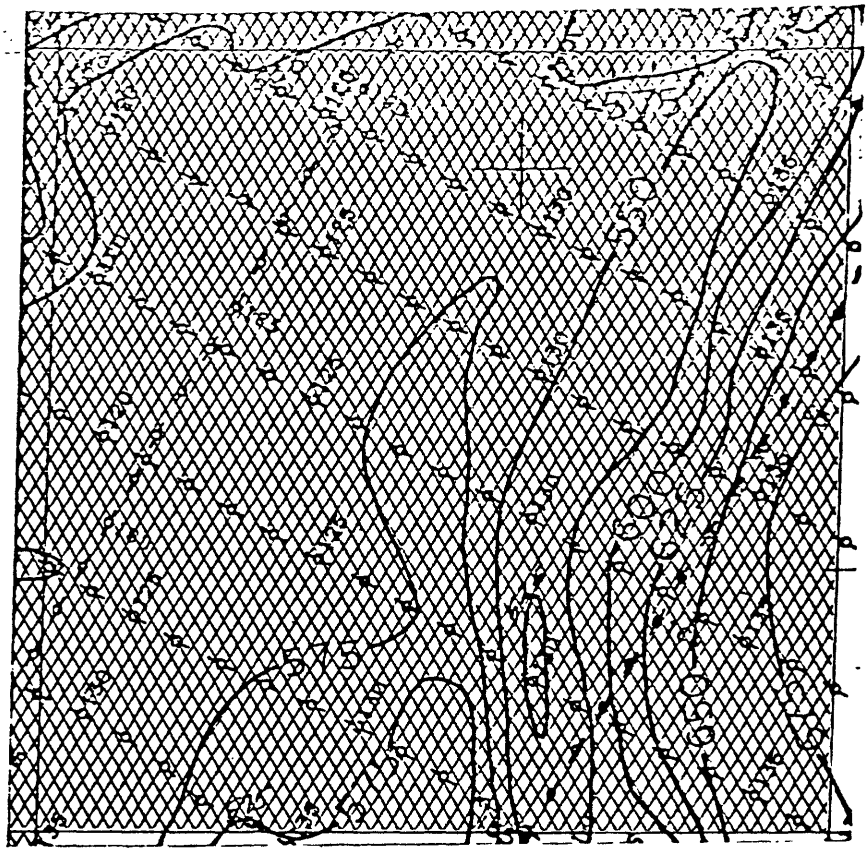
CONSTRAINT



Erosion/Scour

Proposed
Lease Sale 56

Block
NH 17-6-226



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

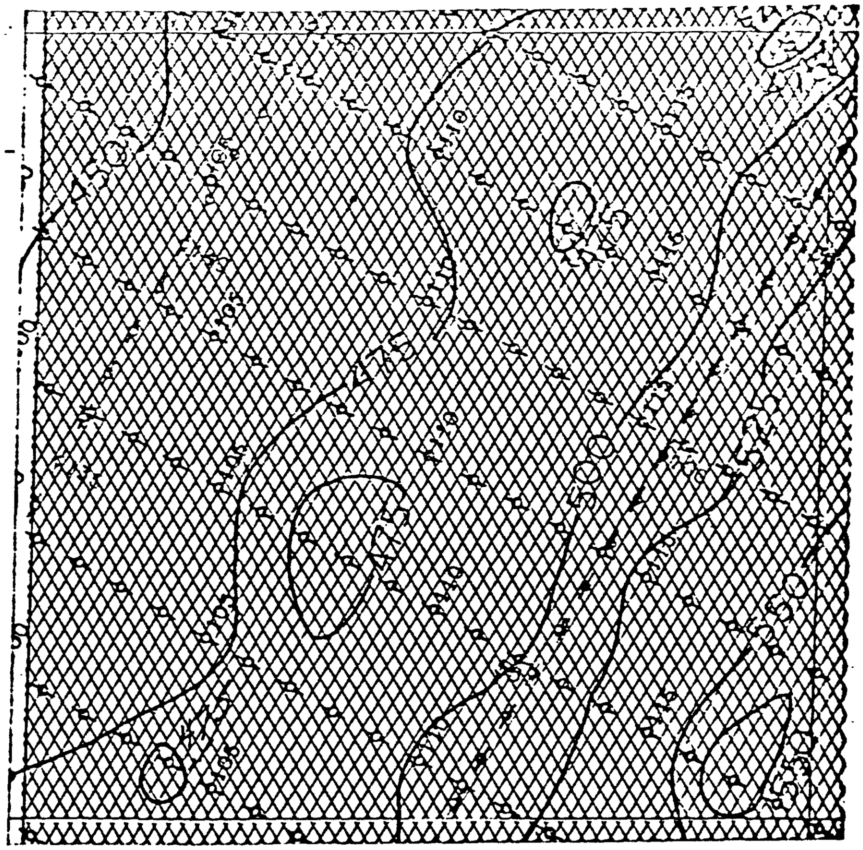
Water Depth: max. 688m , min 502m
Slope Gradient: 28 m/km, Direction: Variable
Surface Sediment Type: Sand

CONSTRAINT

Erosion/Scour

Proposed
Lease Sale 56

Block
NH 17-6-268

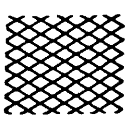


SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

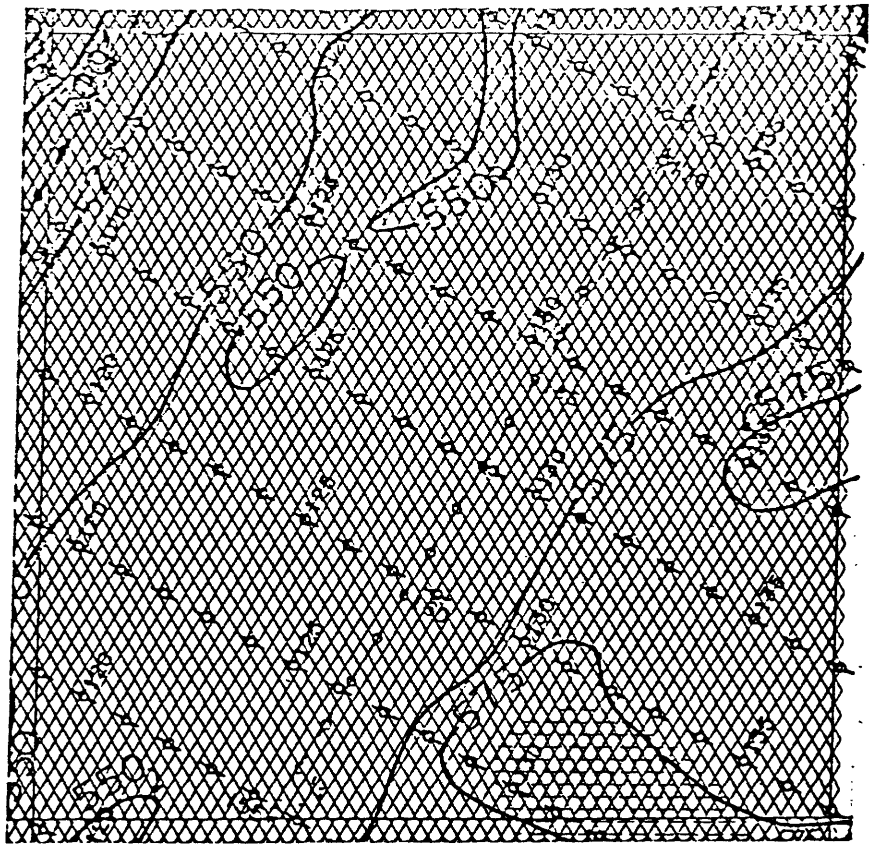
Water Depth: max. 555m , min. 440m
Slope Gradient: 17 m/km, Direction: SE
Surface Sediment Type: Sand

CONSTRAINT



Erosion/Scour

Proposed
Lease Sale 56



Block
NH 17-6-269

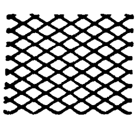
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

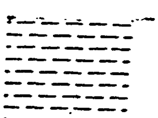
ISOBATHS IN METERS

Water Depth: max. 585m , min. 495m
Slope Gradient: 13 m/km, Direction: SE
Surface Sediment Type: Sand

CONSTRAINTS

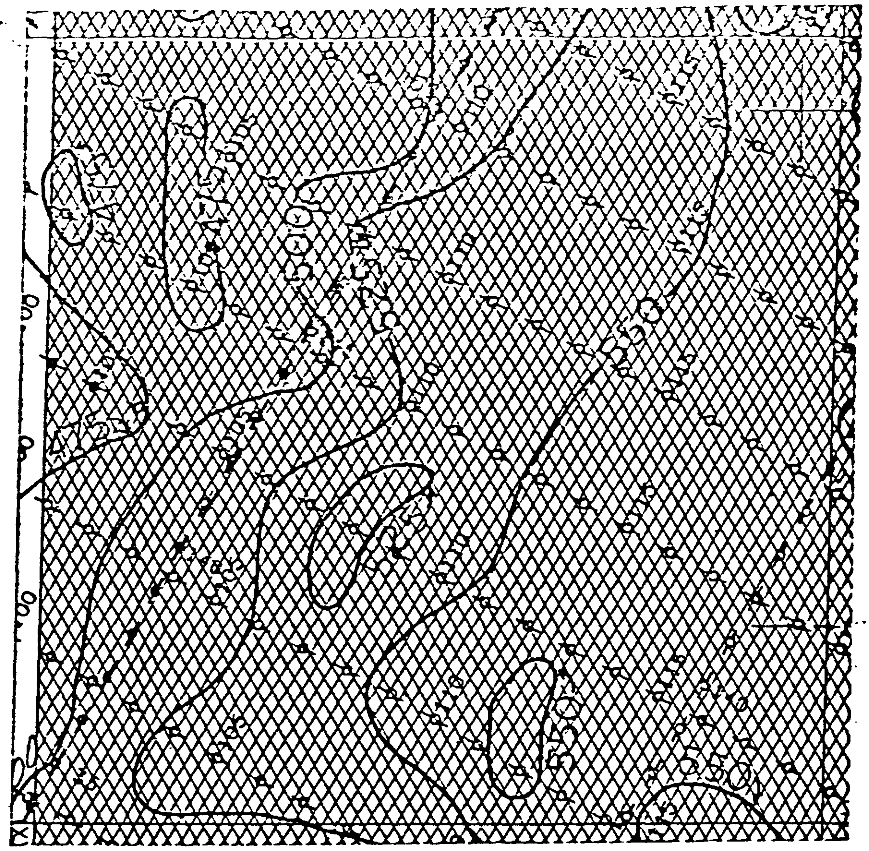


Erosion/Scour



Filled Channel

Proposed
Lease Sale 56



Block
NH 17-6-312

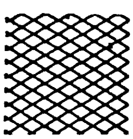
SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

Water Depth: max. 568m , min. 454m
Slope Gradient: 17 m/km, Direction: E
Surface Sediment Type: Sand

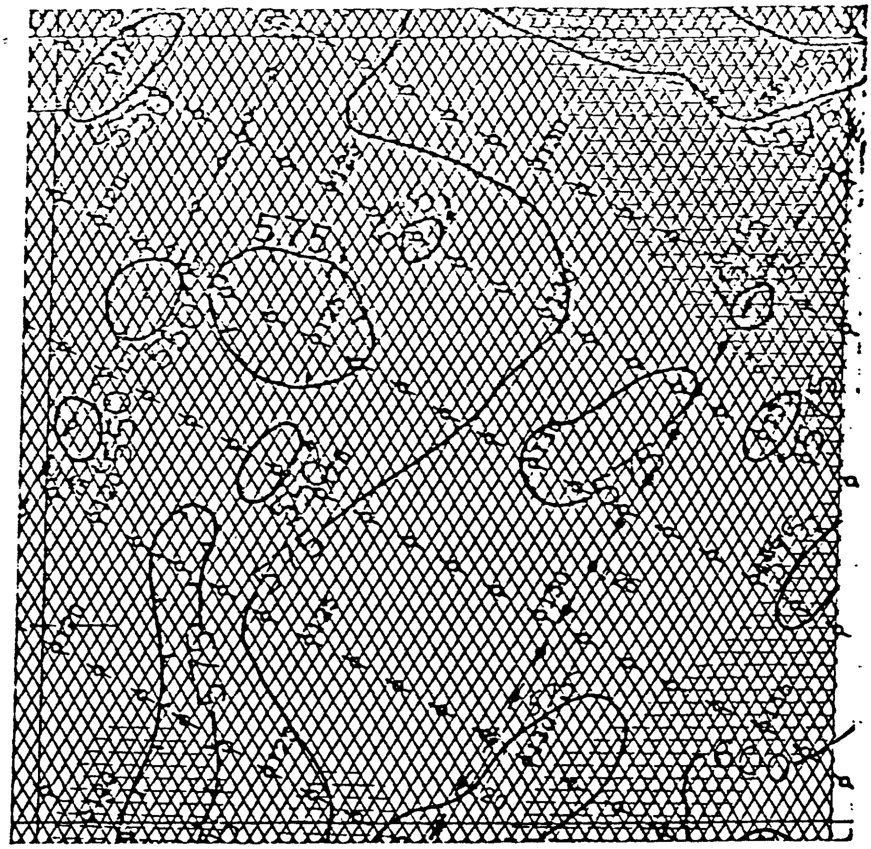
CONSTRAINT



Erosion/Scour

Proposed
Lease Sale 56

Block
NH 17-6-313



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 605m , min. 555m
Slope Gradient: 7 m/km, Direction: SE
Surface Sediment Type: Sand

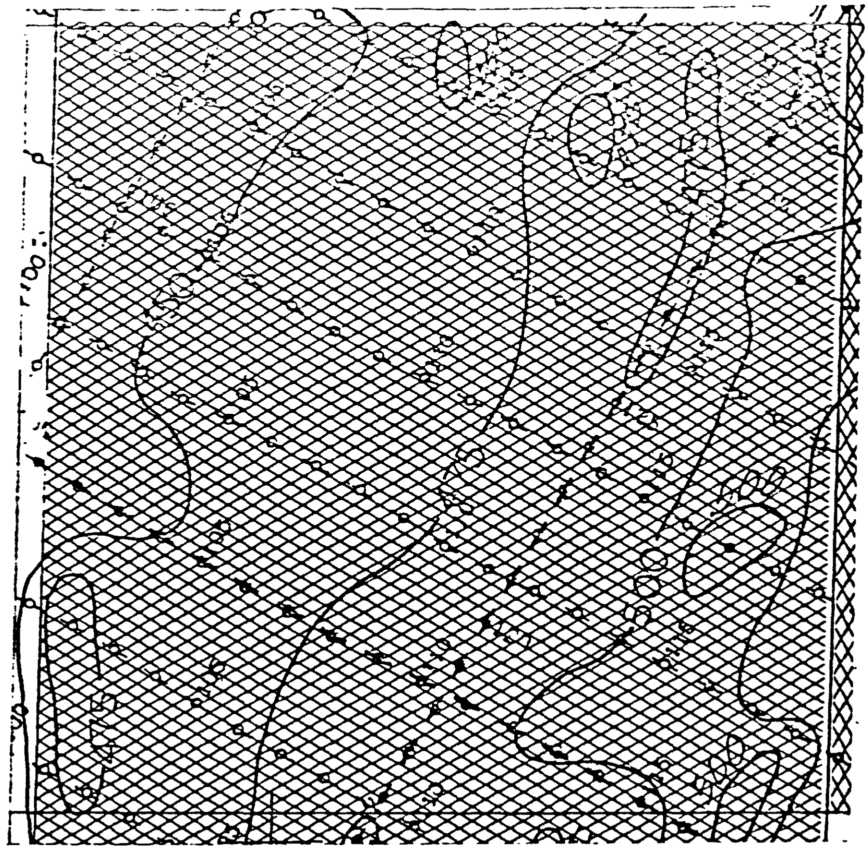
CONSTRAINTS

Erosion/Scour

Filled Channel

Proposed
Lease Sale 56

Block
NH 17-6-355

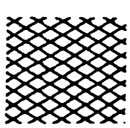


Water Depth: max. 534m , min. 440m
Slope Gradient: 14 m/km, Direction: SE
Surface Sediment Type: Sand

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

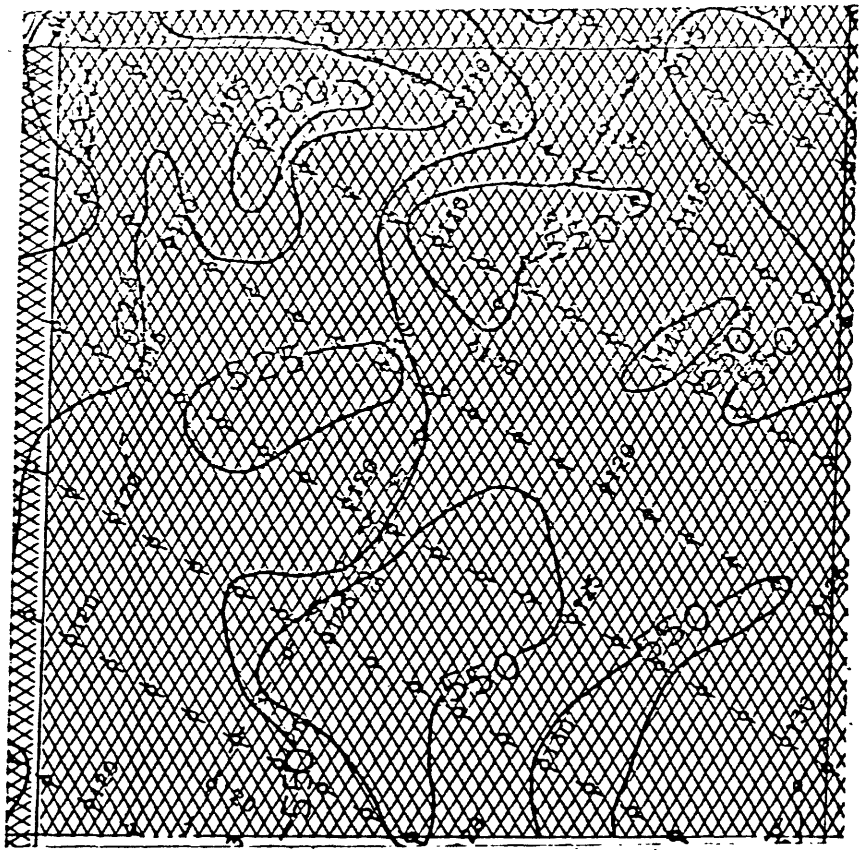
CONSTRAINT



Erosion/Scour

Proposed
Lease Sale 56

Block
NH 17-6-356



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE

ISOBATHS IN METERS

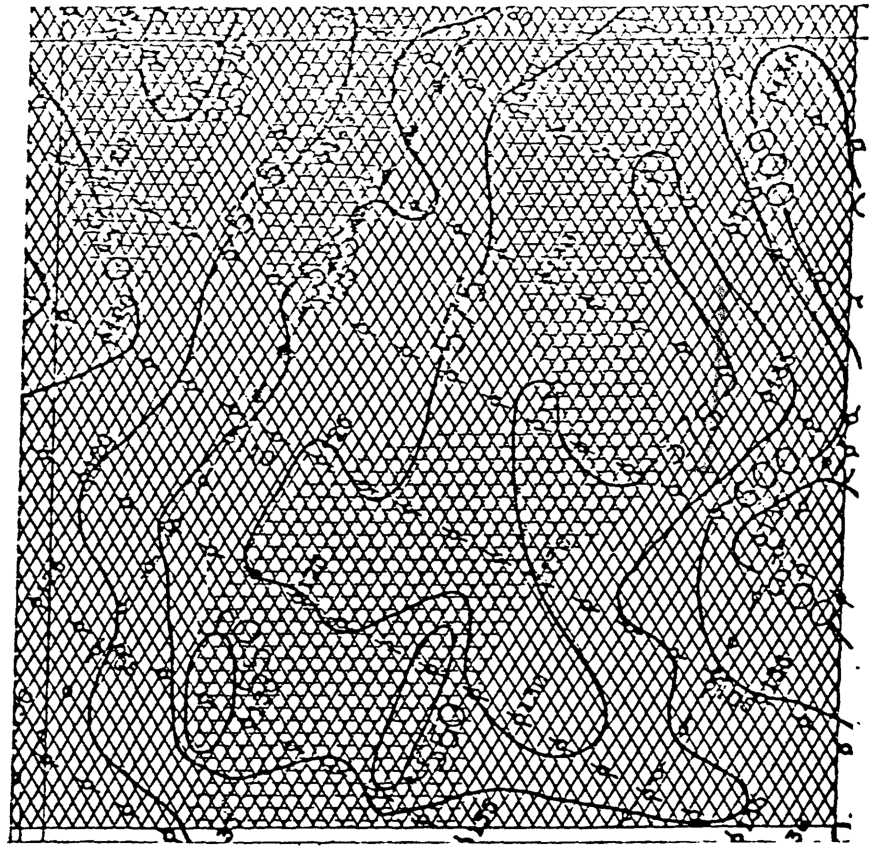
Water Depth: max. 571m , min. 487m
Slope Gradient: 12 m/km, Direction: SE
Surface Sediment Type: Sand

CONSTRAINT

Erosion/Scour

Proposed
Lease Sale 56

Block
NH 17-6-357



Water Depth: max. 605m , min. 568m
Slope Gradient: 5 m/km, Direction: SE
Surface Sediment Type: Sand

SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

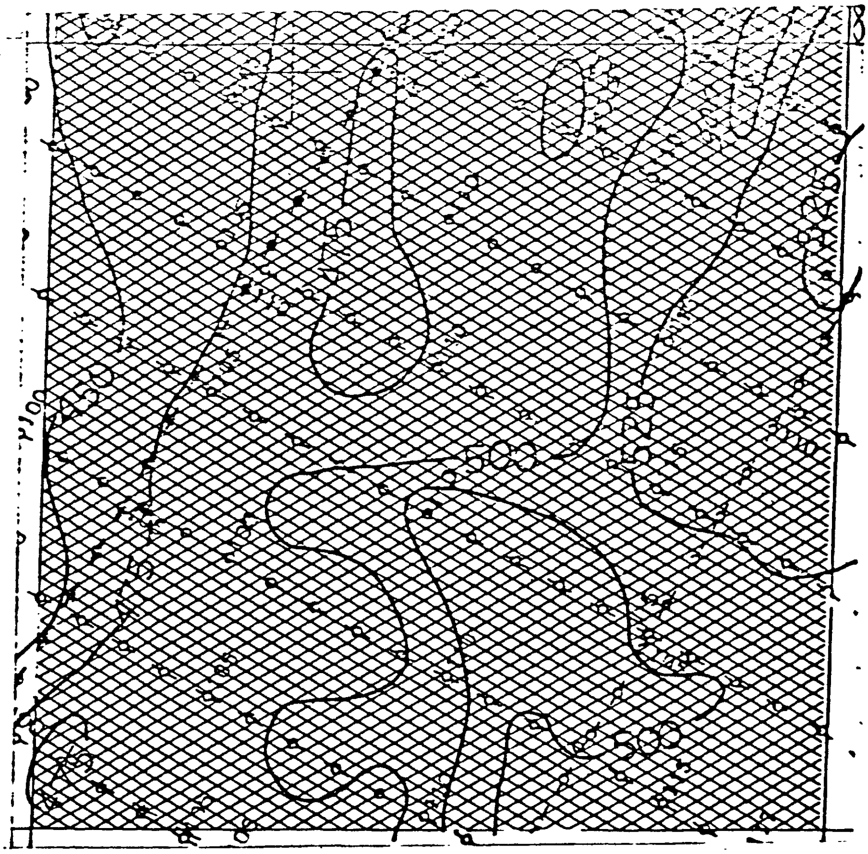
CONSTRAINTS

Erosion/Scour

Filled Channel

Proposed
Lease Sale 56

Block
NH 17-6-399



SCALE 1:48000

0 1/2 1 KILOMETER
0 1/2 1 STATUTE MILE
0 1/2 1 NAUTICAL MILE
ISOBATHS IN METERS

Water Depth: max. 546m , min. 421m
Slope Gradient: 18 m/km, Direction: E
Surface Sediment Type: Sand

CONSTRAINT

Erosion/Scour