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March 31, 1976

Government of Canada
Department of Indian
and Northern Affairs
400 Laurier Avenue West
Ottawa, Ontario

Attention: Mr. I.G. Petrie
Head, Land Management

Dear Sir:

We are pleased to submit 50 copies of our final report entitled: "Geotechnical Evaluation of Granular Material, Mackenzie Delta Area, 1976". This concludes the terms of our Contract No. OSU5-0237.

In the report we have provided logs for some 185 boreholes, together with a summary of pertinent laboratory test data. The recoverable volume of soil borrow has been computed for each of the three sites and some general opinions with regard to pit development are stated.

We appreciated the opportunity to conduct this study for you and we look forward to being of assistance in the future.

Respectfully yours,

EBA Engineering Consultants Ltd.



Don W. Hayley, P. Eng.

cc: M. Dokken
Department of Supply and Services

DWH:linh

**THE ASSOCIATION OF
PROFESSIONAL ENGINEERS
OF ALBERTA
PERMIT NUMBER
P 245
E B A ENGINEERING
CONSULTANTS LTD.**

DETAILED GEOTECHNICAL EVALUATION
OF POTENTIAL SOURCES
OF
GRANULAR MATERIAL

at

DEVIL'S LAKE (SOURCE 326),
LUCAS POINT (SOURCE 303)
and SWIMMING POINT (SOURCE 222),
MACKENZIE DELTA AREA, N.W.T.

Submitted To:

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN AND NORTHERN AFFAIRS

MARCH, 1976



ABSTRACT

This report presents the findings of a geotechnical evaluation of three prospective sources of granular material in the Mackenzie Delta Region. The three sources lie adjacent to the East Channel of the Mackenzie River approximately 45 to 65 miles northwest of the Town of Inuvik, N.W.T. A total of 185 boreholes were drilled at the three sites between January 19 and February 6, 1976. Approximately every third hole was cored to obtain undisturbed samples of the frozen granular soils. From the field data and ensuing laboratory program, the nature, extent and thickness of granular soils considered suitable for construction purposes have been mapped.

Granular materials acceptable for most fill construction purposes are available at all three sites. The computed volume of materials which can feasibly be exploited at the Devil's Lake, Lucas Point and Swimming Point Sites respectively are 13.1, 4.6, and 6.5 million cubic yards. Pit development, however, will be complicated by the presence of bodies of massive ground ice at the base of the deposit and by occurrence of shallow lakes within their boundaries. Orderly pit development is feasible, utilizing the local practice of stripping and stockpiling during the summer months, provided certain constraints discussed in the report are recognized.

Laboratory test data indicate that most of the material would be suitable for use as construction fill, however, there is some question as to its suitability for concrete aggregate. Further testing is required to assess the reactivity of certain potentially deleterious aggregate constituents.



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1. INTRODUCTION

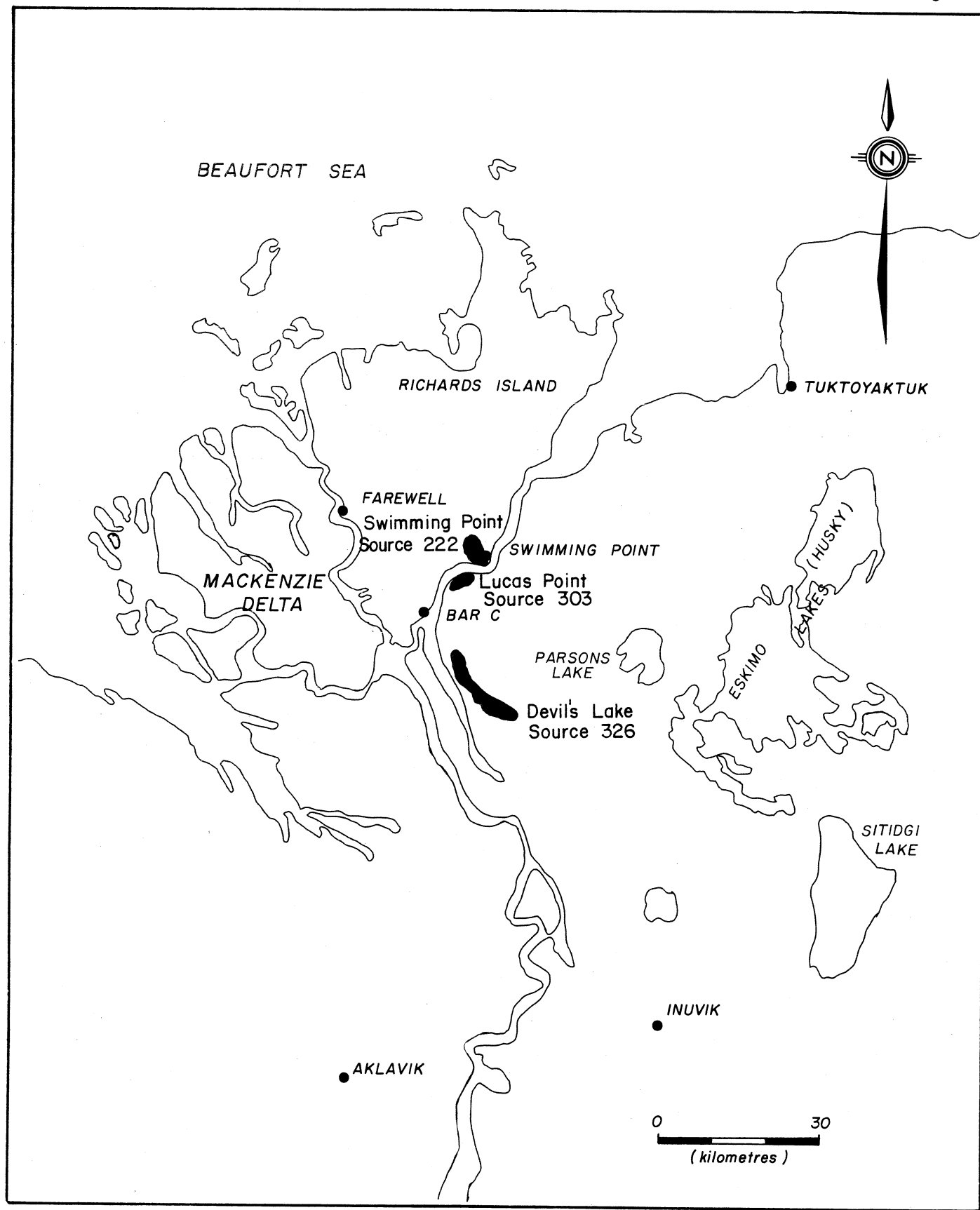
1.1 General

A study of the available granular materials of the Mackenzie Delta region of the Northwest Territories has been undertaken by the Government of Canada, Department of Indian and Northern Affairs (DINA). The study was initiated in response to a recognized need to establish development guidelines for the scarce construction materials in view of pressure from expanding natural resource development activities. A preliminary search of the area north of the settlement of Inuvik, N.W.T., was completed in 1973 by others (Ref. 1). In the winter of 1975-76, DINA retained EBA Engineering Consultants Limited (EBA) to carry out a detailed evaluation of three promising soil borrow sources identified in the earlier study.

The three sources lie adjacent to the East Channel of the Mackenzie River, approximately 45 to 65 miles northwest of the Town of Inuvik, N.W.T. The sites are identified on the location map, Figure No. 1, as: the Devil's Lake site, the Lucas Point site and the Swimming Point site.

Each site was investigated in the field and representative samples were obtained by drilling. Borehole logs prepared from field observations and laboratory testing have been used to formulate an assessment of the quantity and quality of exploitable construction materials and provide guidelines for borrow pit development. A description of the study program and its findings are stated in this report.





LOCATION PLAN
MACKENZIE DELTA

FIGURE 1

1.2 Project Organization

The granular materials survey was conducted within the terms of reference of contract number OSU50237 from the Department of Supply and Services (DSS). Authorization to proceed with the work was received on December 14, 1975 with the completion date set at March 31, 1976. The technical aspects of the program were overviewed by Mr. I.G. Petrie, Head of Land Management, DINA, and the contract was administered by Mr. M. Dokken of the Department of Supply and Services. In the field, technical overview was provided by Mr. Andre Thibault, a Special Projects Officer for DINA.

As the prime contractor, EBA provided all geotechnical and project management services. The surveying was subcontracted to Canadian Engineering Surveys Co. Ltd. of Edmonton (CES) and the drilling was subcontracted to Kenting Big Indian Drilling Co. of Calgary (KBI).

1.3 Report Organization

The text of this report presents a discussion of geological setting, terrain description, and considerations used for determining soil volumes and suitability of the proposed borrow material. Brief guidelines for site access, exploitation and restoration are included in the discussion.

A comprehensive description of field and laboratory procedures is given in Appendix A. Maps, drawings, survey coordinates, borehole logs and laboratory data are included in subsequent Appendices. A glossary of technical terms has been included in Appendix A.



1.4 Methodolgy

1.4.1 Office Preparation

At the outset of the study, preliminary source outlines and suggested borehole density were provided by DINA. This was supplemented by Airphoto analyses and an exploration program was established to adequately delineate and sample the deposits. Moreover, geological literature was reviewed to further assist in the planning of the field drilling program. The proposed field program was submitted to the DINA land use authority for permission to drill on the site and approval was granted on January 12, 1976.

1.4.2 Field Program

A total of 185 boreholes were drilled between January 19 and February 6, 1976. A 24 hour working day with two 12 hour shifts was adopted to allow the program to be completed within the required schedule. All boreholes were logged in the field as to the apparent soil type and permafrost characteristics. These logs were later modified to include the results of the laboratory testing program. A complete description of the field drilling program is given in Appendix A. Photographs of the source areas, drill rig, sampling operation and representative frozen cores are also presented in Appendix A, Plates 1 to 12 inclusive.

A survey party located the borehole sites in the field and obtained elevation data necessary for the calculation of material quantities. The borehole sites selected on airphotographs were subsequently located in the field on a grid pattern. The boreholes are designated by coordinates representing chainage distance along the baseline and offset distance from the baseline.



All frozen soil cores were described in accordance with the "Guide to the Field Description of Permafrost" (Appendix D). The volume of visible segregated ground ice in the soil was estimated as a percentage of total core volume and these are entered on the borehole logs (Appendix D). Where the orientation of segregated ground ice is uncertain, as in the case of grab samples, the letter 'V' was used to indicate visible excess ice.

1.4.3 Soil Classification and Testing

All soil testing was carried out in the EBA Edmonton laboratory, in accordance with American Society for Testing and Materials (ASTM) standards (Ref. 5). The testing program was designed to obtain the data necessary to formulate recommendations as to the suitability of the borrow material for construction purposes. These tests are discussed in subsection 6.2 and Appendix A, (A.1.1). Summaries of laboratory test results are listed in Appendix E.

Soils were described according to the Unified Soil Classification system. In addition to soil description, the 'Unified System' symbol is entered on the borehole logs (Appendix D). A difficulty arises in applying this system to multi-component soils such as glacial tills and very silty gravel-sand mixtures. Wherever the soil is suspected to be a glacial till, the genetic modifier 'till' is used to supplement the soil classification.

For the purpose of this report, granular borrow material has been considered to apply to gravel and/or sand with less than 20 percent combined silt and clay content (particle sizes smaller than 0.074 mm).

1.4.4 Borrow Volume Calculations

In order to derive isopach maps and cross sections (Appendix C) from the borehole logs, it is necessary to assume that the stratigraphy is continuous between adjacent boreholes. The volume of granular materials was determined by two methods. All estimates were initially computed from isopach maps of the thickness of borrow by scaling the aerial extent of borrow material enclosed by the contours. As a check on the first calculation, the "average end area method" was applied where meaningful cross sections could be drawn at regular intervals along the baseline. The latter method consists of calculating the area of granular material in section and multiplying it by the distance to the next cross section to obtain an estimated volume.



11. REGIONAL GEOLOGY AND GEOMORPHOLOGY

2.1 General

The area surrounding the East Channel of the Mackenzie River in the vicinity of Tununuk Point (IOL base camp Bar C) has been subjected to extensive fluvial, glacio-fluvial and glacio-lacustrine action. A surficial geological map has been prepared from the Geological Survey of Canada maps (Ref. 2 and 3). This is included as Drawing 1318-B-1, Appendix B.

2.2 Landforms

The granular deposits discussed in this report are fluvial and possibly glacio-fluvial in origin. These include fluvial terraces, terrace remnants, glacial outwash and delta plains with possible wave modified features. Continuous permafrost extending to depths of several hundred feet exist throughout the area. Only the upper 3 to 4 feet are normally subjected to seasonal thaw. Most of the relief at these deposits has been highly modified by the formation of massive bodies of ground ice. Local regions of thermokarst topography, particularly at the Devil's Lake Site (326), are evidenced by circular lakes occupying enclosed depressions (Appendix A, Plate 2).

The surrounding terrain consists mainly of rolling ground moraine glacio-lacustrine deposits and minor areas of marine beach deposits.



111. DEVIL'S LAKE, SOURCE 326

3.1 General

The Devil's Lake Site, (Source 326, Ref. 1) is located six miles south of Tununuk Point on the east bank of the Mackenzie River (Drawing 1318-B-2, Appendix B). A total of 98 boreholes were drilled at this site. Borehole logs are included in Appendix D together with laboratory data.

3.2 Terrain Description

Source 326 forms a high gently rolling plateau cut by several drainage channels which have eroded to depths up to 35 feet (Plate 1, Appendix A). (Elevation contours are shown on Drawing 1318-C-2, Appendix C). The surface is further characterized by several thermokarst lakes or ponds (Plate 2, Appendix A). Relatively few ponds have developed out-flowing drainage systems. Ice wedge polygons, indicating poorly drained high ice content soils, are prevalent features mainly in low lying areas and are not common on the higher plateau.

3.3 Geological Origin

The topography and stratigraphy indicate that the landform is of glacio-fluvial origin. Specifically, the deposit appears to be a glacio-fluvial terrace. The stratigraphy consists of interbedded sands and gravels with horizontal bedding (Plates 9 to 12, Appendix A). The spacing of boreholes does not permit an accurate interpretation of the stratigraphy as individual beds appear to pinch out rapidly in a horizontal direction. It was noted that thin beds of silt were often highly organic. This is considered further evidence of a depositional environment normally associated with a fluvial plain.

The deposits are generally underlain by glacial tills consisting of variable amounts of silt, clay, fine sand and fine gravel. Some isolated till sections were encountered within granular material, possibly a result of ice rafting.

3.4 Ground Ice

The ground ice conditions in the granular soils at Source 326 range from non-visible (Nbn, Nf) to visible ice (Vx, Vc averaging 5 to 15%). In well drained areas excess ice was rare and because of the low natural moisture content there was little inter-granular bonding (Nf). Some of the fine grained sands were noted to contain non-visible excess ice (Nbe). In general, average moisture contents in the granular material were in the order of 16 percent with a maximum of 42 percent recorded in the test results.

Massive ice prevails throughout the area, with sections 28 feet thick or more encountered in some boreholes. Their usual occurrence in the stratigraphic sequence is between the granular soils and the underlying silt and glacial tills. Drawing 1318-C-1, Appendix C indicates areas where thick massive ice in excess of 6 feet was found to underlie the granular soils. These massive ice bodies sometimes include layers of sand, gravel and silt.

3.5 Granular Borrow Material

3.5.1 Gradation

The granular material encountered at this site consists generally of a well graded sand overlying a somewhat coarser sand and gravel. This



material is relatively free of fine silt size materials. The silt contents measured in the laboratory averaged approximately 5% by weight of total sample with a maximum silt contents in the order of 20%. The gradation envelope is shown by Figure 2 and specific grain size distribution curves are included in Appendix E. Isolated pockets and lenses of silt, fine sand and glacial till occur sporadically throughout the deposit (Appendix D, Borehole Logs). These may reduce the overall quality of the borrow material because the thin interbeds of fine silty material cannot be easily separated from the granular material.

3.5.2 Overburden and Surface Cover

Relatively few surface exposures of granular material exist at this site. Organic soil and peat covers the ground surface to a typical thickness of 3 inches to 1 foot. A maximum thickness of 5 feet of organic soil was encountered at 20+00, 10+00W. Fine grained sand, silt and clay is usually found below the peat to an average depth of 3 feet. The maximum thickness encountered of this near surface soil was 5 feet at 24+00, 1+00W.

The vegetation at the Devil's Lake site is typical of the Arctic Tundra. Vegetative cover consists of mainly low willows, flowering plants, labrador tea, and varied tundra grasses. Some scattered spruce trees grow in sheltered, south facing slopes. The ground vegetation and tree density is quite high on the slopes facing the river channel.

For the most part, only a minor amount of stripping is anticipated. Stripping ratios of 1 to 15 are expected to be representative of the source.



GRAIN SIZE DISTRIBUTION

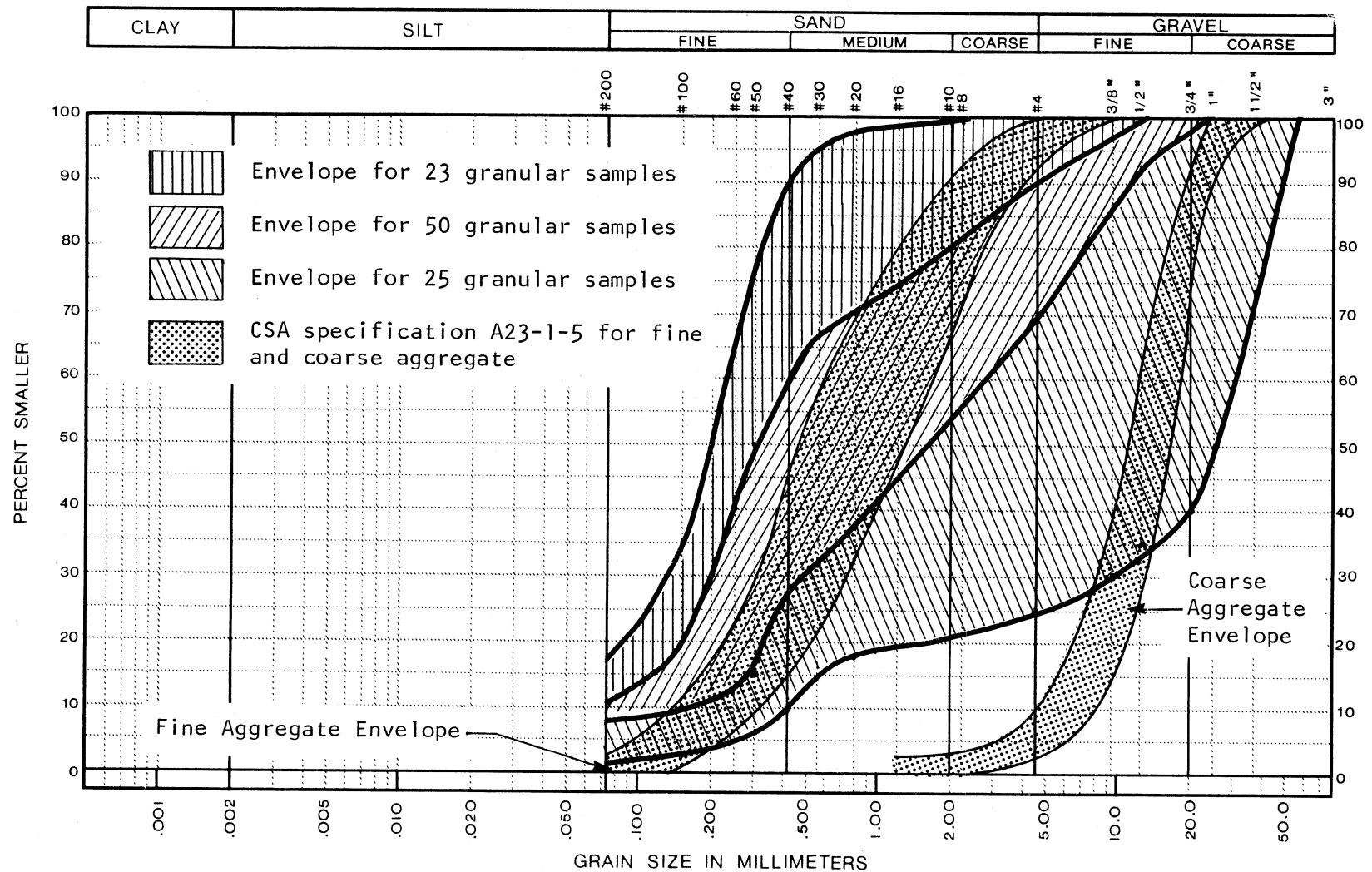


FIGURE 2 COMPOSITE GRAIN SIZE ENVELOPE
 DEVIL'S LAKE, SOURCE 326

3.5.3 Estimate of Recoverable Borrow Material Volume

Several volume calculations were performed imposing various physical constraints on the granular deposit. The computed volumes of recoverable granular material are summarized in Table 3.1.

The constraints imposed during assessment of recoverable granular material are discussed in Section VI of the report. An isopach map showing the thickness of recoverable granular material for the most restrictive case (13.1 mc yds) is presented in Drawing 1318-C-1, Appendix C of this report. Stratigraphic sections are also presented in Appendix C.



TABLE 3.1
ESTIMATED RECOVERABLE BORROW VOLUME - DEVIL'S LAKE SOURCE

RECOVERABLE VOLUME	IMPOSED CONSTRAINTS
13.1 million cubic yards	<ul style="list-style-type: none"> - 5 feet of cover is left above bodies of massive ground ice - the overburden does not exceed 6 feet thick - the recoverable borrow lies above the elevation of adjacent lake surfaces
15.2 million cubic yards	<ul style="list-style-type: none"> - the overburden does not exceed 6 feet thick - the recoverable borrow lies above the elevation of adjacent lake surfaces
16.1 million cubic yards	<ul style="list-style-type: none"> - the recoverable borrow lies above the elevation of adjacent lake surfaces
17.9 million cubic yards	<ul style="list-style-type: none"> - the total volume of granular material if no development restrictions are imposed

NOTES:

1. Massive ice, as discussed in Section 6.3, is considered to be greater than 6 feet thick.
2. Overburden has been defined here as the organic topsoil and fine grained mineral soil which would normally have to be removed to gain access to the granular soils.
3. It is estimated that after removing the overburden, an additional 5 to 10% of the material excavated will be small ice bodies and/or undesirable fines which must be wasted to achieve the estimated recoverable volumes stated above.



IV. LUCAS POINT, SOURCE 303

4.1 General

The Lucas Point Source (Source 303, Ref. 1) is located on the east bank of the East Channel, six miles south-west of Swimming Point, Gulf Oil Canada Limited's Base Camp. Source 303 is composed of three separate granular deposits designated by Baseline A, B, and C (Drawing B-3, Appendix B). A total of 43 boreholes were drilled in this area. Borehole logs and laboratory data are presented in Appendices D and E.

4.2 Terrain Description

Source 303, Baseline A and B areas, appear to be elongate, flat topped ridge-like features highly modified by massive ground ice formation (Plate 3, Appendix A). Ice wedge polygons are evident on the aerial photographs. The elevation of the prospective borrow deposits on Baseline A and B is approximately 50 feet above river level. The northern area, at Baseline C (Plate 4, Appendix A), is noted to be roughly triangular in shape with a nearly flat surface. The terrain in this area is higher, reaching an elevation up to 105 feet above the river level. A steep river bank, up to 100 feet high, forms the north-west edge of the deposit at Baseline C, (Drawing B-3, Appendix B).

4.3 Geological Origin

The three areas comprising this source appear to be terrace remnants of glacio-fluvial origin. Several high level river meander scars are evident in this area. In general, the source consists of interbedded sand and gravel overlying glacial till. A bed of cobbles and coarse



gravel exists near the lower contact of the granular borrow. In some areas, isolated thin beds of till were penetrated within the granular deposit. These are believed to have been ice rafted.

4.4 Ground Ice

The ground ice distribution within the granular material at this source ranges from non-visible ice to visible excess ice averaging 10% estimated ice content by volume. Moisture content of the soil averages 13% with a maximum of 29% in the granular materials.

Along Baseline A, massive ground ice in excess of 32 feet thick was found underlying the granular material at some locations. Regions where massive ice greater than 6 feet thick was encountered are identified in Drawing 1318-C-3, Appendix C. Boreholes on Line A at 8+00 and 10+00, encountered 2 feet of silt below the granular soil but overlying the massive ice. Baseline B area appears to be essentially free of massive ice in and below the granular deposit, with the exception of Borehole B8+00, 0+00 where 5 feet of ice was encountered within the gravel. Baseline C area does have some massive ground ice within its bounds, however, it is overlain by glacial till up to 10 feet thick and is generally not in the area considered as a source of recoverable granular material.

4.5 Granular Borrow Material

4.5.1 Gradation

The granular material of Source 303 consists mainly of well graded sand to sand and gravel. However, some infrequent sections do contain silty

granular soils and others contain soils which exhibit definite gaps in grading. Average silt content was determined to be approximately 6% with a maximum silt content of 16% in the granular material considered to be exploitable.

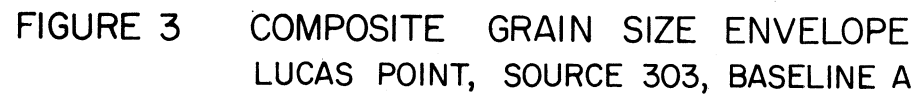
Boreholes drilled along Baseline C encountered coarser material as shown by some grain size curves of the material in the upper layer of the deposit (Appendix E). A gradation envelope for granular soils found within the deposit is shown in Figures 3, 4 and 5.

It was noted that in the region of Baselines B and C, significant beds of silt and glacial till (up to 4 feet thick) were encountered within the granular materials. These horizons may reduce the overall quality of borrow material if care is not taken to separate them during pit development. A 37 foot thick section of fine to medium sand was drilled at B10+00, 1+00N. This is believed to be a lens of limited lateral extent as indicated by adjacent cross sections (Appendix C).

4.5.2 Overburden and Surface Cover

The overburden thickness in the region of Baselines A and B was found to consist of an average of 3 feet of peat, organic silt, and fine grained mineral soils. Some isolated pockets of up to 5 feet non-granular soil occur along Baseline B. A typical overburden profile along Baseline C consists of 3 to 5 feet of silt, peat and fine sand. Overburden at C10+00, 1+00N and C11+00, 0+00 reaches an exceptional thickness of 14 feet. Much thicker overburden can be expected at the flanks of all terrace remnants. Overburden should not be a significant factor in the recovery of the granular material due to its generally thin nature.

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



GRAIN SIZE DISTRIBUTION

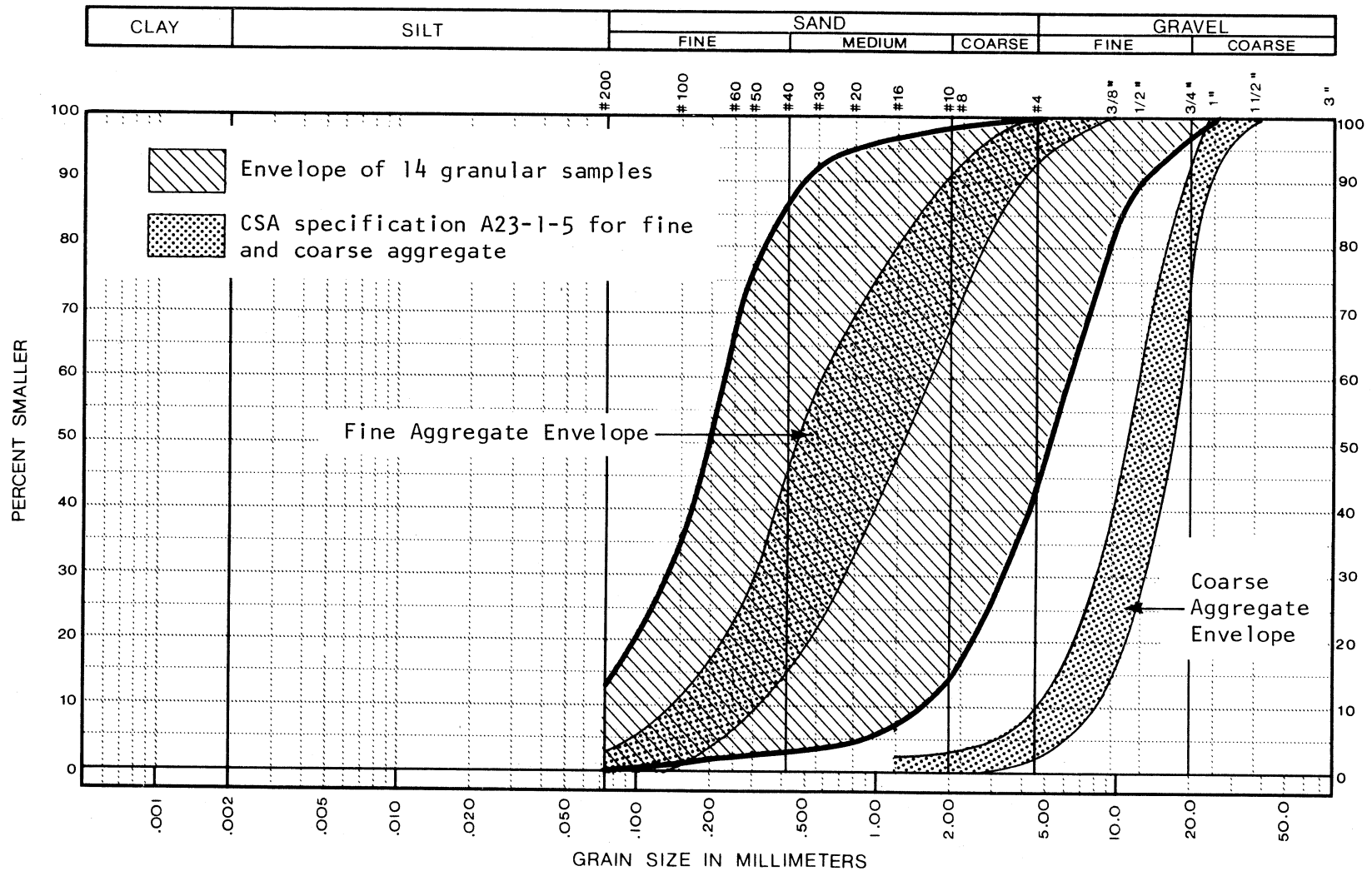


FIGURE 4 COMPOSITE GRAIN SIZE ENVELOPE
LUCAS POINT, SOURCE 303, BASELINE B

GRAIN SIZE DISTRIBUTION

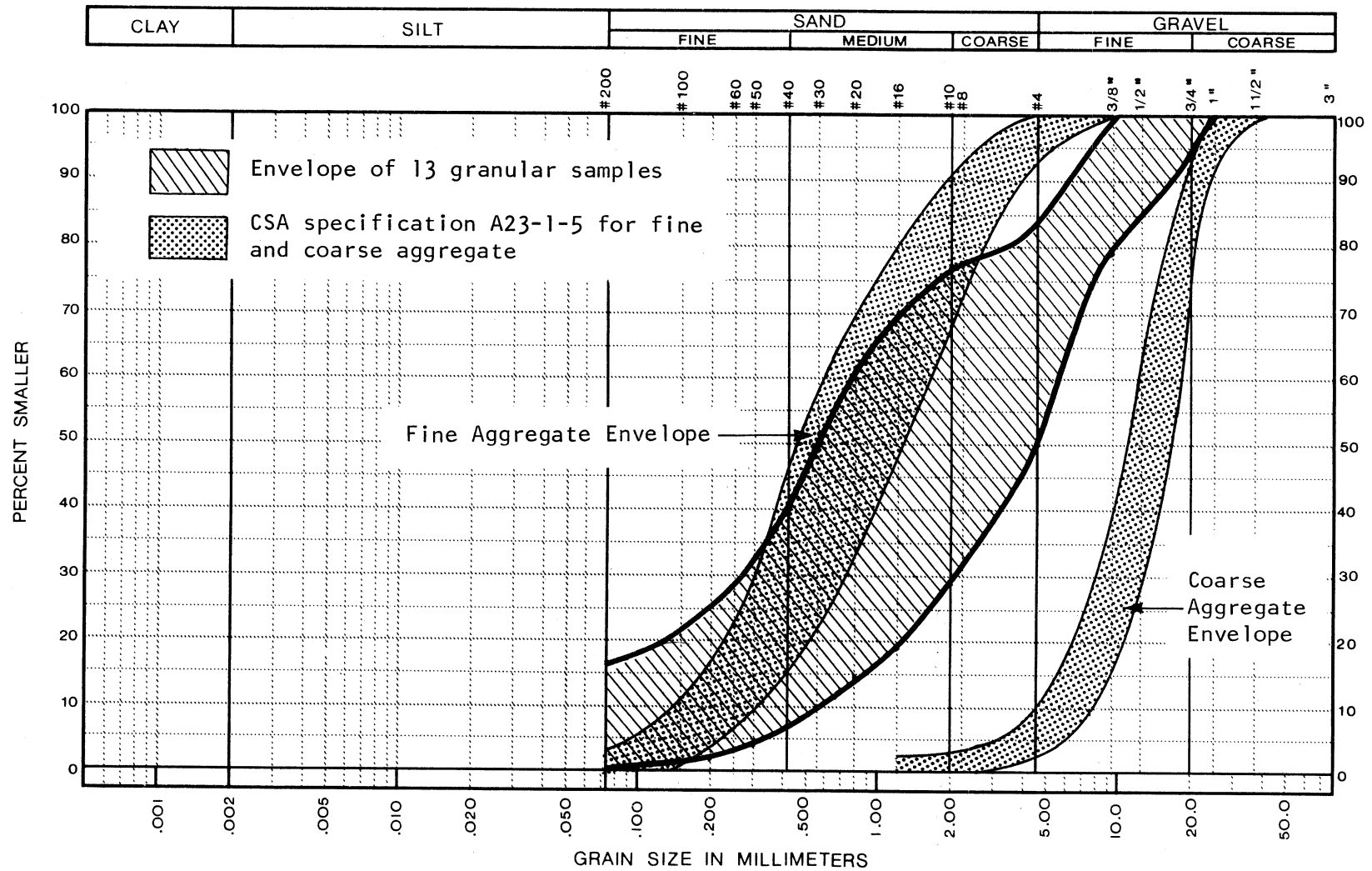


FIGURE 5 COMPOSITE GRAIN SIZE ENVELOPE
LUCAS POINT, SOURCE 303, BASELINE C

The vegetative cover at these sites is typical of the Arctic Tundra, consisting of sparse dwarf shrubs, such as willow and birch, flowering plants and a thin ground cover of grass, moss and lichens.

4.5.3 Estimate of Recoverable Borrow Material Volume

Several estimates of the volume of recoverable borrow material have been made to allow for various physical and environmental constraints which may be imposed. These have been summarized in Table 4.1.

TABLE 4.1			
ESTIMATED RECOVERABLE BORROW VOLUME, - LUCAS POINT SOURCE			
RECOVERABLE VOLUME (million cubic yards)		IMPOSED CONSTRAINTS	
Baseline	A	0.39	- 5 feet of cover is left above bodies of
	B	1.31	- massive ground ice
	C	2.90	- the recoverable borrow lies above the
TOTAL		4.60	elevation of adjacent lake surfaces
Baseline	A	0.78	- the recoverable borrow lies above the
	B	1.31	elevation of adjacent lake surfaces
	C	2.94	
TOTAL		5.03	
Baseline	A	0.78	- the total volume of granular material if
	B	2.00	no development restrictions are imposed
	C	3.24	
TOTAL		6.02	

NOTES:

1. Massive ice as discussed in Section 6.3 is considered to be greater than 6 feet thick.
2. It is estimated that after removing the overburden, an additional 5 to 10% of the material excavated will be small ice bodies and/or undesirable fines which must be wasted to achieve the estimated recoverable volumes stated above.



The constraints imposed during computation of recoverable granular material are discussed in Section VI of the report. An isopach map showing the thickness of recoverable granular material for the most restrictive case (4.60 mc yds.) is presented as Drawing 1318-C-3, Appendix C.

V. SWIMMING POINT, SOURCE 222

The Swimming Point Source (Source 222, Ref. 1) is comprised of several individual deposits of granular material to the west of Gulf Oil Canada Limited's Base Camp as shown on Drawing B-4, Appendix B. A total of 44 boreholes were drilled to delineate the thickness and aerial extent of the deposit. Borehole logs and laboratory data are presented in Appendix D and E. The area designated Source 222, Central was found to contain a relatively large amount of granular borrow. However, the distribution of boreholes is somewhat biased in favour of other portions of the deposit since investigation of the central source was not originally within the terms of reference of the study.

5.2 Terrain Description

The prospective gravel deposit consists of a series of flat topped, low lying plateaus about 30 to 50 feet above river level except for Source 222, North which is substantially higher. Slightly lower valleys separate the outlined areas. The lower valleys have a thicker accumulation of peat and are poorly drained in the summer months (Plate 5, Appendix A). High ice content soils are indicated in the intermediate valleys by extensive ice wedge polygons. Source 222 North, however is distinct from the remainder of the deposit since it is separated by an arcuate escarpment about 50 feet high. The topography of the North source area consists of several knob like features.

5.2 Geological Origin

The topographical expression and stratigraphy of this borrow source indicates a glacio-fluvial origin. The most obvious evidence for this is the arcuate escarpment which is believed to be a high level meander scar in the northwest end of the borrow area, Drawing B-4, Appendix B. the bulk of the area can be classified as a terrace remnant, however, the area designated as Source 222, North appears to be of earlier glacio-fluvial origin. The stratigraphy of the terrace remnant, (South, East, West and Central) consists of interbedded clean sand and gravel overlying fine grained sand, sandy silt, and silt with traces of fine sand.

5.3 Ground Ice

Ground ice in the granular borrow material of Source 222 is generally of a non visible well bonded nature (Nbn). Poorly bonded, non-visible ice (Nf) is often present in the upper few feet of granular material near the ground surface. Where visible ice exists in the gravel borrow, the average estimated ice content ranges from 5% to 10% by volume. Moisture contents averaged 12 percent with some test results noting a high of 25 percent.

Underlying silt, fine sand and clay beds exhibit both visible and non-visible ice. Excess, well bonded ice (Nbe) is rare, being found only in silty sand, sandy silt and fine sand horizons. The major ground ice types in the silt and fine sand beds vary from well bonded non-visible ice (Nbn), to visible ice of a stratified (Vs) or random orientation (Vr).

Massive ground ice was encountered sporadically throughout the stratigraphic sequence. Ice up to nine feet thick has been recorded immediately below silt and sand overburden (Borehole 22+00, 4+00E, Appendix D) or directly below a surface peat layer. This ice may represent an ice wedge which is of limited lateral extent. Thinner ice beds (about 1 foot thick) also occur sporadically throughout the granular borrow materials (Borehole 6+00, 0+00 at 6 feet). The most common occurrence of massive ice in the stratigraphic section was encountered at the granular material and fine sand-silt contact (Borehole 10+00, 2+00E at 5 feet). However, in some cases the massive ice was found within the fine sand and silt strata (Borehole 12+00, 8+50E).

5.4 Granular Borrow Material

5.4.1 Gradation

Most of the granular material can be designated as a well to poorly graded sand and gravel with an average silt content of approximately 7 percent (Figure 6). However, a silt content up to 23 percent has been recorded thus some contamination of clean granular materials will result during exploitation. Some thin medium to fine grained sand layers and some isolated high silt content beds should be anticipated within the borrow area.

5.4.2 Overburden and Surface Cover

Overburden consists of organic fine sand, silt, clay and peat varying in thickness over the borrow areas from 0 to 11 feet. However, the average amount of material encountered overlying useable borrow is approximately 3 feet (Appendix C).

GRAIN SIZE DISTRIBUTION

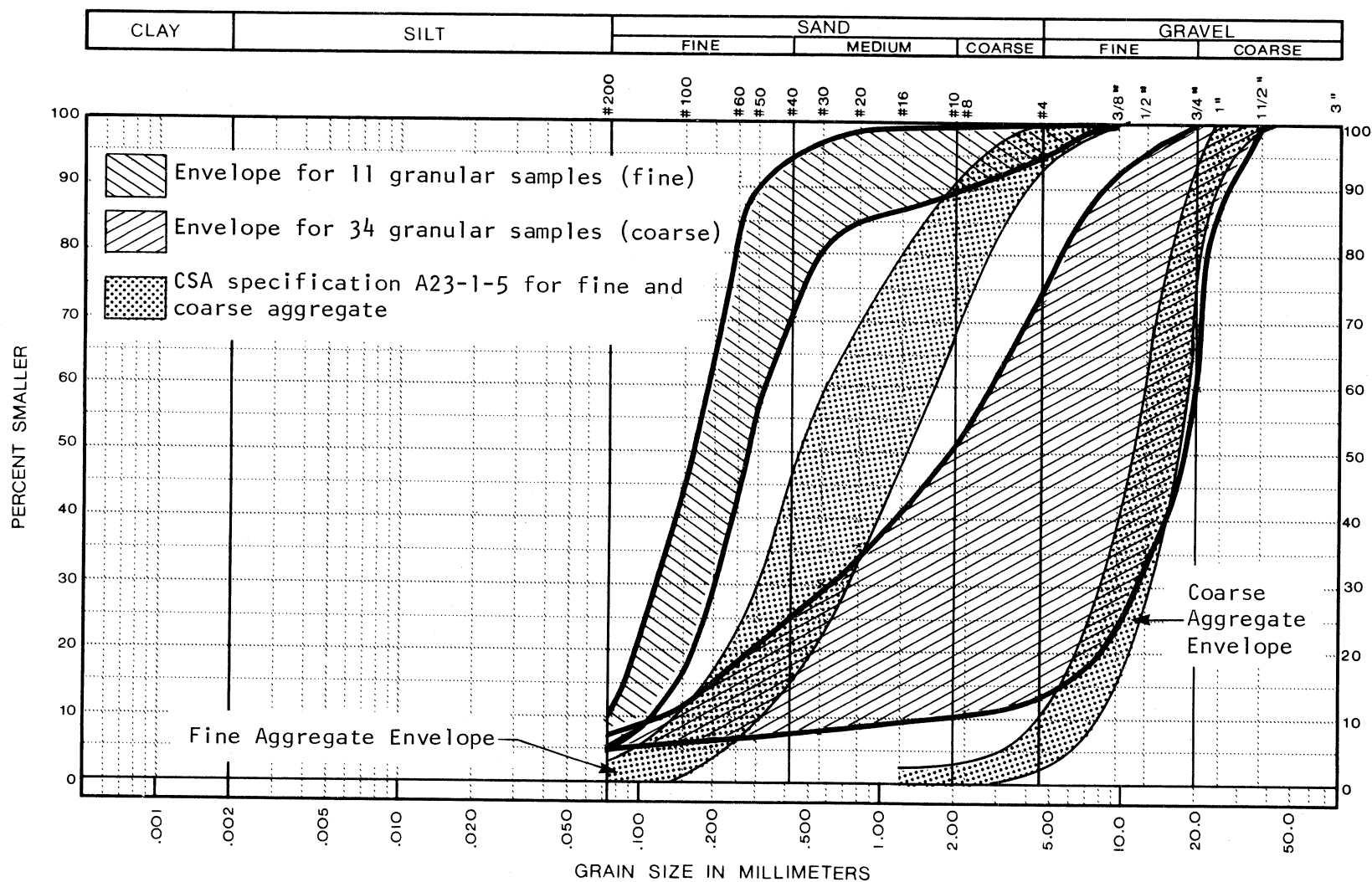


FIGURE 6 COMPOSITE GRAIN SIZE ENVELOPE
SWIMMING POINT, SOURCE 222

The vegetative cover consists of sparse dwarf willow and flowering plants with a well established growth of grasses, lichens and moss at ground surface. Denser concentrations of shrubs can be found on the steep sideslopes and in lowlying wet areas between the prospective borrow sources.

5.4.3 Estimate of Recoverable Borrow Material Volume

Several estimates of the volume of recoverable borrow material have been made to allow for various physical and environmental constraints which may be imposed. These volume estimates are summarized in Table 5.1.

The constraints imposed during computation of recoverable granular material are discussed in Section VI of the report. An isopach map showing the thickness of recoverable granular material for the most restrictive case (6.47 mc yds) is presented as Drawing 1318-C-5, Appendix C. Stratigraphic sections for representative sub-areas within the source are also included in Appendix C.

TABLE 5.1

ESTIMATED RECOVERABLE BORROW VOLUME - SWIMMING POINT SOURCE

RECOVERABLE VOLUME (million cubic yards)		IMPOSE CONSTRAINTS
North	0.18	- the overburden does not exceed 6 feet thick - the recoverable borrow lies above the elevation of adjacent lake surfaces
Central	0.90	
West	0.94	
South	1.85	
East	2.60	
TOTAL	6.47	
North	0.18	- the recoverable borrow lies above the elevation of adjacent lake surfaces
Central	0.90	
West	1.10	
South	2.07	
East	2.84	
TOTAL	7.09	
North	0.18	- the total volume of granular material if no development restrictions are imposed
Central	7.91	
West	1.11	
South	2.07	
East	2.84	
TOTAL	14.11	

NOTE:

1. Overburden has been defined here as the organic topsoil, and fine grained mineral soil which would normally have to be removed to gain access to the granular soils.
2. It is estimated that after removing the overburden, an additional 5 to 10% of the material excavated will be small ice bodies and/or undesirable fines which must be wasted to achieve the estimated recoverable volumes stated above.



VI. PIT DEVELOPMENT AND UTILIZATION

6.1 Access and Exploitation

6.1.1 Summer Operations

The three source areas are reasonably accessible by river barge which would allow transportation of the granular material during the short summer season. The barges may be loaded by means of a conveyor system which can be fed by front end loaders. In the case of Source 326 it may be desirable to use a conveyor system to avoid the steep, environmentally sensitive river banks. Probable access routes are shown on Drawing 1318-B-2, Appendix B. Direct loading may be possible at Lucas Point if a docksite can be constructed. (Drawing 1318-B-3, Appendix B).

Overland trucking may be required to reach certain inland construction sites. This type of operation would require gravel road beds to be built from the pit to the construction site. The volume of material needed for these roads may be prohibitive. A minimum of five feet of road bed gravel would be required to minimize thermal disturbances to the underlying permafrost and to maximize seasonal useage. Access to all sites can be gained quite readily by constructing low incline approach ramps.

Experience at the Ya-Ya Lakes' pit on Richards Island, has shown that a feasible method of exploiting the gravel resources involves a simple stripping and stockpiling operation. Newly thawed material is pushed into stockpiles by bulldozers and allowed to drain. The cycle of operation is dependant on the rate of thaw, which can be accelerated by stripping in the spring with stockpiling operations commencing when the thaw front



has progressed one to two feet into the deposit. This system allows the material to drain rapidly in the stockpiles while progressively increasing the amount of thawed material in the pit. The material in the piles may then be removed and loaded by front end loaders during any time of the year.

In the event that large volumes of granular borrow are required very rapidly, thereby reducing the available time for thawing and draining, it is recommended that either ripping with a dozer or drill and blasting operations be instituted. The ease of rippability must be compared with the economics of a drill and blast operation. Drill and blast operations have been used successfully for gravel pit development during construction of the Dempster Highway near Fort MacPherson, N.W.T. A crusher may be required to reduce the frozen blocks of borrow to manageable size. Bulk density of frozen core included in Appendix D, provide valuable information as to the volume of frozen material as it is trucked versus the thawed and computed volume of borrow material at the construction site.

Environmental restrictions may seriously reduce the extent to which summer recovery operations may be carried out. It is recommended that site specific environmental studies be considered before recovery plans are formulated.

6.1.2 Winter Operations

All three prospective borrow sites are readily accessible from a winter road on the river channel ice. Some small earth fill ramps would be required to reduce some of the steeper approach grades. Material hauling may be carried out by dump trucks via river ice roads and land ice roads



which can be easily built and maintained. Stockpiled material may be hauled quickly and economically during the winter season. The extent of terrain disturbance due to road construction and wildlife disturbance would be significantly reduced by a winter haulage operation.

Recovery operations during winter will be restricted to drilling and blasting as discussed in the previous subsection. The borrow material will probably require crushing before being transported.

6.1.3 Development Restrictions

6.1.3a Treatment of Massive Ice

Extensive bodies of massive ground ice underlie the borrow deposits as shown on Drawings 1318-C-1, 1318-C-3, and 1318-C-5, Appendix C for Sources 326, 303 and 222 respectively. The extent of the massive ice varies significantly from underlying all of Baseline A, at Lucas Point, Source 303 to being almost absent at Swimming Point, Source 222. General recommendations are difficult to set out because of the variability of the extent of the ice and the nature of the borrow. Each occurrence must be evaluated as it is encountered during pit development.

The problems with the massive ice are both environmental and construction oriented. The environmental concerns include the effect of draining large bodies of muddy water from the thermokarst ponds which may form in the pit, restoration of a thermokarst sensitive area, and the attraction of wild fowl to open bodies of water during a pit development operation.

construction concerns also relate to the disruptive affect of ponds formed by thaw subsidence in the pit floor. These include the disruption of haul roads, erosion gullying and rutting of the water saturated soils.

The estimates of recoverable material, volumes discussed in previous sections of this report, have assumed as one of the constraints that 5 feet of soil would be left covering the massive ice. This is a minimum estimated thickness of cover which would allow development of the pit without disruption due to rapid melting of the massive ice. Haul roads over this minimum cover cannot be expected to last long during a prolonged period of warm summer weather. When pit restoration is underway, a veneer of organic overburden should be placed over the five feet of remaining borrow to improve the insulating cover over the massive ice.

In some areas of the borrow pits where the massive ice is thin, or it is not feasible to protect it, complete stripping may be adviseable. This will allow the ice core to melt completely. Haul roads and drainage channels must be carefully planned to accommodate the rapid melting of the ice during the summer. Lenses of ice within the deposit can be stripped and wasted as development of the pit progresses.

6.1.3b Groundwater Associated With Excavation Near Lakes

The second consideration in the volume calculations, presented in previous sections is the concern for natural bodies of water. The small thaw ponds which border and cover part of the granular material will be environmentally sensitive. Some of the smaller bodies of water can probably be expendable as they freeze to the bottom and thus do not

maintain a permanent aquatic population. Deeper bodies of water, however, will be subject to strict regulation and will have to be protected against contamination and drainage.

Existing drainage courses of all natural water bodies will have to be maintained. Also ponds which form from the melting of massive ice may develop an aquatic or wildfowl population which may be subject to land use restrictions. It is essential to actively update the pit drainage system to reduce the possible loss of borrow reserves in the area of a newly formed lake. The maintenance of a slope away from the working face to promote drainage will be an asset.

Siltation of existing bodies of water by pit drainage will also be an environmental concern. The Mackenzie River would appear to be the obvious discharge area for silt-rich pit runoff. However, the escarpment along the west side (Mackenzie River side) of Source 326 is one of the most environmentally sensitive areas of the delta, thus making drainage to the river somewhat difficult.

It is beyond the scope of this study to evaluate and summarize the various environmental and land use regulations which will be encountered. The obvious problem areas have been discussed above but a more detailed study should be undertaken before development guidelines are established.

6.1.4 Restoration

During the initial stripping of the pit, the organic surface cover should be removed from the sites and stockpiled to allow orderly pit development. This material can be used to temporarily control pit

drainage. At the completion of recovery operations, the sites should be regraded to smooth, stable slopes of approximately 3:1 keeping a minimum 5 feet of cover over those massive ice deposits which have been protected during excavation. Stockpiled surface organic soils can then be redistributed over the sites to provide a fertile horizon for the purposes of revegetation.

6.2 Suitability of Granular Borrow for Concrete Aggregate

6.2.1 General

A series of laboratory tests were run to assess the quality of material for use in concrete or in granular fill. Standard ASTM and CSA testing procedures were followed. A condensed version of the test results is given in Tables 6.1 to 6.4 inclusive. The complete laboratory testing summary is presented in Appendix E of the report.

6.2.2 Aggregate Test Data

The test results of the granular materials from all sources indicate a normal weight aggregate having specific gravities in the range of 2.53 to 2.64 (Table 6.1 to 6.3). Gradation of the various aggregates is discussed in previous subsections and illustrated in Figures 2 to 6. These materials can be classified as fine aggregates as specified in ASTM C33 and CSA A23.1. Very little coarse aggregate has been documented at the potential borrow sites. It will however, be possible to recover a small volume of coarse aggregate if the material is screened and recombined in appropriate proportions. The silt and clay fractions can also be reduced by screening. The fineness modulus provided with the grain size data in Appendix E will be useful for estimating proportions

TABLE 6.1
SUMMARY OF TEST RESULTS
DEVIL'S LAKE, SOURCE 326

AREA	8+00-14+00 2+00E-3+00W	18+00,9+00W	24+00,1+00E	32+00-36+00, 1+00W-4+00E	36+00,10+00W	36+00-40+00, 7+00-12+00W	46+00,3+50E	54+00-60+00, 3+00W-1+00E	66+00,1+00W
SAMPLE TYPE	Combined	Surface	grab sample @ 10'	Combined	Surface	Combined	Surface	Combined	Surface
% GRAVEL	19	32	40	11	25	30	29	25	13
% SAND	77	63	59	72	75	68	68	69	86
% SILT	4	5	1	17	0	2	3	6	1
COARSE AGGREGATE									
Bulk S.G.	2.51	2.53			2.51			2.54	2.49
Bulk S.G. (SSD)	2.55	2.56			2.55			2.57	2.54
Apparent S.G.	2.61	2.61			2.62			2.65	2.61
Absorption (%)	1.53A	1.33A			1.70A			1.42A	1.71A
FINE AGGREGATE									
Bulk S.G.	2.62	2.62		2.62	2.62			2.62	2.61
Bulk S.G. (SSD)	2.66	2.67		2.66	2.66			2.65	2.66
Apparent S.G.	2.73	2.76		2.73	2.72			2.72	2.73
Absorption (%)	1.49A	1.93A		1.48A	1.44A			1.35A	1.60A
Color Plate	No. 5-N	No. 4-N		No. 3-No. 5-N	No. 3A		No. 4-N	No. 3-A	
Minimum Dry Density (pcf)	104.9					108.9	110.2	106.9	
Maximum Dry Density (pcf)	120.7					128.9	124.6	139.9	
SOUNDNESS LOSS (%)									
Fine		2.14A					1.06A		
Coarse		4.18A					---		
Reactivity Rating	Innocuous-A		Deleterious-N	Innocuous-A		Potentially Deleterious		Potentially Deleterious	Potentially Deleterious
Los Angeles Abrasion Loss (%)					17.4A	17.8A	17.0A		
Moisture Content (%)	10.7	6.8			6.2	8.3	7.3	8.7	5.1

A - Acceptable according to ASTM standards and CSA standard (A23.1)

N - Not acceptable according to ASTM standards and CSA standard (A23.1)

TABLE 6.2
SUMMARY OF TEST RESULTS
LUCAS POINT SOURCE 303

AREA	BASELINE A	BASELINE B at 4+00,1+00S	BASELINE B	BASELINE C at 6+00,2+00N	BASELINE C
SAMPLE TYPE	Combined	Surface	Combined	Surface	Combined
% GRAVEL	30	38	27	71	35
% SAND	68	59	68	22	60
% SILT	2	3	5	7	5
COARSE AGGREGATE					
Bulk S.G.	2.53		2.54	2.54	2.54
Bulk S.G. (SSD)	2.57		2.57	2.57	2.58
Apparent S.G.	2.63		2.62	2.63	2.63
Absorption (%)	1.50A		1.24A	1.34A	1.32A
FINE AGGREGATE					
Bulk S.G.	2.63		2.62	2.62	2.63
Bulk S.G. (SSD)	2.67		2.65	2.71	2.67
Apparent S.G.	2.74		2.71	2.84	2.74
Absorption (%)	1.48A		1.26A	2.84A	1.58A
Color Plate	No. 4 -N	No. 5 -N	No. 5 -N	No. 5-N	No. 4 & No. 5-N
Minimum Dry Density (pcf)	103.0		97.8		104.2
Maximum Dry Density (pcf)	119.0		129.1		121.3
SOUNDNESS LOSS (%)					
Fine	1.62A		1.44A	1.68A	1.77A
Coarse	---		---	0.49A	---
Reactivity Rating	Innocuous-A	Innocuous-A	Innocuous-A	Innocuous-A	Innocuous to Potentially Deleterious
Los Angeles Abrasion Loss (%)		15.9A			
Moisture Content (%)	9.0	3.9	7.5		

A - Acceptable according to ASTM standards and CSA standards (A23.1)

N - Not acceptable according to ASTM standards and CSA standards (A23.1)

TABLE 6.3
SUMMARY OF TEST RESULTS
SWIMMING POINT, SOURCE 222

AREA	SOUTH	WEST	EAST	CENTRAL
SAMPLE TYPE	Combined	Combined	Combined	Combined
% GRAVEL	36	36	47	42
% SAND	59	56	47	54
% SILT	5	8	6	4
COARSE AGGREGATE				
Bulk S.G.	2.56	2.54	2.57	2.54
Bulk S.G. (SSD)	2.59	2.58	2.59	2.58
Apparent S.G.	2.64	2.64	2.64	2.63
Absorption (%)	1.22A	1.44A	1.10A	1.29A
FINE AGGREGATE				
Bulk S.G.	2.59	2.64	2.63	2.62
Bulk S.G. (SSD)	2.61	2.67	2.67	2.66
Apparent S.G.	2.64	2.73	2.74	2.72
Absorption (%)	0.62A	1.27A	1.47A	1.36A
Color Plate	No. 4-N	No. 3 & No. 5-N	No. 3-A	No. 5-N
Minimum Dry Density (pcf)	106.8	106.4	106.0	103.0
Maximum Dry Density (pcf)	130.0	133.6	137.8	127.0
SOUNDNESS LOSS (%)				
Fine			1.92A	1.59A
Coarse			---	0.14A
Reactivity Rating	Deleterious -N	Innocuous -A	Potentially Deleterious	Innocuous -A
Los Angeles Abrasion Loss (%)				
Moisture Content (%)	7.2	6.3	5.8	7.3

A - Acceptable according to ASTM standards and CSA standards (A23.1)

N - Not acceptable according to ASTM standards and CSA standards (A23.1)

TABLE 6.4

SUMMARY OF RESULTS OF PETROGRAPHIC EXAMINATION

Weighted Percent Composition of Constituents											
CONSTITUENTS	SOURCE 326				SOURCE 303			SOURCE 222			
	8+00,0+00 (19'-24')	36+00,10+00W (0'-1')	46+00,3+50E (0'-1')	66+00,1+00W (5'-14')	BASELINE A COMBINED	BASELINE B 4+00,1+00 (0'-1')	BASELINE C COMBINED	CENTRAL COMBINED	SOUTH COMBINED	WEST COMBINED	EAST COMBINED
1. Quartzite	21.8	21.9	25.6	17.2	31.2	29.1	20.3	32.2	23.9	15.4	26.4
2. Quartz	24.4	35.4	25.5	49.5	31.0	12.2	28.0	22.3	29.7	28.8	24.7
3. Chert	20.7	13.5	17.9	14.4	14.8	28.4	13.7	13.9	15.2	13.1	14.9
4. Sandstone	10.0	20.7	15.4	11.7	17.9	15.3	32.3	21.7	23.4	27.4	29.0
5. Conglomerate	0.8	0.1	1.0	0.2		0.1	0.1	0.8	0.4	0.1	0.1
6. Argillite	16.5	2.6	9.3	1.4	0.6	5.9	1.4	0.8	1.0	2.0	0.2
7. Basalt	3.0	5.6	4.8	3.2	3.1	7.4	2.9	3.3	2.0	5.3	3.7
8. Granite	1.5	0.2	0.2	0.3	0.5	1.0	0.6	1.4	1.4	2.6	0.4
9. Coal	0.9		0.2	0.3	0.1	0.3	0.1	0.8	1.4		
10. Schist	0.1		0.1			0.3					
11. Limestone	0.3			1.8	0.8		0.6	2.8	1.6	5.3	0.6
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

of fine and coarse aggregates for concrete mix design purposes. For small projects, pit run gravel can probably be used effectively for concrete aggregate.

Sulphate soundness testing gave losses in the range of 1.06 to 2.14 percent for fine gradations and 0.14 to 4.18 percent for coarse gradations. These percentages are well below the maximum acceptable standards set out by CSA A23.1 which provides for losses of 16 percent for fine aggregate and 12 percent for coarse aggregate. Los Angeles Abrasion testing resulted in losses of 15.7 to 17.8 percent which is well below the 35 percent maximum set by CSA A23.1 for most common concrete uses. Thus the granular material is sufficiently durable for use as concrete aggregate.

Organic contents are generally high as indicated by the colour plate tests listed in Tables 6.1, 6.2 and 6.3. Removing these organics by flotation in water is deemed necessary which will also remove some of the fines. Reactivity test results described a wide range of innocuous, potentially deleterious and deleterious samples within Sources 326 and 222 (Table 6.1 and 6.3) and (Appendix E, Reactivity Plots). This wide variation could not be attributed to any variation in concentration or size of potentially deleterious constituents noted in the petrographic analyses. Reactivity results from Source 303 were the most consistent giving ratings of 4 innocuous samples and 1 potentially deleterious one (Table 6.2).

Petrographic analyses, which are summarized in Table 6.4 and detailed in Appendix E, indicate several potentially deleterious components in these aggregates. These include: chert-chalcedony, argillite and coal. The latter two constituents comprise a very small, almost negligible percentage

of the total samples. Chert is present usually in all grain sizes and reaches a maximum of 20 percent by weight of some samples. Although chert-chalcedony is nominally undesirable in concrete, the reactivity test results did not conclusively show that the borrow would be unsuitable for aggregate.

Only a very minor portion of the tested samples indicated fine mineral coatings on coarse aggregate particles. These are specifically silicious in composition and can easily be removed by washing. The particle shape noted in Appendix E will be advantageous to the workability of the fresh concrete.

To clearly establish if the granular material will be satisfactory for concrete aggregate it is recommended that trial batches be mixed and tested for resistance to freezing and thawing, chemical reactivity, and compressive strength. Providing these additional tests produce satisfactory results, the granular materials can be considered for use as concrete aggregate. Large soil samples will have to be gathered from test pits for trial mix design testing.

6.3 Construction Fill Suitability

Most borrow material samples identified were found to be well graded and reasonably free of fines (less than 10% passing a No. 200 sieve). This material will be excellent for use as compacted fill for roads, airstrips, or foundation pads. The material is expected to be free draining, frost stable and readily compactable under thawed conditions.

Experience with winter time placement and compaction of frozen gravels in the Mackenzie Delta has shown that the fill cannot be mechanically

compacted during sub freezing conditions if the moisture content is above approximately 10%. For frozen placement moisture contents less than 10% a compacted Relative Density of 40 to 60% can usually be achieved. Since in situ moisture (ice) conditions in the prospective pits are in the 10% to 25% range, thawing and stock piling to allow drainage during the summer months would be essential prior to placement during either a summer or winter construction season.

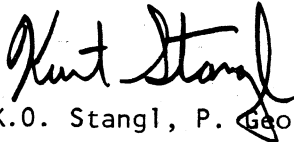
VII. STUDY FINDINGS

7.1 General Conclusions

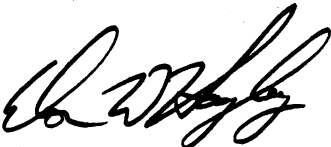
Acceptable soil borrow material was found at the Devil's Lake, Lucas Point and Swimming Point sites. Volume calculations for the above sources indicate a minimum of 13.1, 4.6 and 6.5 million cubic yards of borrow material respectively, given several major constraints involving overburden thickness, level of adjacent lakes and presence of massive ice formations. Laboratory testing has indicated the materials suitability for use in high quality granular fills, however reactivity testing has indicated a high proportion of potentially deleterious components in addition to a lack of coarse aggregate sizes. Further testing is recommended before an accurate assessment of the aggregate quality can be made.

Respectfully submitted,

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KOS:lmh



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FIELD AND LABORATORY PROCEDURE

A.1 FIELD DRILLING PROGRAM

A.1.1 General

The field drilling program commenced on January 19 and was terminated on February 6, 1976. A total of 185 boreholes were drilled to an average depth of 31.2 feet. The drilling was carried out on a 24 hour basis, in order to complete the work within the given time frame. Available daylight hours were an important factor in the layout of the borehole and level survey. Because of the poor light in January the level survey was carried out after the drilling program.

The weather conditions were favourable during the period of field activities. Temperatures for the first week of the program were seasonable, averaging -40°C with some extreme lows of -55°C . A warming trend was experienced during the latter weeks, with temperatures in the range of -15°C recorded. After the drill rig and camp were demobilized on February 6, the weather turned to blowing snow and the temperature dropped to -40°C . The surveying was extended beyond that date and unfortunately experienced several days of lost time on account of poor visibility.

A.1.2 Support Facilities

A.1.2.1 Camp Accommodation

Beattie Contractors Limited of Inuvik were subcontracted to provide accommodation for a maximum of 20 field crew members. The sleigh mounted "cat camp" consisted of the following: two sleepers, a utility, kitchen-diner and a power plant with bulk fuel storage. At the completion of

the drilling program, Beattie Contractors provided a single kitchen-sleeper sleigh for the survey crew who spent an additional week on site. A D-7 dozer, provided by Beattie, was used for camp moves and provided a standby for a second dozer (D-6) assigned to the drill rig.

A.1.2.2 Drill Rig

A fully enclosed, sleigh mounted Mayhew 200 "Heli-Drill" was subcontracted from Kenting Big Indian Drilling (KBI) of Calgary, Alberta, for this project (Plate 6, Appendix A). The drill is powered by a four cylinder air cooled gasoline engine. It has the capability of drilling with either compressed air or drilling mud. The compressor, electrical power plant, and Herman Nelson heater are contained in a second attached sleigh. A D-6 dozer was utilized to move the rig between borehole locations. A fuel sloop with 2400 gallons capacity supplied the rig, dozer and other support vehicles and was towed behind the drill sleighs. The rig offered the advantage of a heated enclosure within which work could be conducted in relative comfort both night and day.

A.1.2.3 Transportation

Several support vehicles were required to carry out the field activities related to the drilling program. A Nodwell FN-60 crew cab provided crew transportation between the rig and camp. A second Nodwell and Bombardier Skidoo was obtained for the use of the survey crew. A four wheel drive crew cab truck served as regular transportation on the ice roads for shipment of samples and procurement of supplies from Inuvik.

A.1.3 Drilling and Sampling Procedure

A.1.3.1 General

Soil sampling was carried out by both coring the frozen ground and by catching chip samples. Approximately every third borehole was sampled in detail by core barrel. Detailed boreholes are indicated by the core symbol in the appropriate column of the borehole logs, Appendix D.

A.1.3.2 Sampling and Logging Techniques

Undisturbed frozen samples were obtained by using a VTM-3 core barrel (Valley Tool and Machine Works, Calgary, Alta.) with air circulation. (Plate 7, Appendix A) The outside diameter of the core barrel is approximately 5 inches with cut cores being 3 inches in diameter. Four large carbide insert teeth provided the cutting action. When the coarsest material was under an inch in diameter, the recovery of core was excellent with almost full recovery being achieved for most runs. The core barrel was not effective when gravel particles greater than 3 inches or cobbles predominated; however for the deposits under study this was not a major concern. All cores were logged in the field and distribution of ground ice was classified according to the NRC System.

Grab samples were obtained by continuous air return drilling with 'Walmac' type bits (Plate 8, Appendix A). Some segregation of the sample was evident as the ice was blown a greater distance from the hole. Coarser material tended to collect in the borehole until air pressure increased to the point where the material was ejected in a single gust.

Walmac and rock bits were used in detailed cored boreholes where either too fine or too coarse a material was encountered. In this case they were strictly used to advance the hole and reduce wear on the VTM core barrel bit.

A.1.3.3 Performance

A minimum amount of lost time due to equipment failure or poor weather was experienced on this project (17 hours in total). Table A-1 presents the drilling statistics in a concise manner.

A.1.4 Sample Handling

Frozen core was logged, bagged in plastic, labelled and kept outdoors to prevent thawing. When a sufficient number of cores were collected, they were shipped to EBA's laboratory in Edmonton for testing. Insulated, specially constructed core boxes were used for sample shipment. All samples of frozen core arrived intact. Grab samples were generally thawed but were carefully sealed to prevent moisture loss. These were then packaged in 5 gallon pail containers for shipment to Edmonton.

TABLE A-1

DRILLING STATISTICS FOR GRANULAR MATERIAL STUDY, 1976

DRILL TYPE: KENTING BIG INDIAN HELI-DRILL

HOURS WORKED	DATE	NO. OF BOREHOLES		DEPTH (FEET)		AVERAGE DEPTH (FT)	REMARKS
		DETAIL	NON DETAIL	MAX.	MIN.		
12	21/01/76	1	2	32	27	30	6 hr move
24	22/01/76	2	7	37	28	35	
24	23/01/76	4	7	57	28	38	
24	24/01/76	1	8	52	32	35	12 hr breakdown
24	25/01/76	3	10	37	27	31	
24	26/01/76	3	11	42	17	29	
24	27/01/76	3	8	52	12	32	
24	28/01/76	5	9	37	26	32	
24	29/01/76	3	11	42	17	30	2 hr move
24	30/01/76	3	10	37	3	27	8 hr move
24	31/01/76	2	9	40	3	27	3 hr move 5 hr down
24	01/02/76	2	11	42	18	32	3 hr move
24	02/02/76	4	7	37	3	30	4 hr move
24	03/02/76	4	10	32	27	31	
24	04/02/76	3	13	37	17	28	
14	05/02/76	1	8	57	32	36	
TOTAL		44	141				43 hours

DAILY AVERAGES (24 hour shift)

Detail Cored Hole:	2.9
Non detail Hole:	<u>9.4</u>
TOTAL	12.3

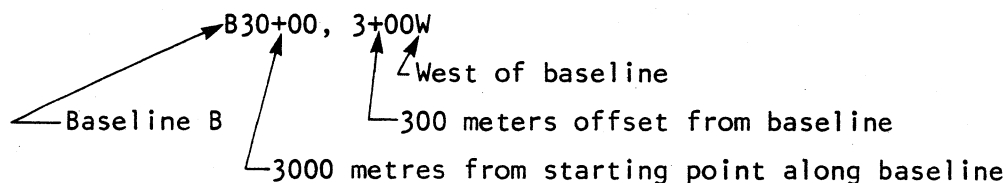
AVERAGE DEPTH: 31.4 feet

TOTAL NUMBER OF HOLES DRILLED: 185

A.1.5 Surveying

Surveying of all three borrow sites was carried out by Canadian Engineering Surveys (CES) on a subcontract to EBA. Initially, baselines were laid out using chainage for distance control and visual landmarks together with a transit for bearing. Boreholes locations were set out in a similar manner on normal grid lines. At the completion of drilling, the Motorola Mini-Ranger System (MRS) was employed to tie in all baselines to the Universal Transverse Mercator (UTM) grid. A level survey was run to obtain elevations for all boreholes. Sufficient additional stations were added to obtain reasonable cross section profiles of the borrow deposit. Temporary bench marks were in most cases arbitrarily tied to river or lake ice elevations. Some 'permanent' bench marks such as the VOR/DME site at Swimming Point were utilized wherever possible. Iron spikes have been placed in all baselines to facilitate relocation of the borehole sites. This information is being kept on file in the CES office in Edmonton, Alberta.

The grid system was laid out in an orderly manner giving two coordinates for each borehole. A typical borehole designated B30+00, 3+00W would be located as follows:



Survey data is given in table form in Appendix C.

A.2.1 LABORATORY TESTING

A.2.1.1 Objectives

A comprehensive laboratory program was undertaken at the completion of field work. The objective of the programs was to provide:

- a. Verification of field descriptions of soils by gradational analyses.
- b. An indication of the variability of engineering properties of soils within the same potential borrow area.
- c. Suitability of granular material for use as high quality granular fill or as concrete aggregate.

A.2.2 Test Program

Laboratory tests were performed in accordance with ASTM or CSA standards in EBA's Edmonton laboratory. It is believed that sufficient testing was carried out to provide a representative sampling of the material characteristics for each deposit. These tests are summarized in Appendices D and E of this report.

GLOSSARY

ALLUVIAL	-	Pertaining to streams of comparatively recent age.
ALLUVIUM	-	Stream deposits of comparatively recent time, does not include subaqueous deposits of seas and lakes.
BOULDER	-	A rock fragment larger than 8" in diameter.
CLAY	-	Soil particles smaller than 0.002 mm. in diameter.
COBBLE	-	A rock fragment between 3" and 8" in diameter.
EXCESS ICE	-	Ice in excess of the fraction that would be retained as water in the soil voids upon thawing.
FLOOD PLAIN	-	That portion of a river valley, adjacent to the river channel, which is built of sediments during the present regime of the stream and which is covered with water when the river overflows its banks at flood stages.
FLUVIAL	-	Pertaining to streams or produced by river action.
GLACIAL TILL	-	Nonsorted, nonstratified sediment carried or deposited by a glacier.
GLACIOFLUVIAL	-	Pertaining to streams flowing from glaciers or to the deposits made by such streams.
GRAVEL	-	Soil particles smaller than 3" in diameter and larger than that which will pass a #4 sieve.
GROUND MORaine	-	A moraine with low relief, devoid of transverse linear elements.
HUMMOCK	-	A mound or knoll.
ICE WEDGE	-	Generally downward-tapering wedge-shaped dikes of foliated ground ice. Typically 1 cm to 3 m wide and 1 to 10 m high.
ICE WEDGE POLYGON	-	Large scale polygonal features commonly outlined by shallow trenches underlain by ice wedges.

ISOPACH	-	A line on a map drawn through points of equal thickness of a designated unit.
MEANDER SCAR	-	Crescentic stream-made cuts in the inactive flood plain bordering a stream.
OUTWASH	-	Bodies of stratified drift that are washed out and deposited by meltwater streams issuing from and discharging beyond active glacier ice.
OVERBURDEN	-	The fine soil or waste that overlies useable borrow material.
PEAT	-	A dark brown or black residuum produced by the partial decomposition and disintegration of mosses, sedges, trees and other plants that grow in marshes and like wet places.
PERMAFROST	-	The thermal condition under which earth materials exist at a temperature below 32 degrees F continuously for a number of years.
RELIEF	-	The difference in elevation between the high and low points of a land surface.
SILT	-	Soil particles smaller than the #200 sieve and larger than 0.0002 mm.
TERRACE	-	A relatively flat elongate stairstepped surface bounded by a steeper ascending slope on one side and a steep descending slope on the other.
THERMOKARST LAKE	-	Lakes which occupy depressions resulting from subsidence caused by thawing of ground ice.
TILL	-	A nonsorted and nonstratified mixed grained sediment carried or deposited by a glacier.
TUNDRA	-	Any of the vast, nearly level, treeless plains of the Arctic Regions.

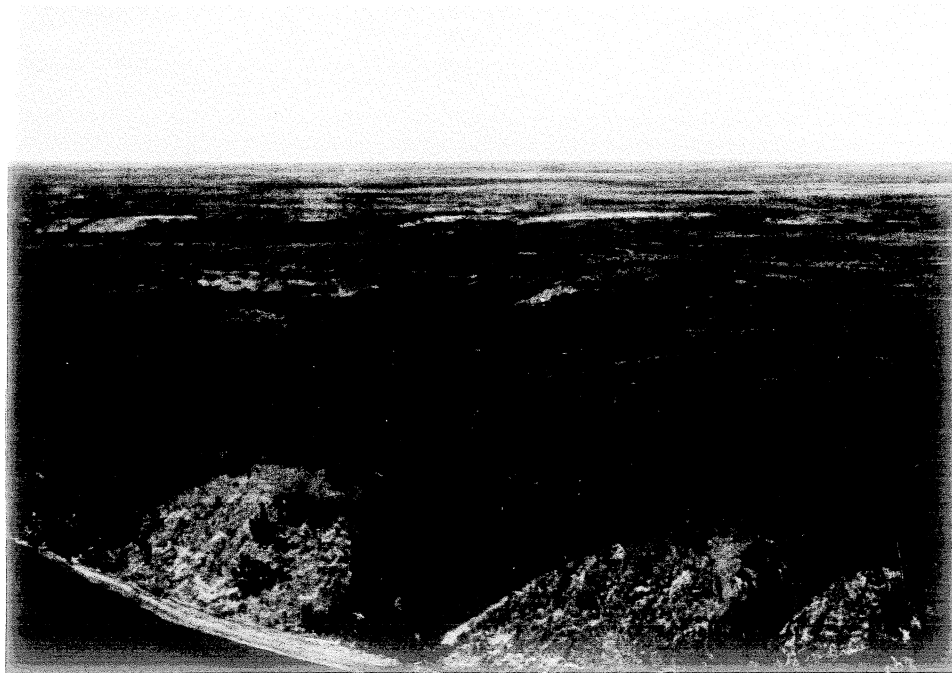


PLATE 1 Aerial view of Devil's Lake, Source 326.
 Source is located beyond spruce trees - some
 bare patches of gravel can be seen.

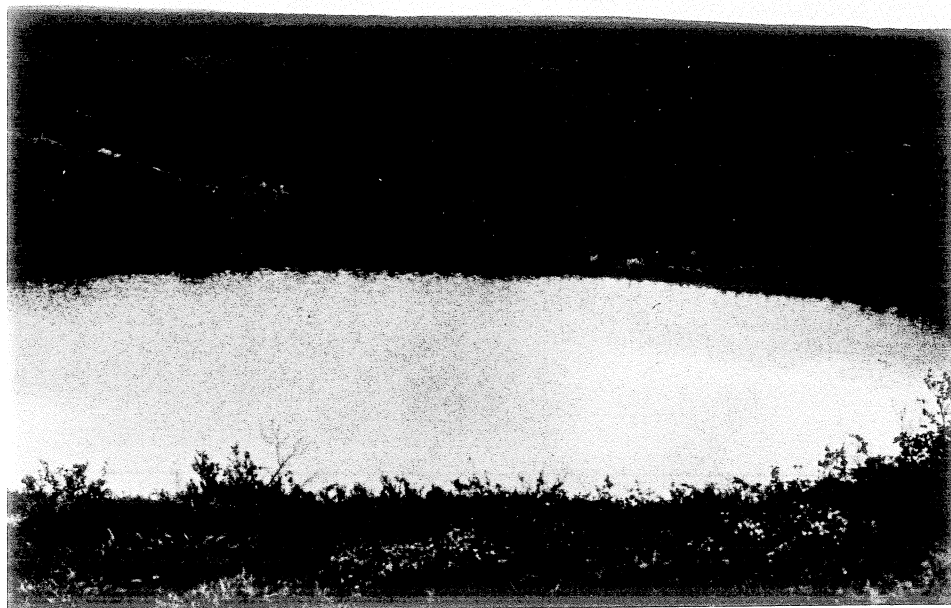


PLATE 2 View of circular thermokarst pond, Devil's Lake.
 Source 326 at A64+00, 3+00E (approx.)

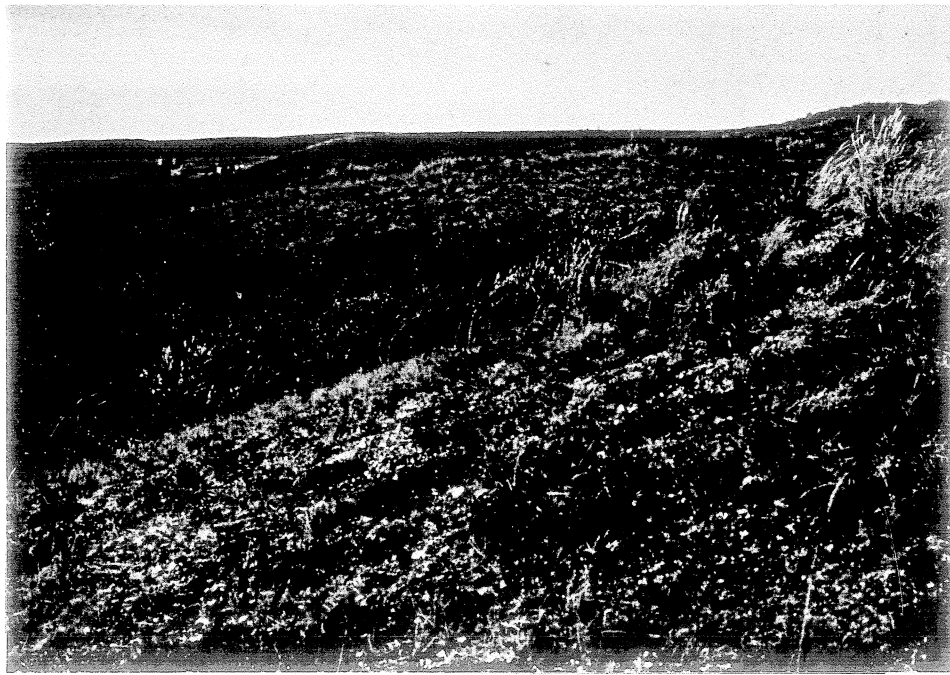


PLATE 3 View of rolling terrain at Lucas Point, Source 303A.
Gulf Oil Staging Area in distance.

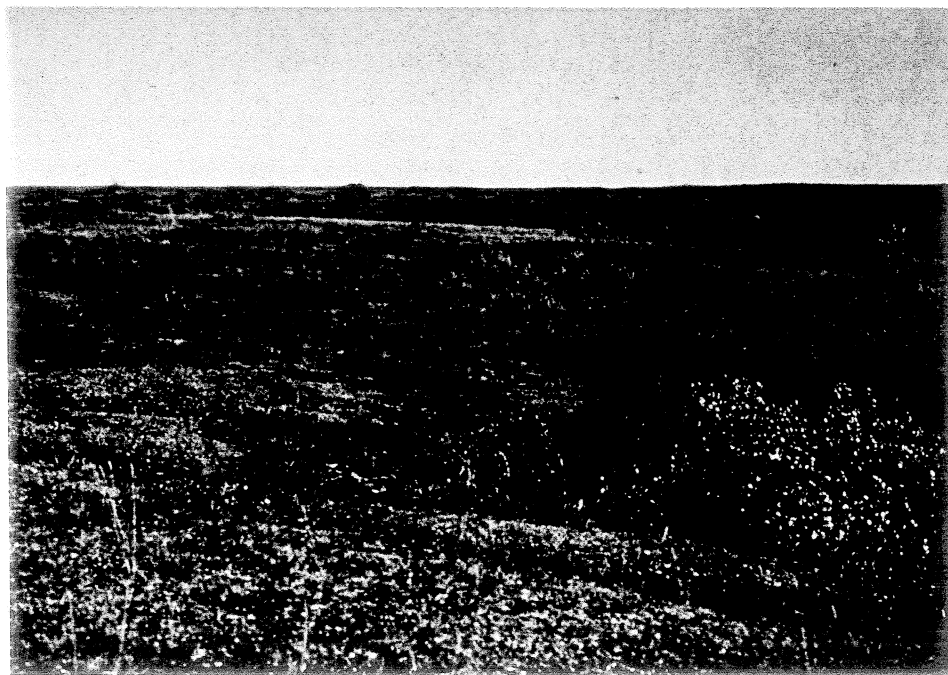


PLATE 4 Overlooking Lucas Point, Source 303C. Note
surface cover and very flat to gently rolling
topography.

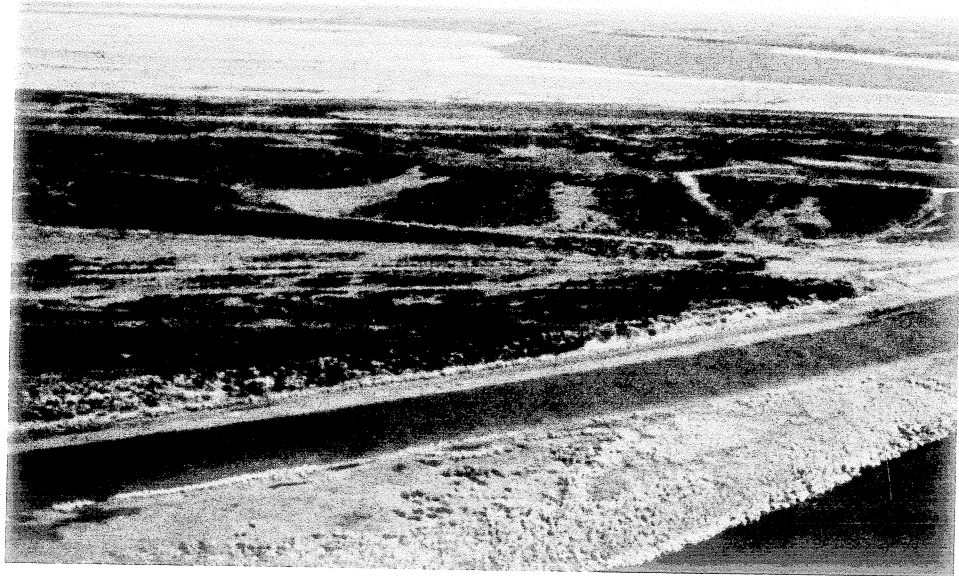


PLATE 5 Aerial view of Swimming Point, Source 222 south.
Valley in foreground trends north-south and is
notably very marshy.

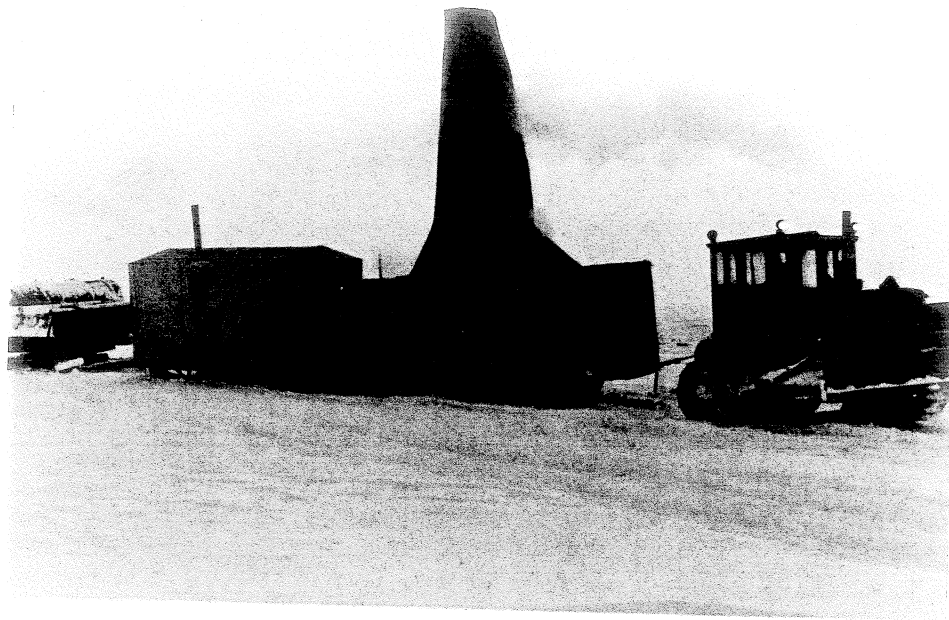


PLATE 6 Kenting Big Indian Heli-Drill, with D-6 caterpillar
and fuel sloop.

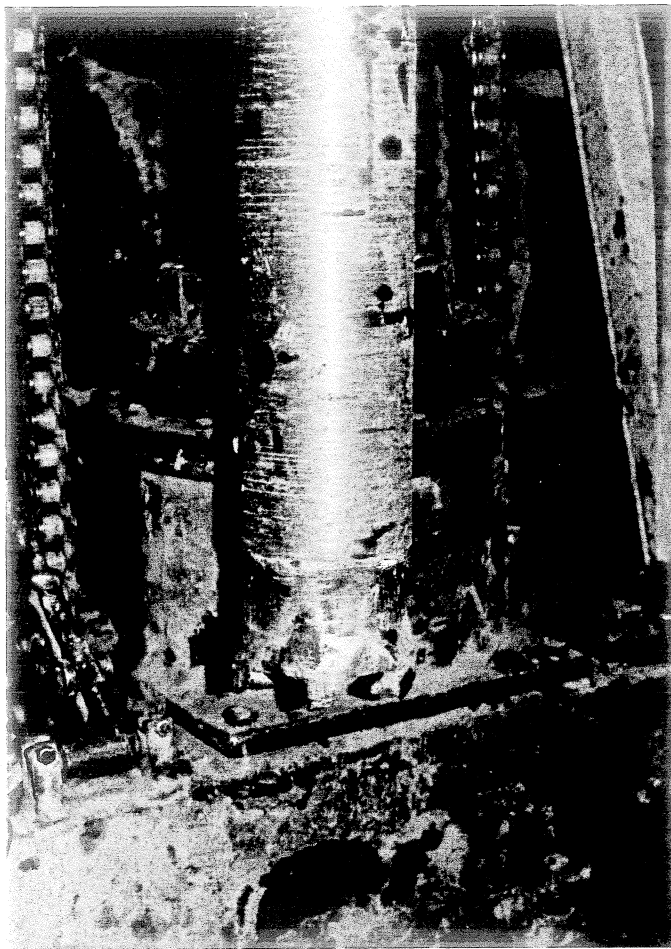


PLATE 7

Lower section of VTM
core barrel with carbide
toothed bit.

PLATE 8

Dust deflector suspended
in place during air
drilling operation using
Walmac bits. Sample
return is shown being
blown out of the bore-
hole.



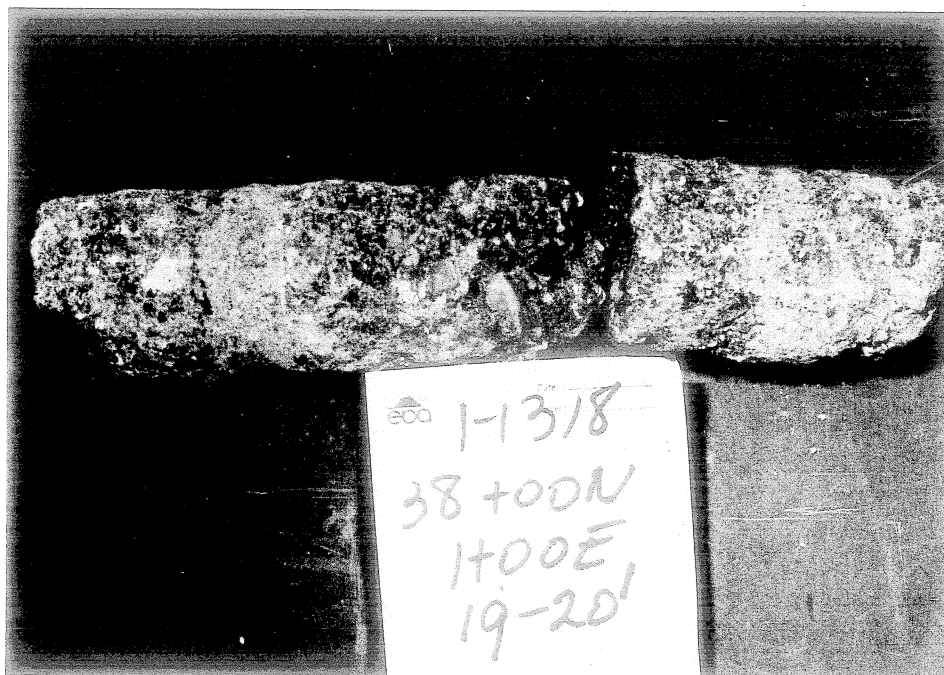


PLATE 9

VTM frozen core taken from Devil's Lake, Source 326, Borehole A38+00, 1+00E at a depth of 19 to 20 feet. Note medium grained sand interbeds. Core is generally sand and gravel.



PLATE 10

VTM frozen core taken from Devil's Lake, Source 326, Borehole A64+30, 1+90E at a depth of $5\frac{1}{2}$ - $9\frac{1}{2}$ feet. Horizontal bedding is evident, some finer sandy layers are present within the gravelly sand.

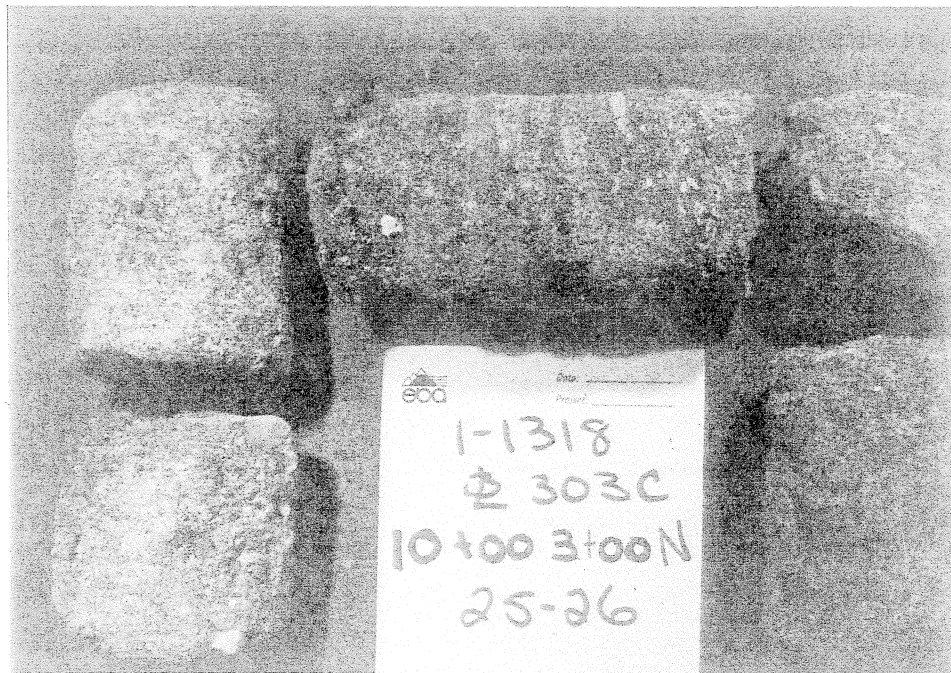
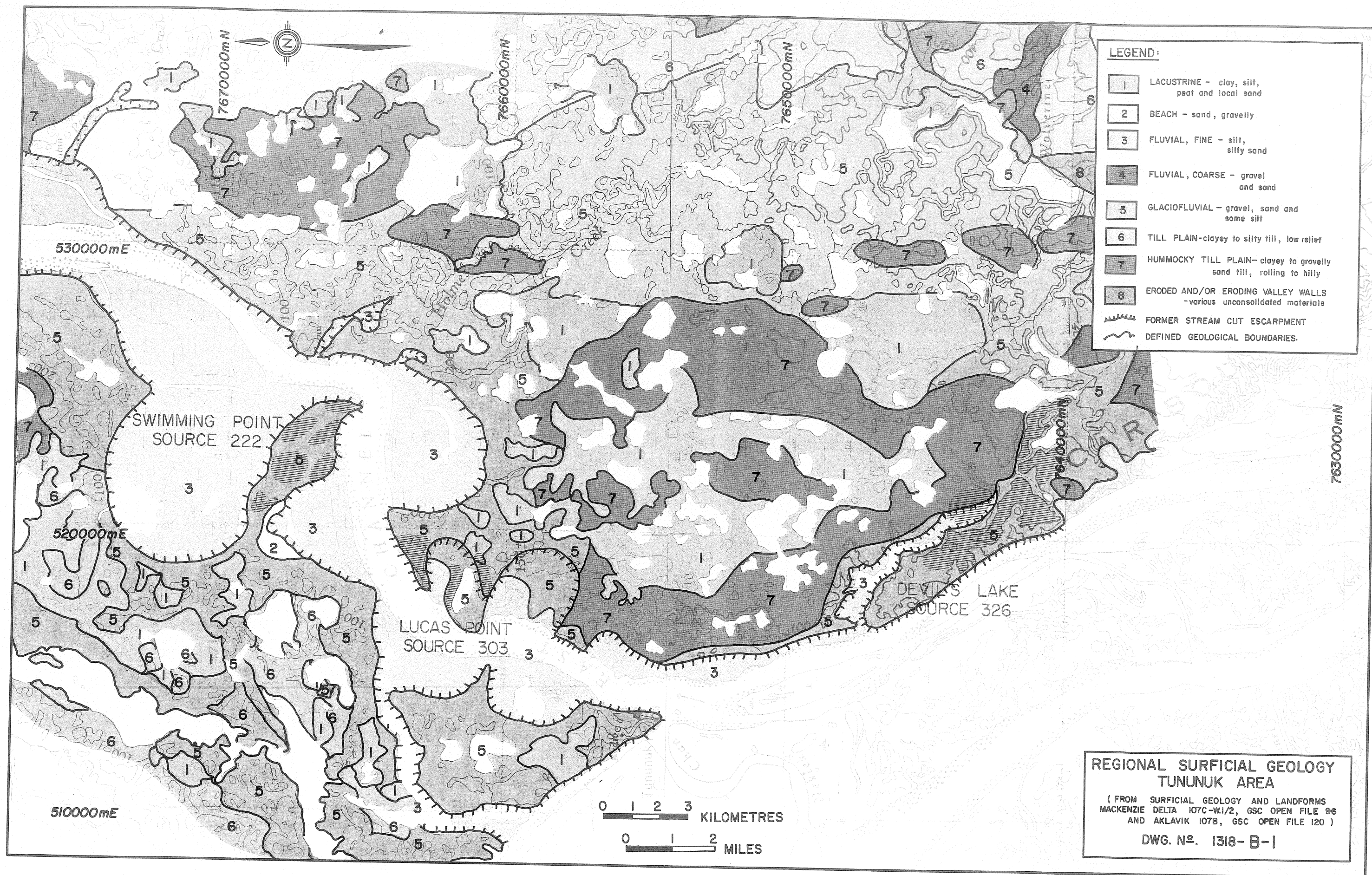


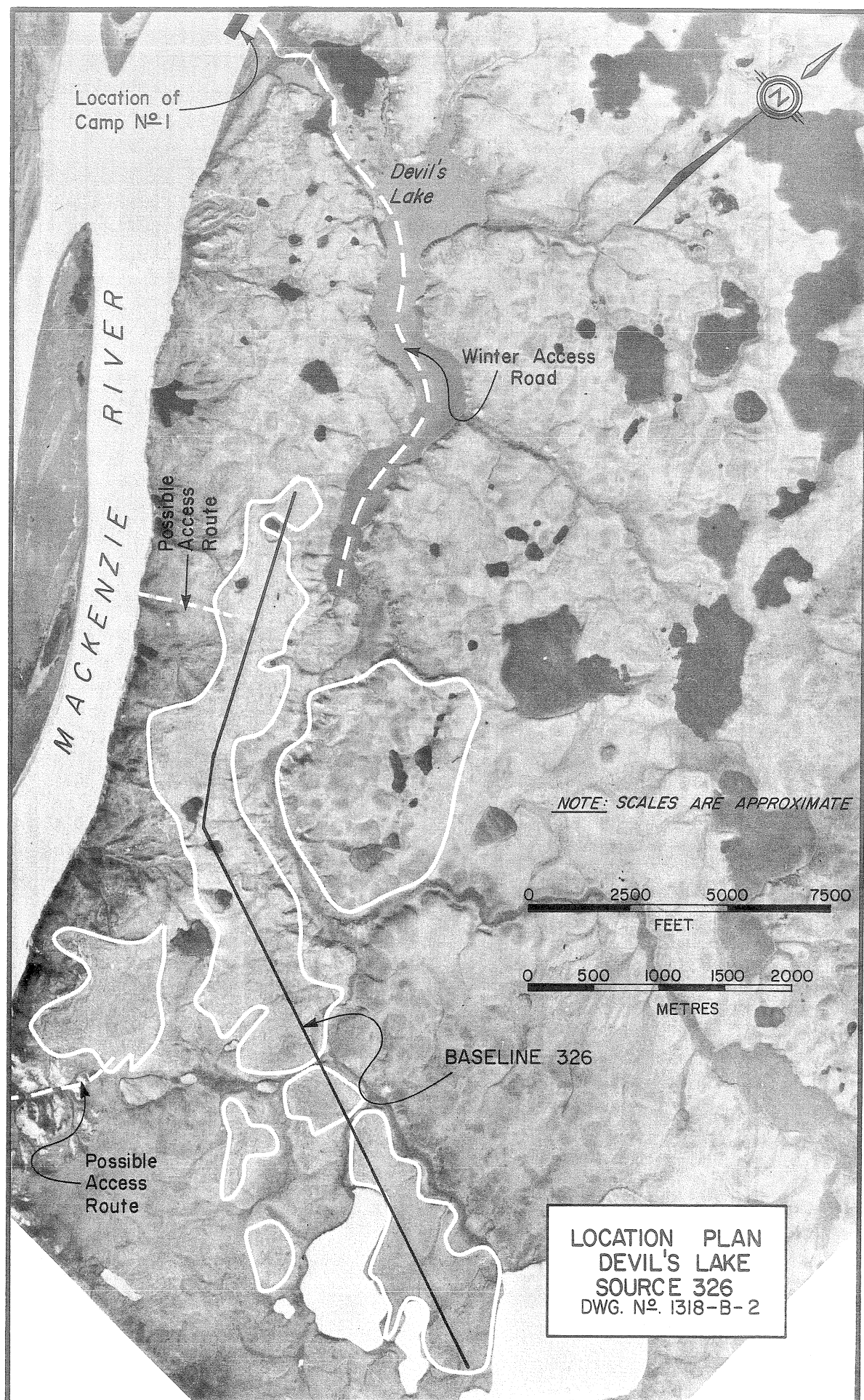
PLATE 11 VTM frozen core from Lucas Point, Source 303C, Borehole C10+00, 3+00N, at 25 to 26 feet. Sample is classified as sand, some gravel.

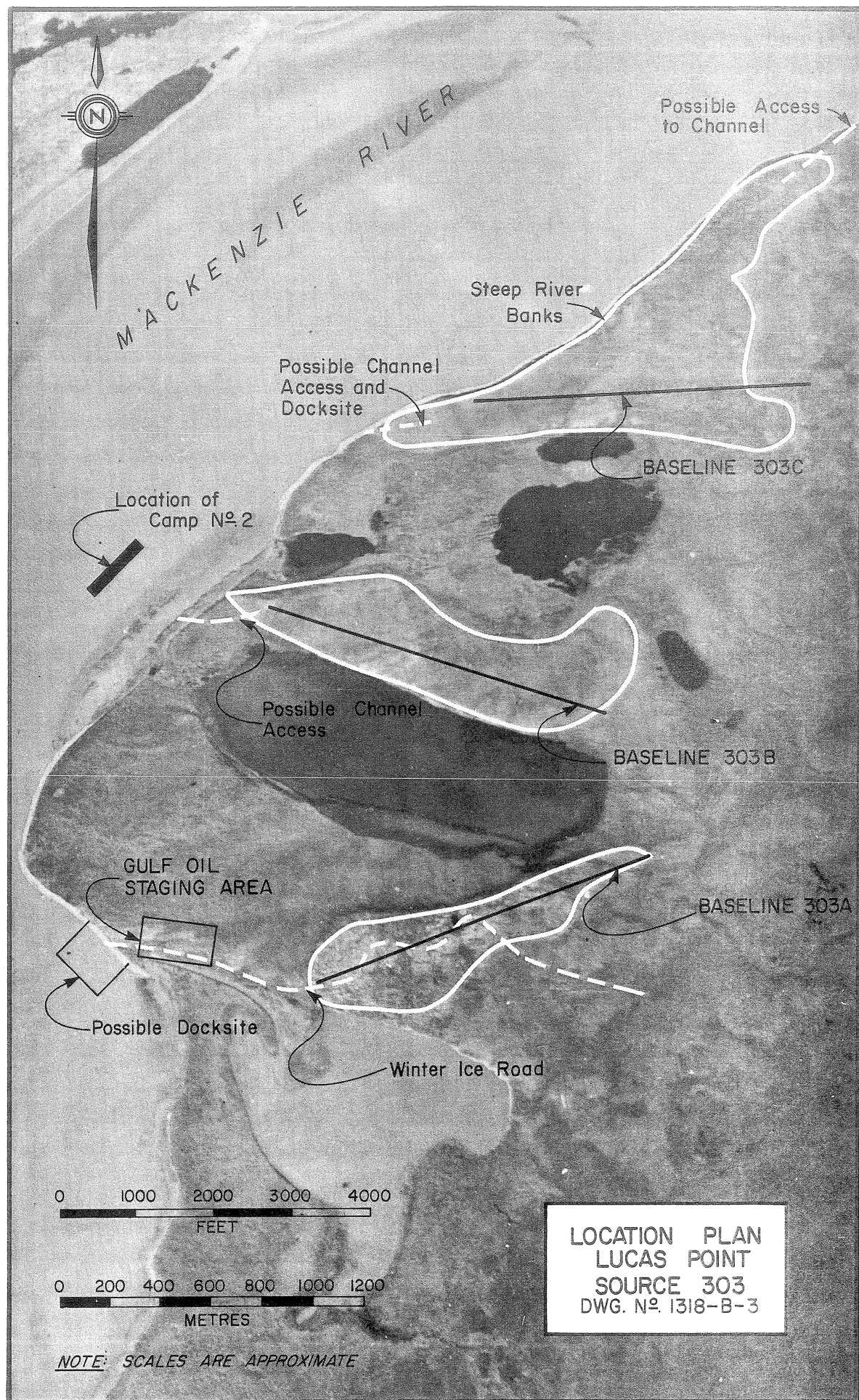


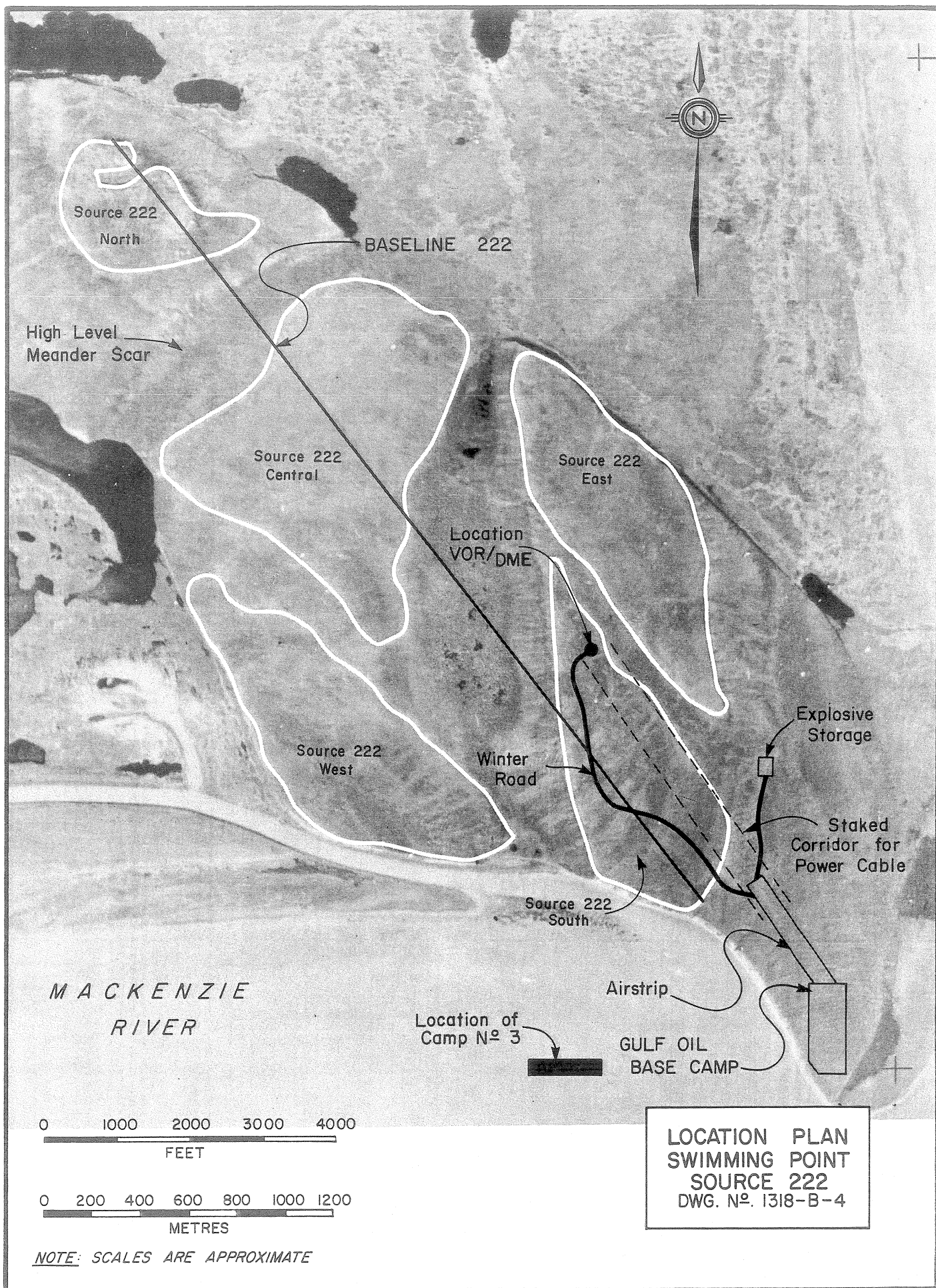
PLATE 12 VTM frozen core from Swimming Point, Source 222. Borehole A2+00, 1+00W, at 8 to 9 feet. Sample is classified as sand, some gravel.

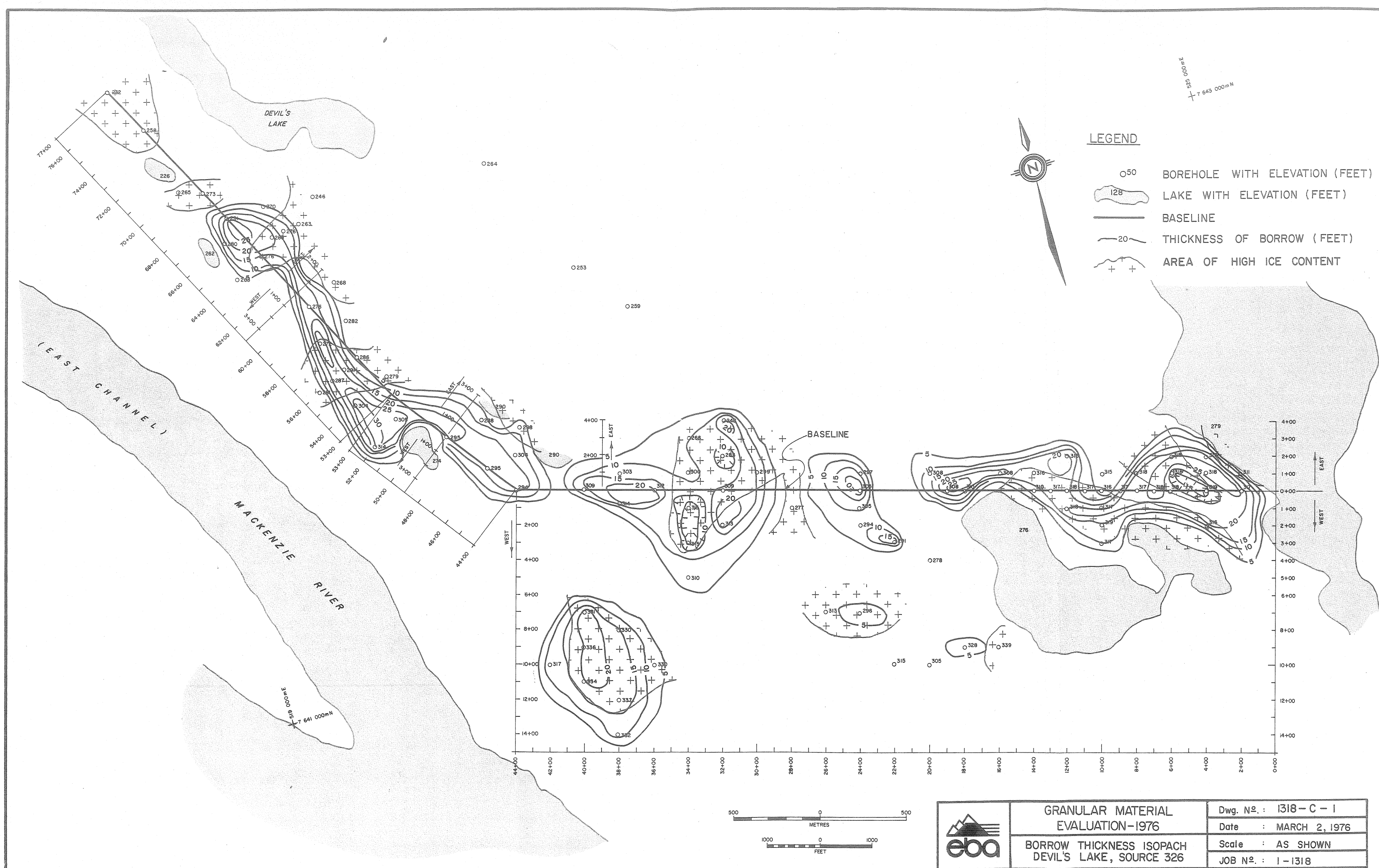
Drawings









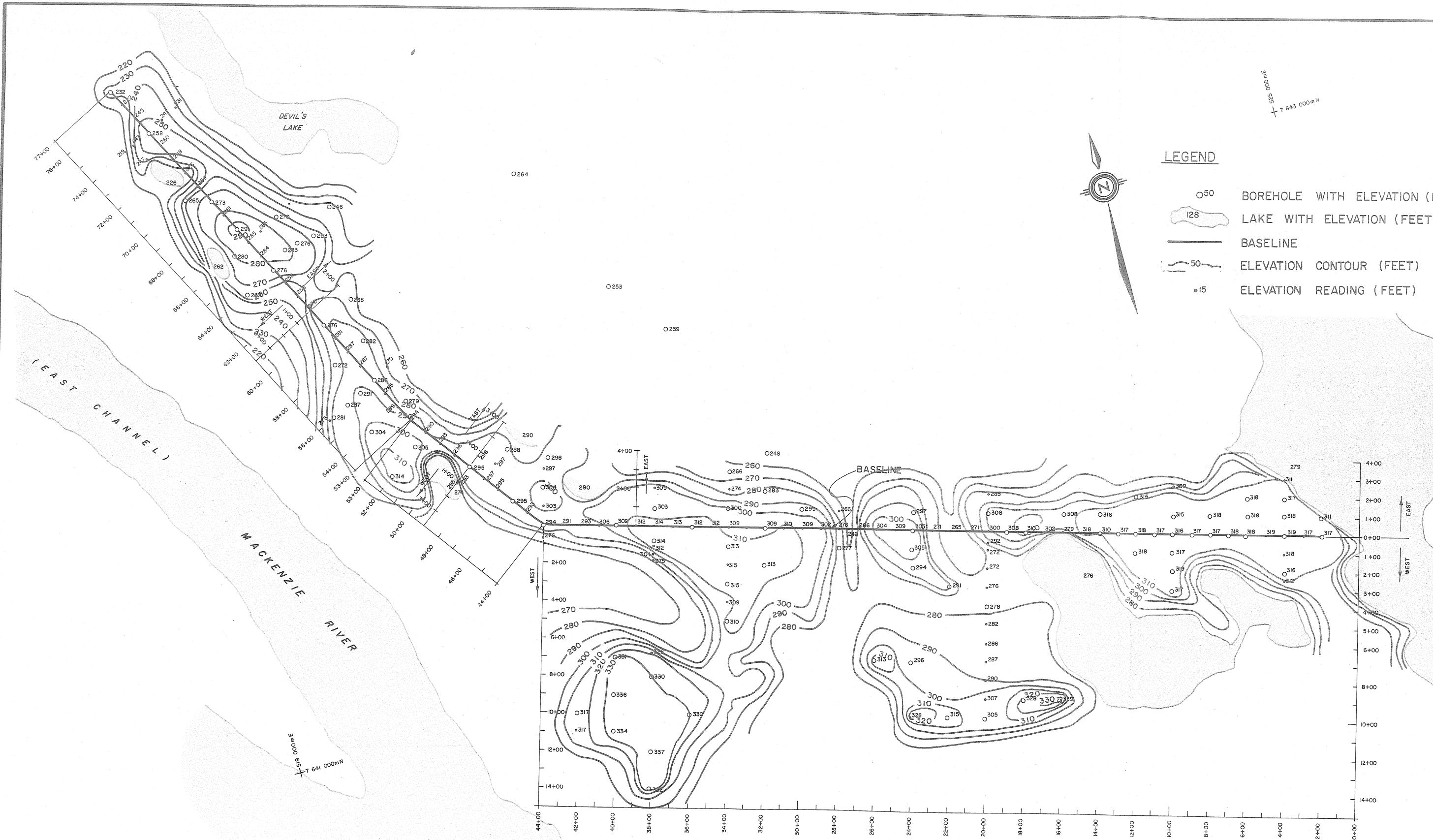


LEGEND

- 50 BOREHOLE WITH ELEVATION (FEET)
- 128 LAKE WITH ELEVATION (FEET)
- BASELINE
- 20— THICKNESS OF BORROW (FEET)
- + + AREA OF HIGH ICE CONTENT




GRANULAR MATERIAL EVALUATION-1976 BORROW THICKNESS ISOPACH DEVIL'S LAKE, SOURCE 326	Dwg. No. : 1318-C-1
	Date : MARCH 2, 1976
	Scale : AS SHOWN
	JOB No. : 1-1318

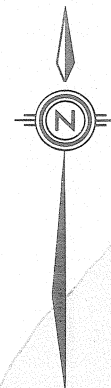


LEGEND

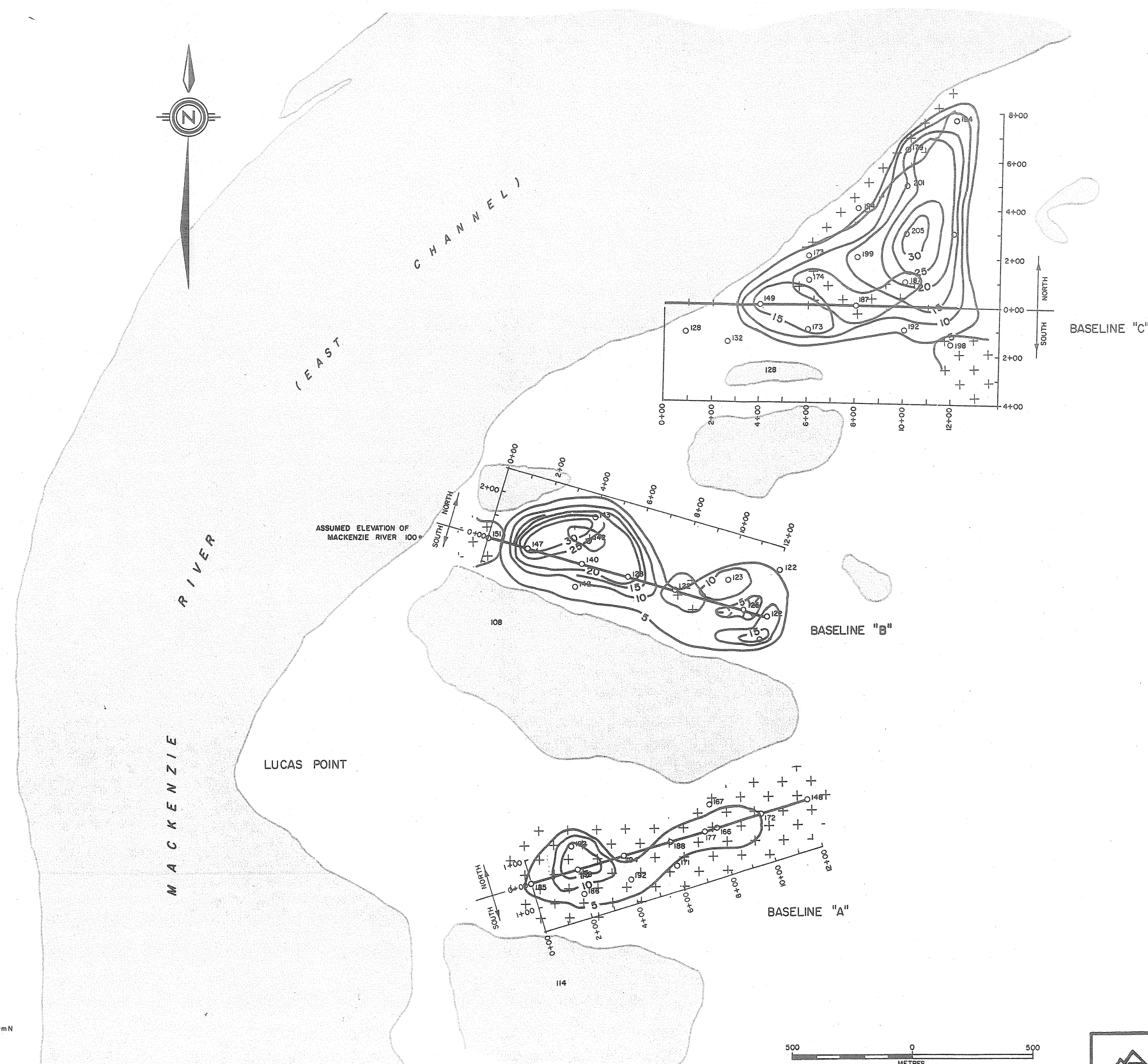
- O50 BOREHOLE WITH ELEVATION (FEET)
- 128 LAKE WITH ELEVATION (FEET)
- BASELINE
- 50 ELEVATION CONTOUR (FEET)
- 15 ELEVATION READING (FEET)

	GRANULAR MATERIAL EVALUATION-1976		Dwg. No. : 1318-C-2
	ELEVATION CONTOURS DEVIL'S LAKE, SOURCE 326		Date : MARCH 2, 1976
			Scale : AS SHOWN
			JOB No. : 1-1318

515 000 mE
7 660 000mN

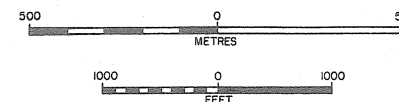



520 000 mE
7 664 000mN

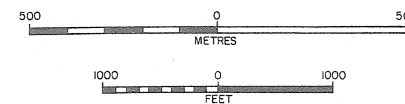
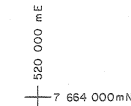







LEGEND


- 50 BOREHOLE WITH ELEVATION (FEET)
- 128 LAKE WITH ELEVATION (FEET)
- BASELINE
- 20 THICKNESS OF BORROW (FEET)
- + + AREA OF HIGH ICE CONTENT



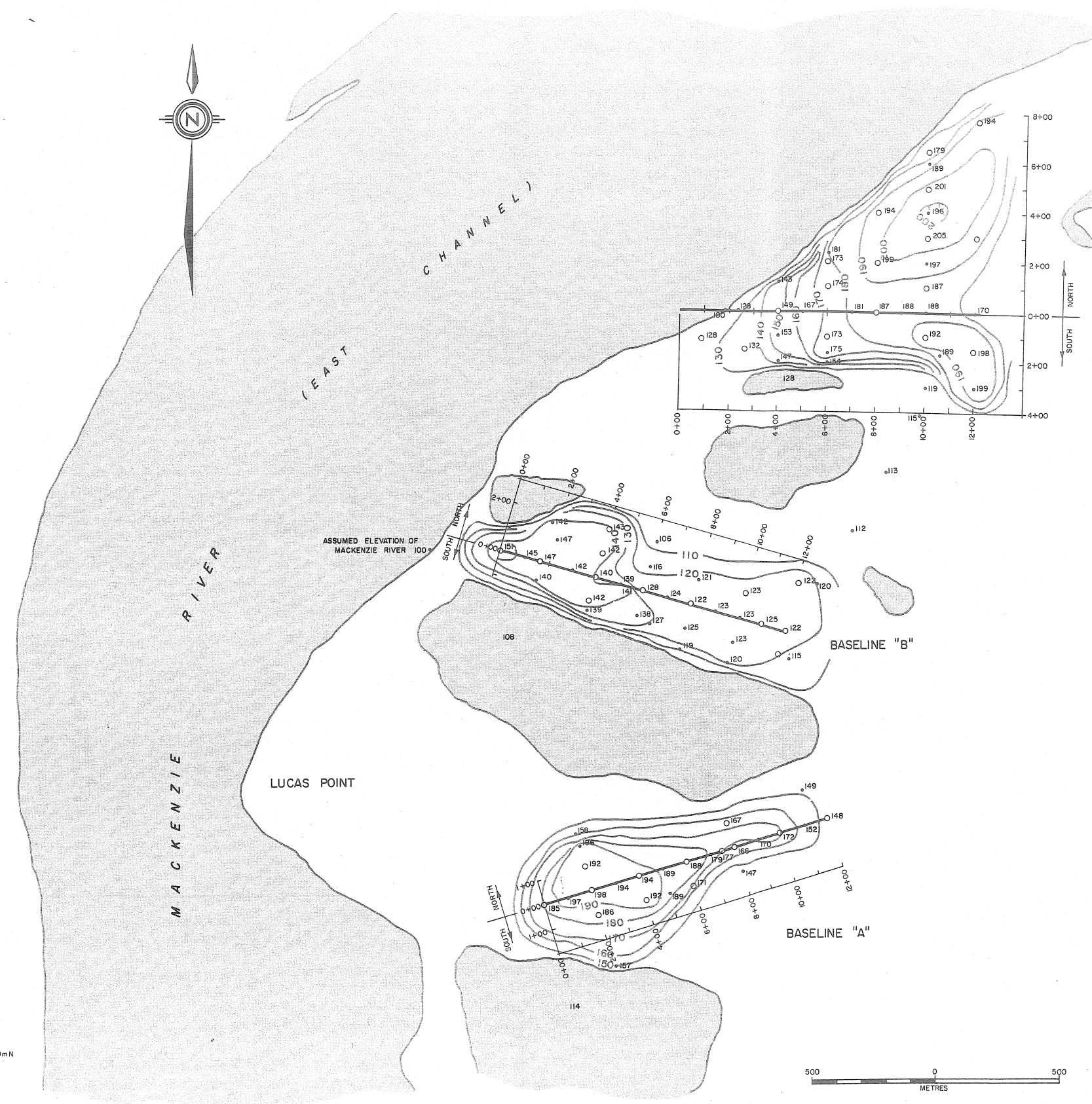
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	BORROW THICKNESS ISOPACH LUCAS POINT, SOURCE 303		Date : MARCH 1, 1976
			Scale : AS SHOWN
			JOB N ^o . : 1-1318



 BOREHOLE WITH ELEVATION (FEET)
 LAKE WITH ELEVATION (FEET)
 BASELINE
 ELEVATION CONTOUR (FEET)
 ELEVATION READING (FEET)

	<p align="center">GRANULAR MATERIAL EVALUATION-1976</p>	Dwg. No. : 1318 - C - 4
		Date : MARCH 1, 1976
	<p align="center">ELEVATION CONTOURS LUCAS POINT, SOURCE 303</p>	Scale : AS SHOWN
		JOB No. : 1-1318

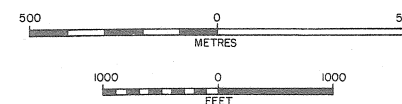
515 000 mE
7 660 000mN




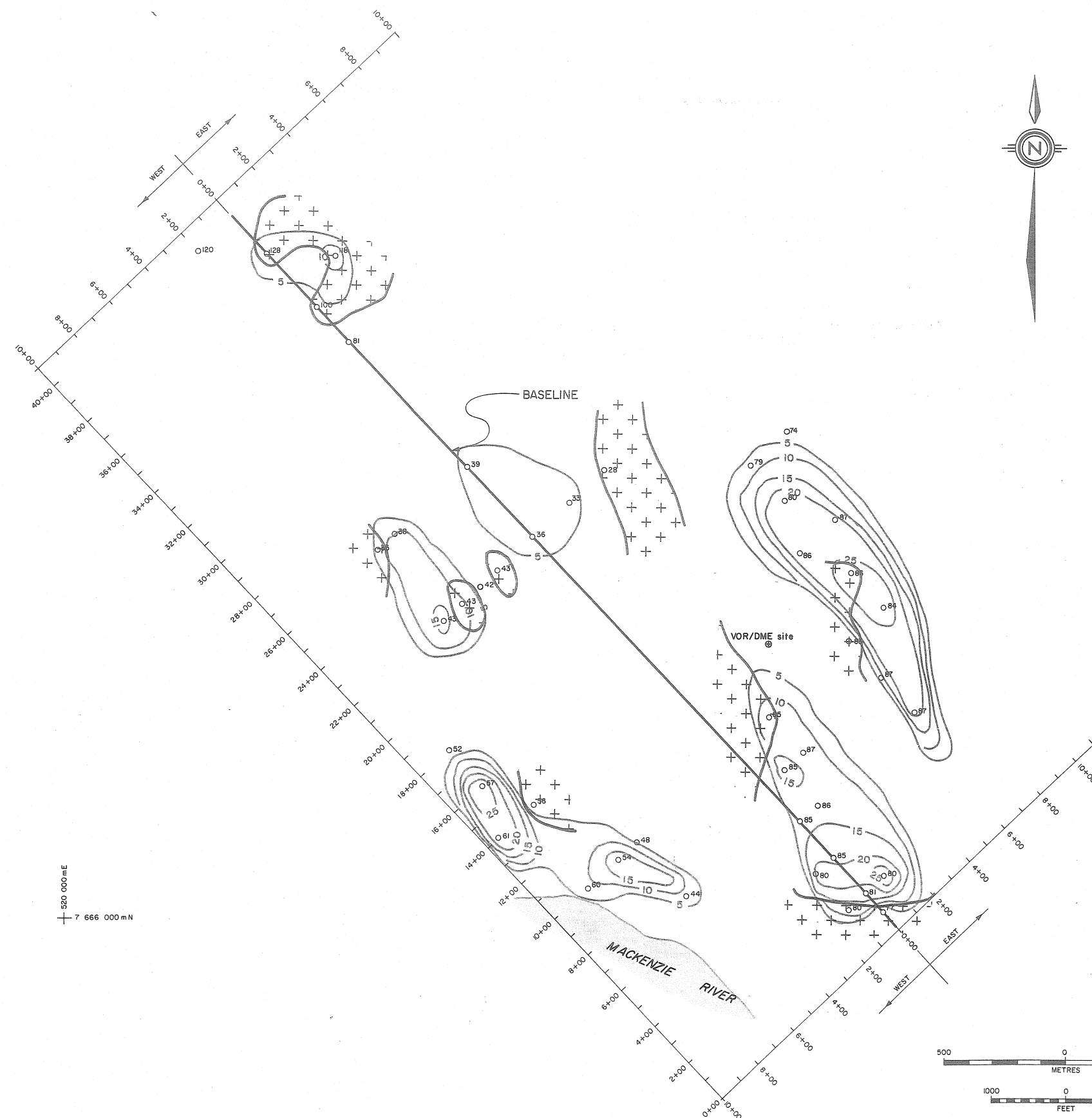
520 000 mE
7 664 000mN

LEGEND

- 50 BOREHOLE WITH ELEVATION (FEET)
- 128 LAKE WITH ELEVATION (FEET)
- BASELINE
- 50 ELEVATION CONTOUR (FEET)
- 15 ELEVATION READING (FEET)

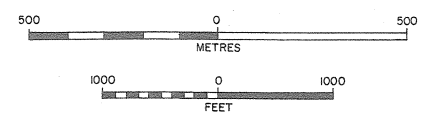



	GRANULAR MATERIAL EVALUATION-1976		Dwg. No. : 1318-C-4
	ELEVATION CONTOURS		Date : MARCH 1, 1976
	LUCAS POINT, SOURCE 303		Scale : AS SHOWN
			JOB No. : 1-1318

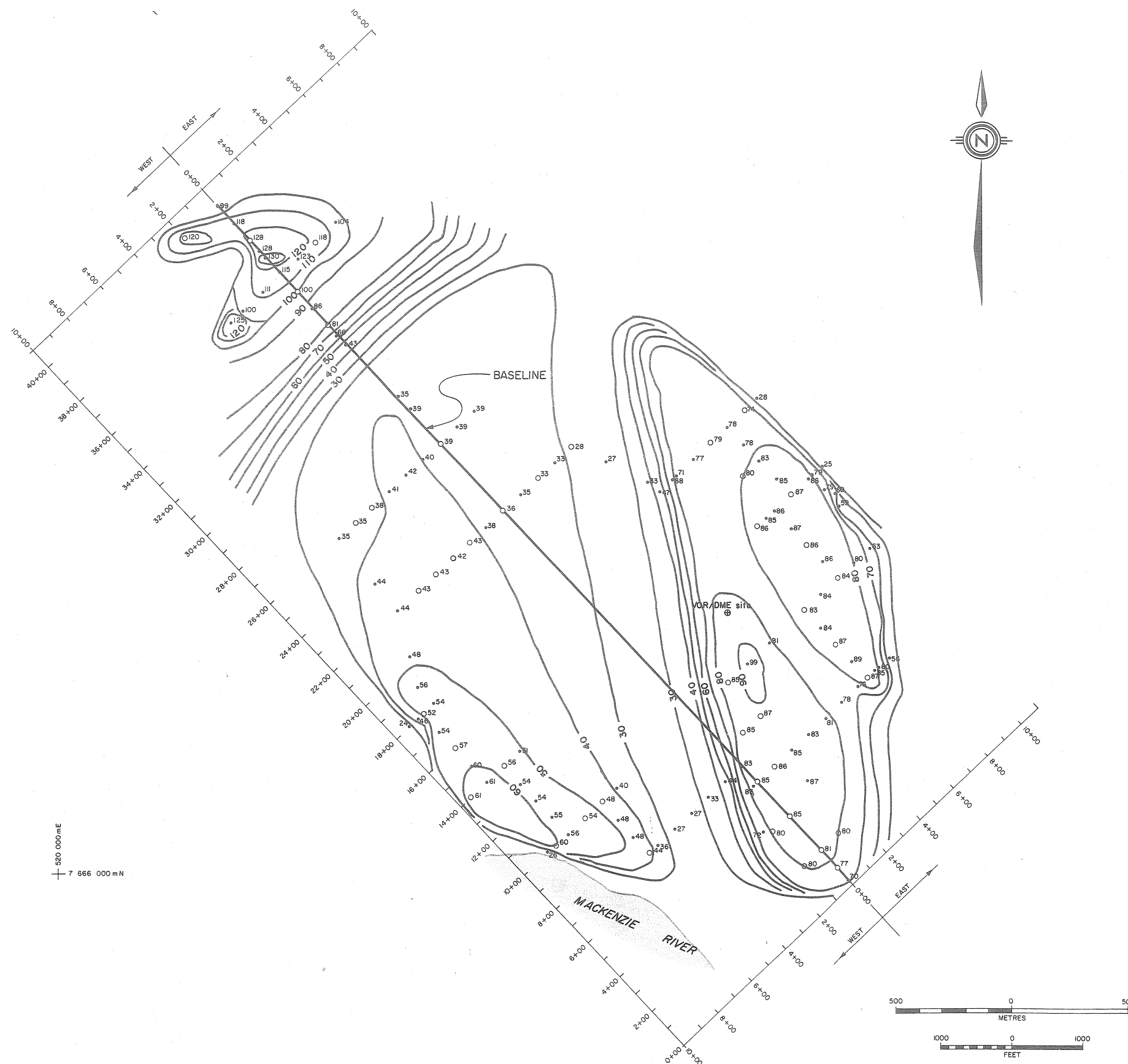


LEGEND

- O50 BOREHOLE WITH ELEVATION (FEET)
- 128 LAKE WITH ELEVATION (FEET)
- BASELINE
- 20 THICKNESS OF BORROW (FEET)
- + + AREA OF HIGH ICE CONTENT



	GRANULAR MATERIAL EVALUATION-1976		Dwg. N ^o . : 1318-C-5
	BORROW THICKNESS ISOPACH		Date : MARCH 2, 1976
	SWIMMING POINT, SOURCE 222		Scale : AS SHOWN
			JOB N ^o . : 1-1318



LEGEND

- 50 BOREHOLE WITH ELEVATION (FEET)
- 128 LAKE WITH ELEVATION (FEET)
- BASELINE
- 50 ELEVATION CONTOUR (FEET)
- 15 ELEVATION READING (FEET)



GRANULAR MATERIAL
EVALUATION-1976

ELEVATION CONTOURS
SWIMMING POINT, SOURCE 222

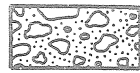
Dwg. N^o. : 1318-C-6

Date : MARCH 2, 1976

Scale : AS SHOWN

JOB N^o. : 1-1318

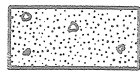
LEGEND FOR CROSS-SECTIONS



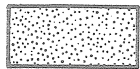
GRAVEL



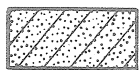
SAND and GRAVEL



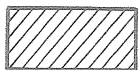
SAND, some GRAVEL



SAND



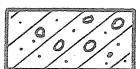
SAND, SILTY



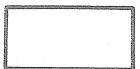
SILT



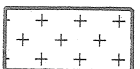
CLAY



SILT (TILL)



ICE

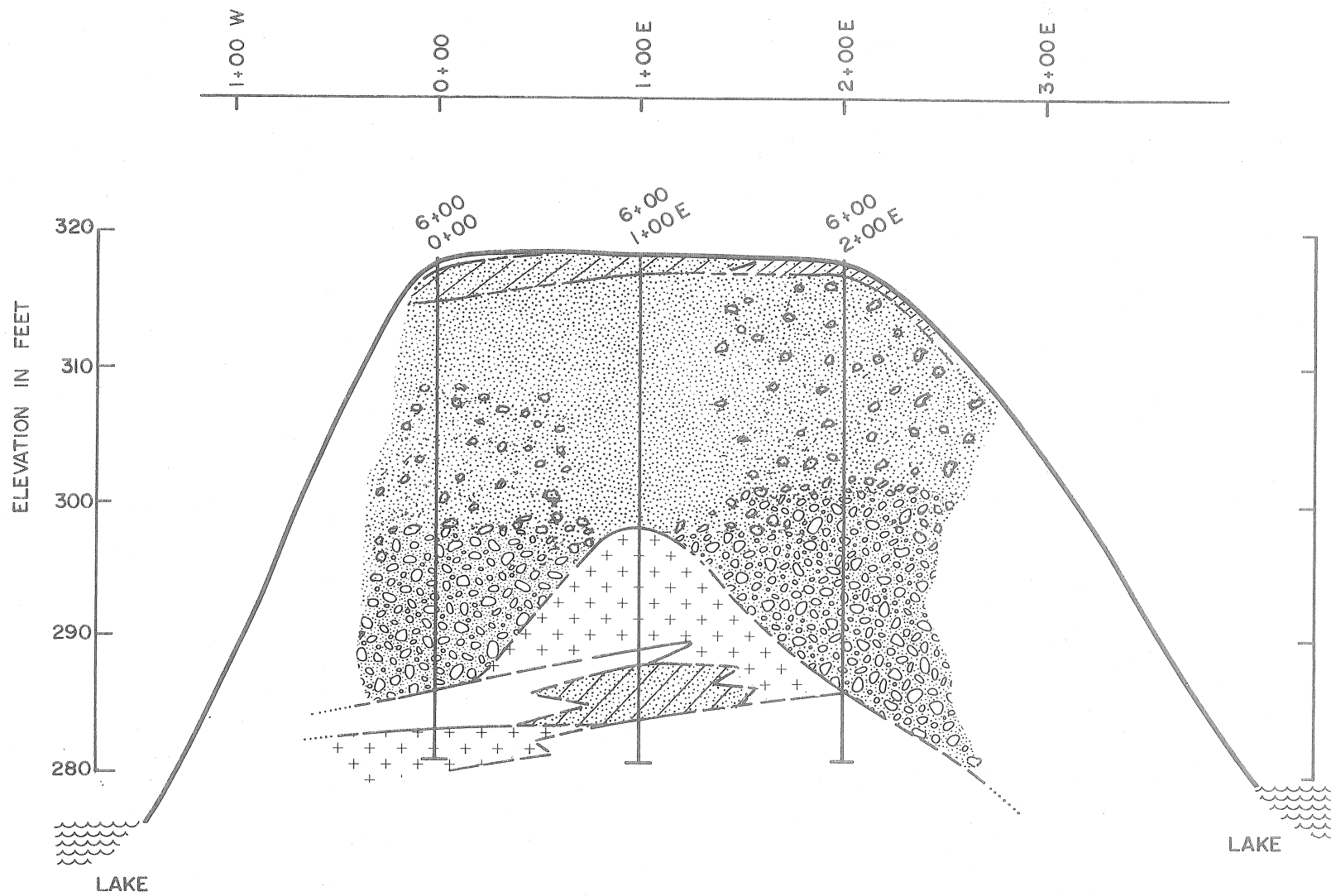


ICE + less than 20% SOIL

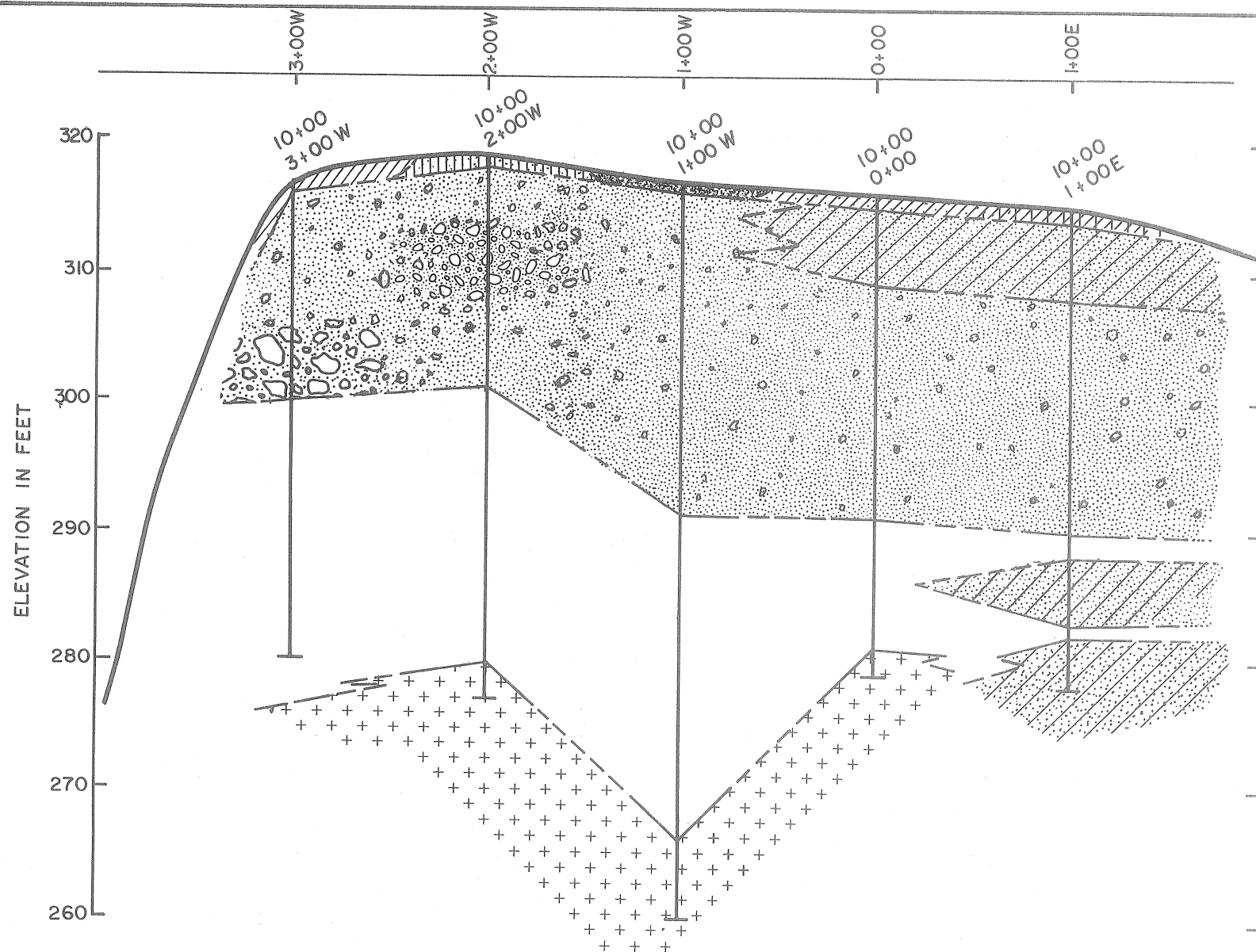


PEAT

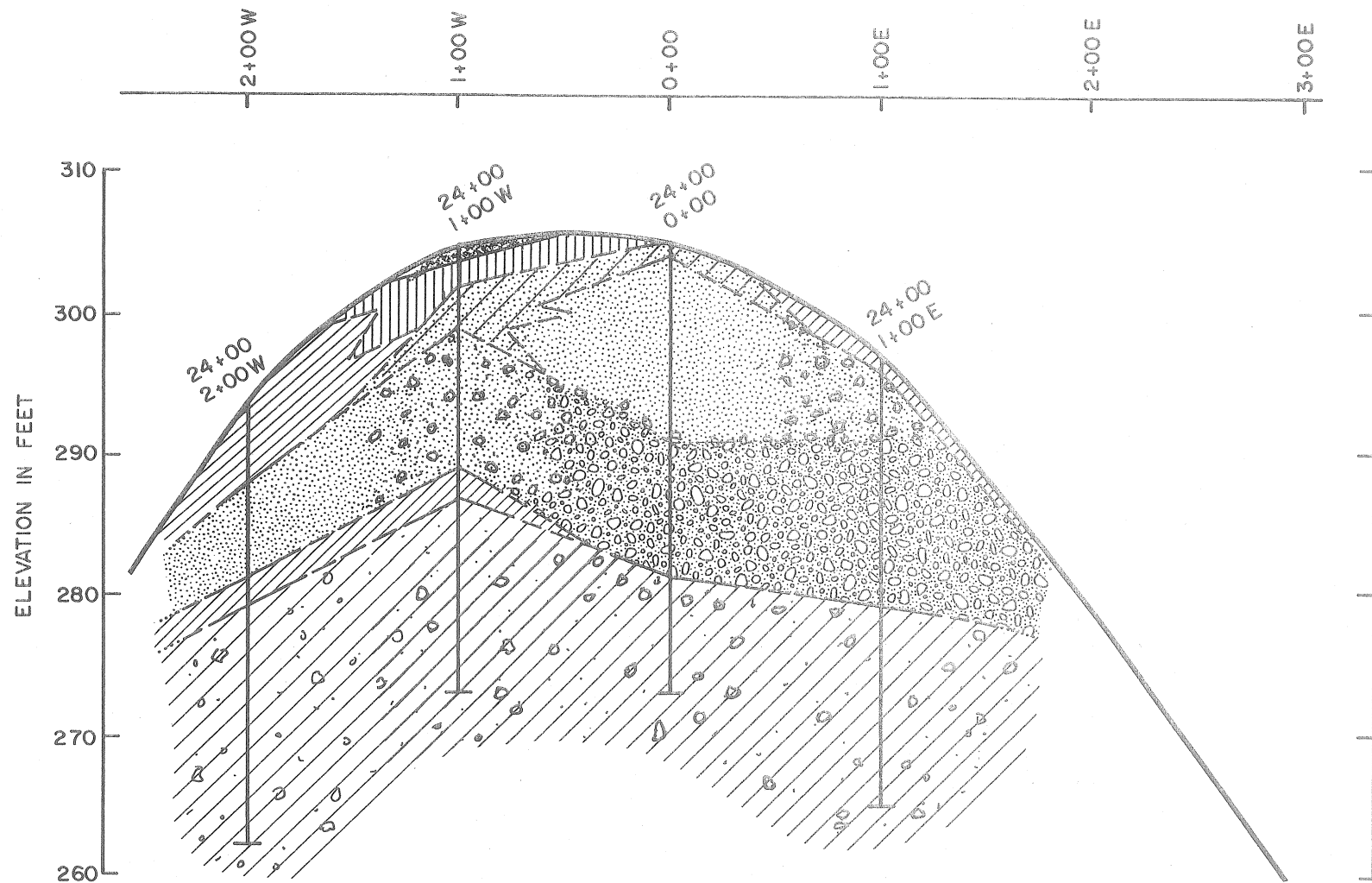
NOTE: Stratigraphy between boreholes has been assumed.



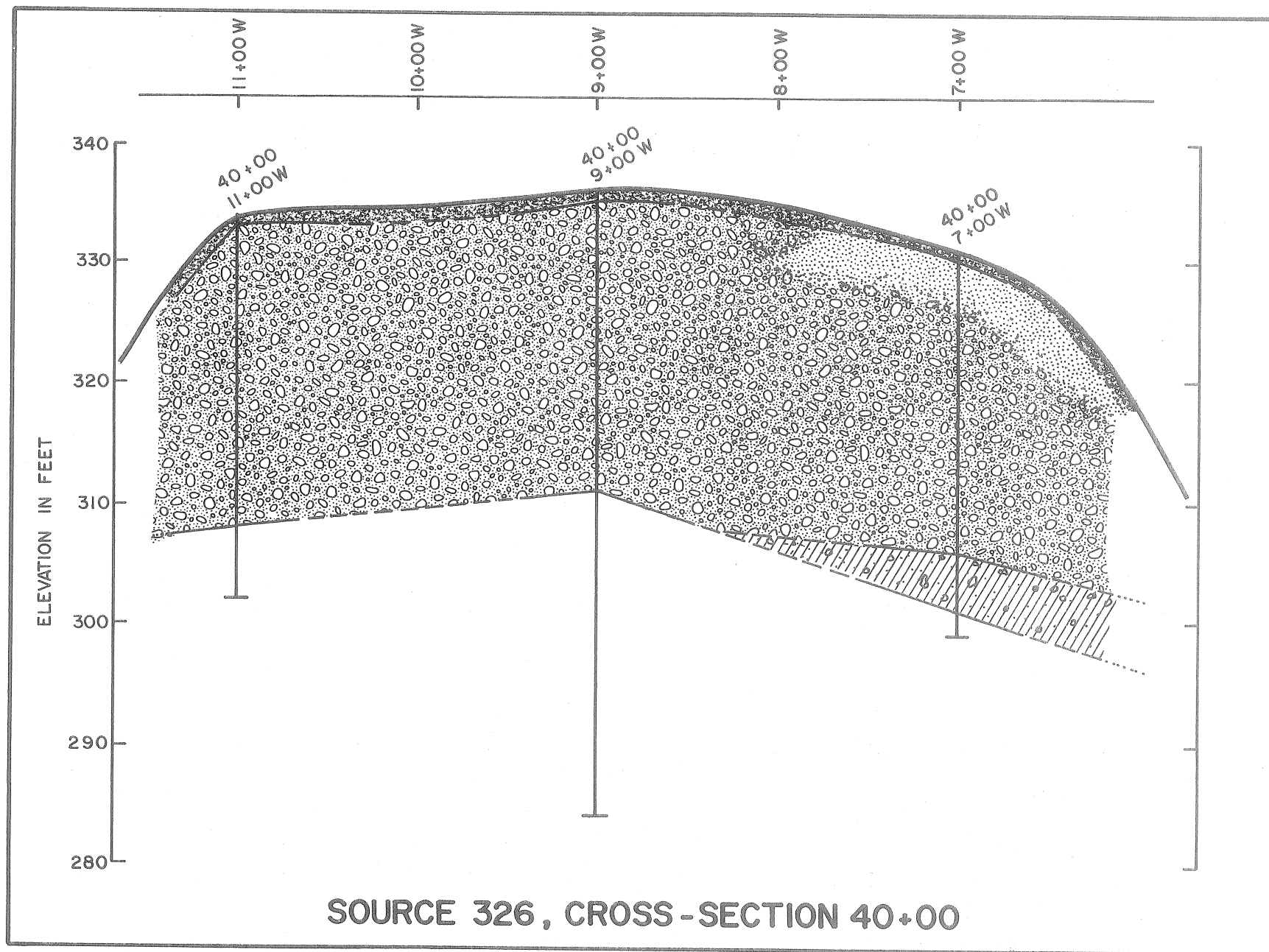
SOURCE 326, CROSS-SECTION 6+00

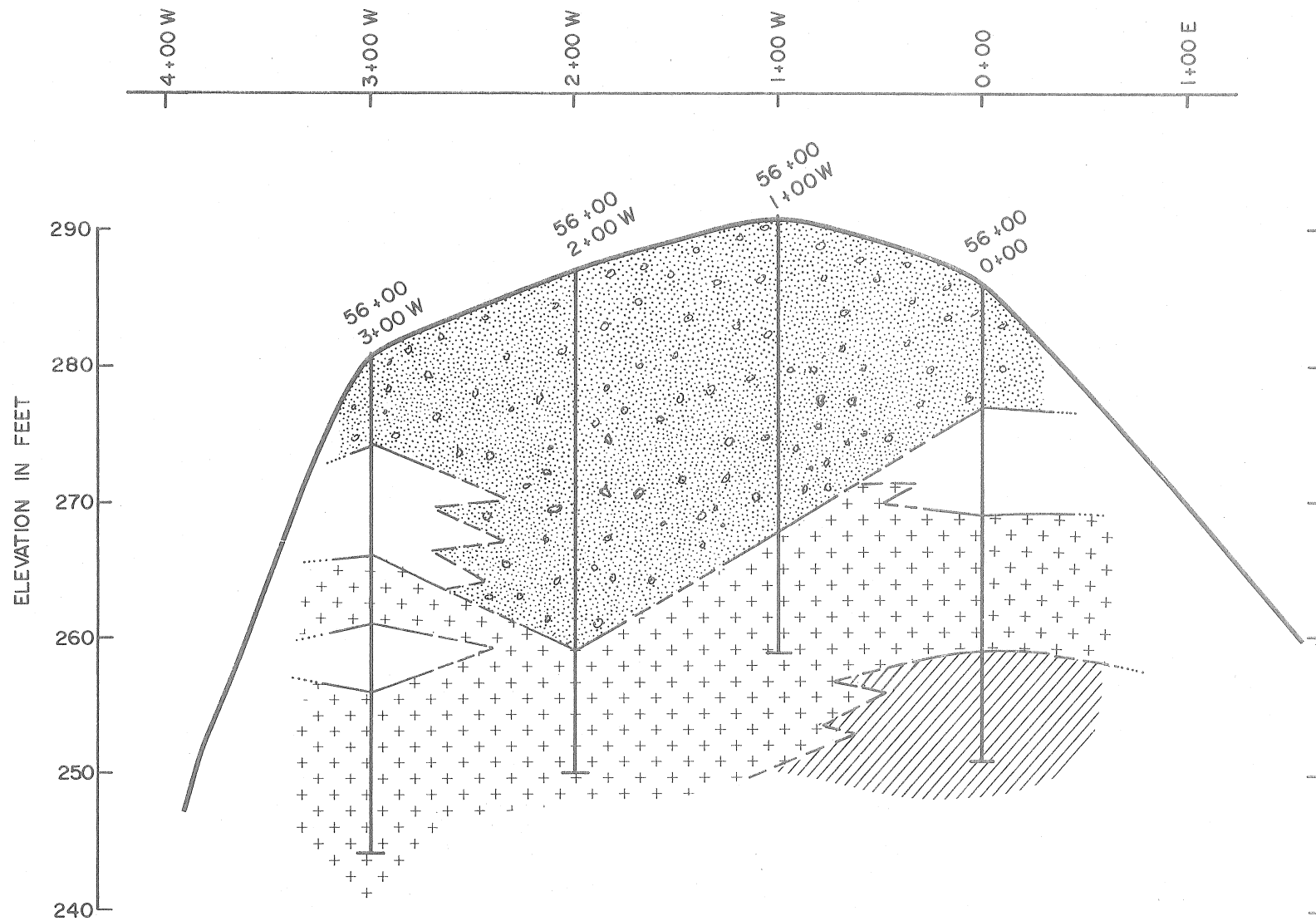


SOURCE 326, CROSS-SECTION 10+00

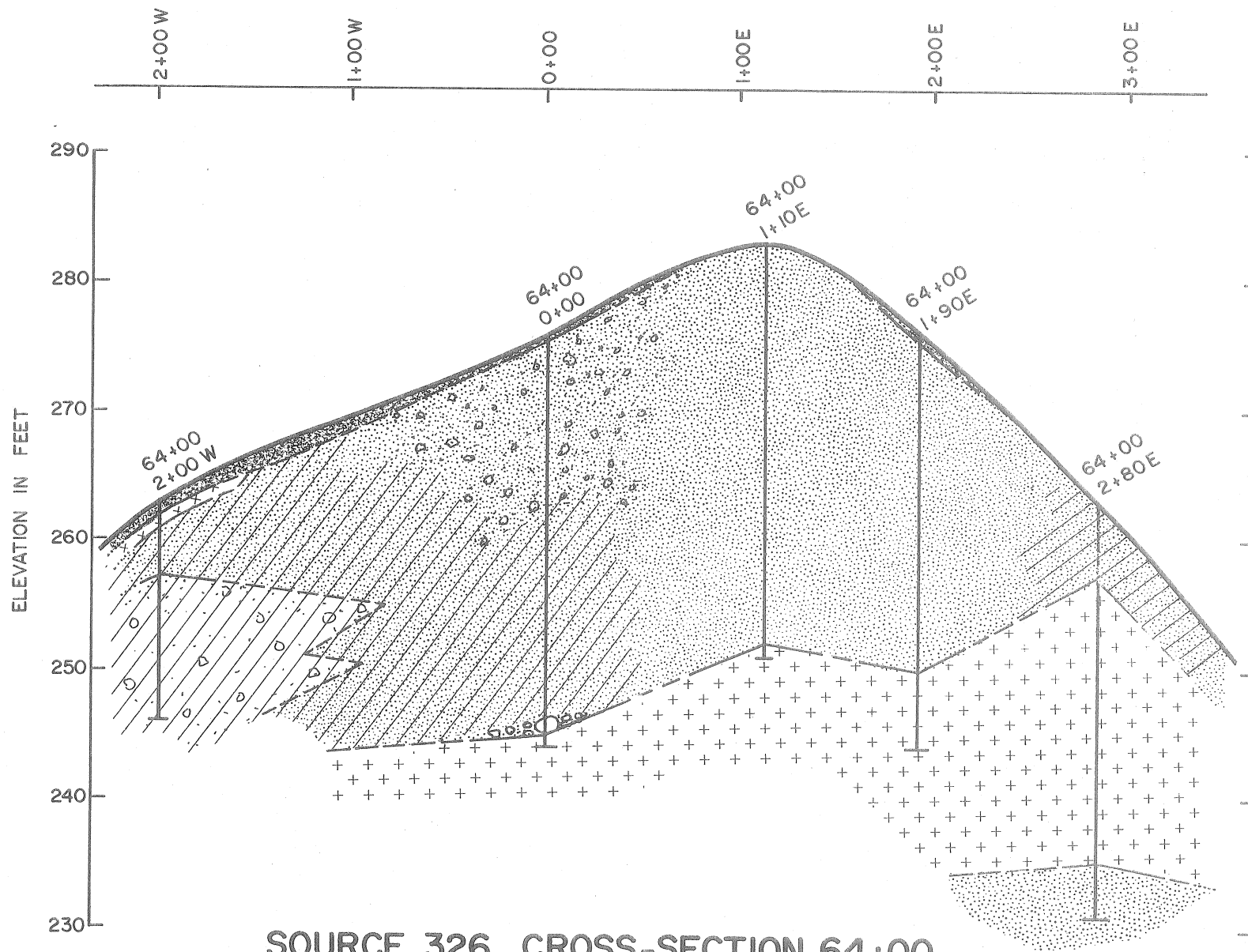


SOURCE 326, CROSS-SECTION 24+00

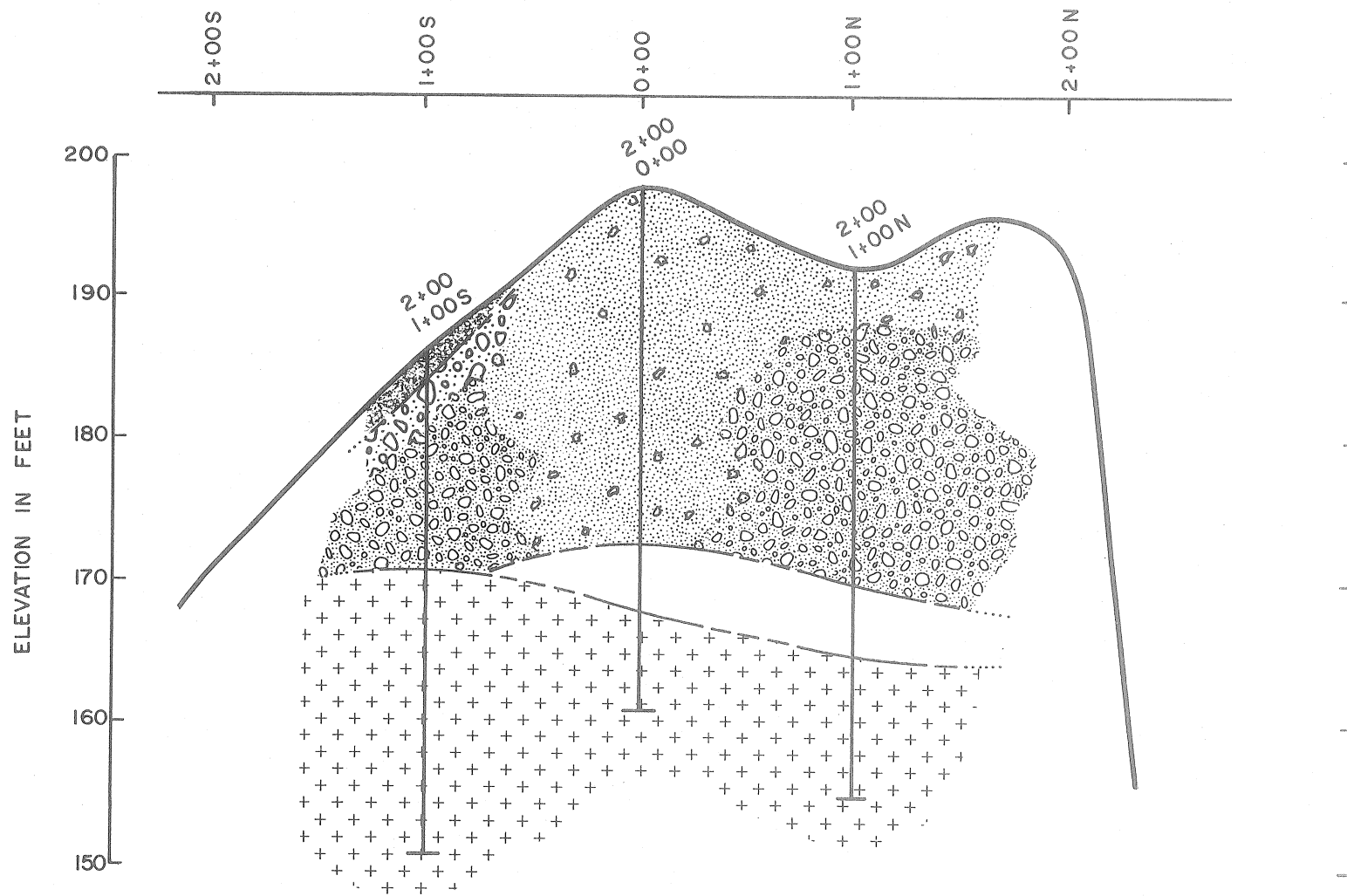




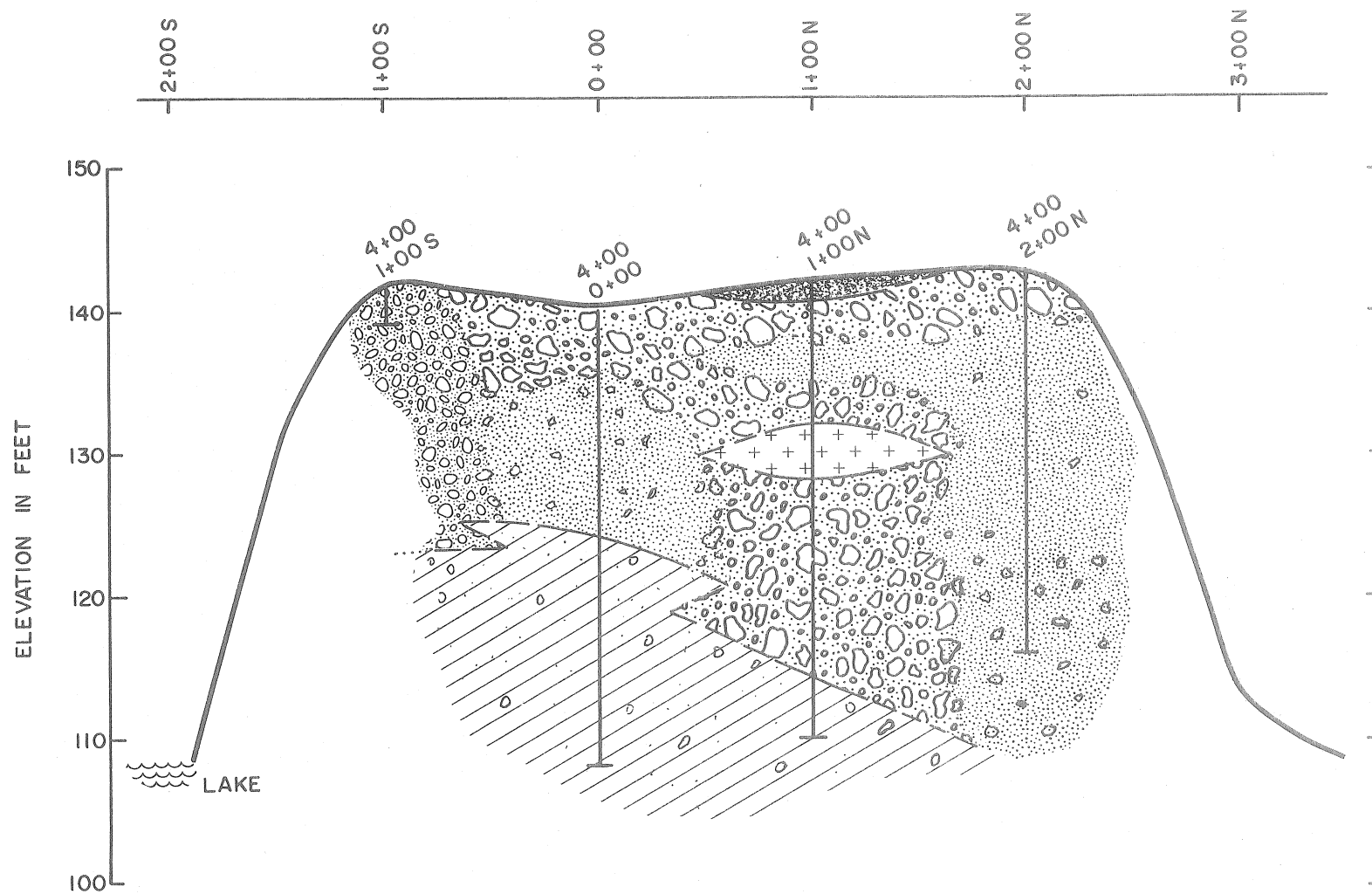
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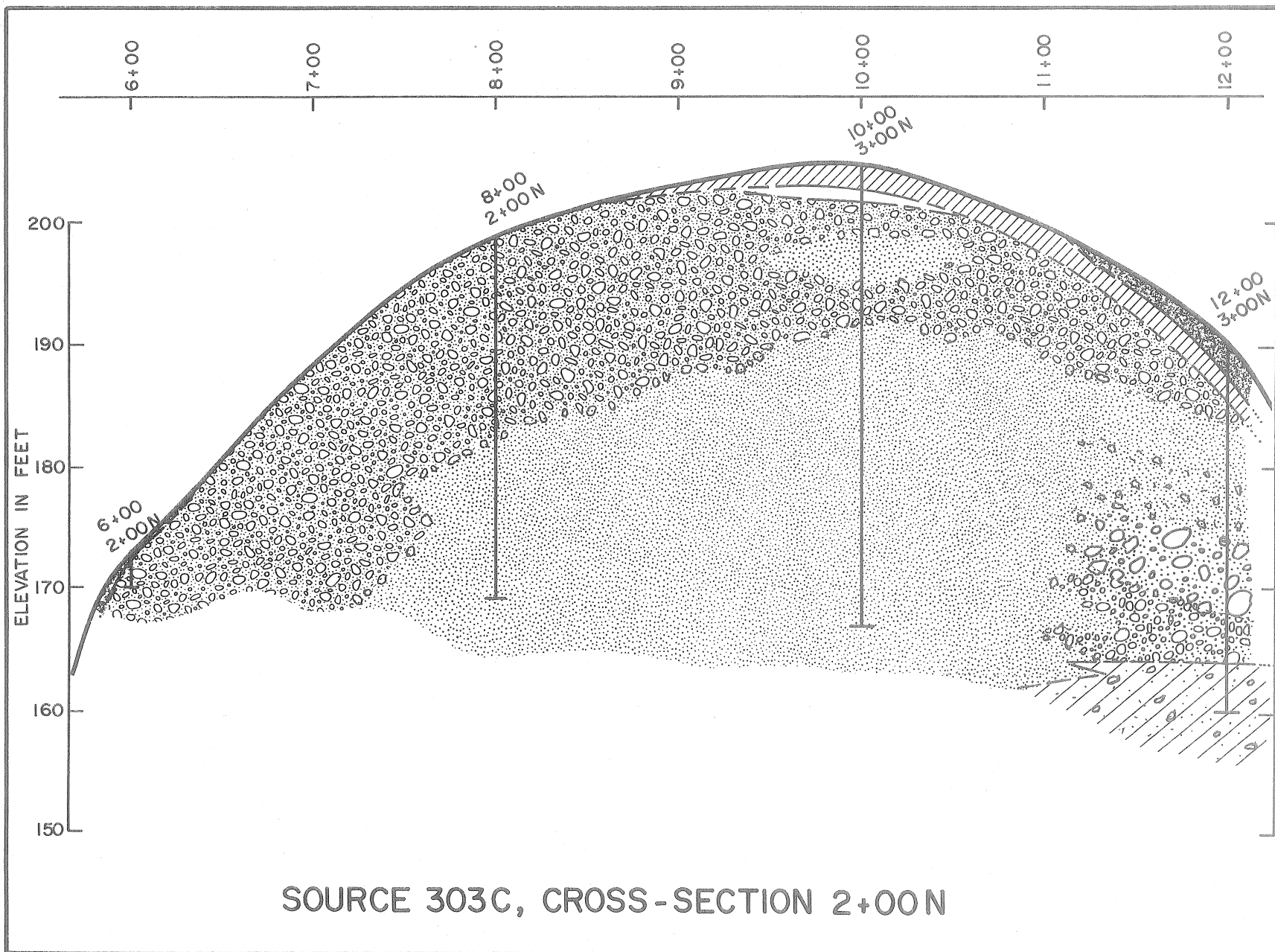
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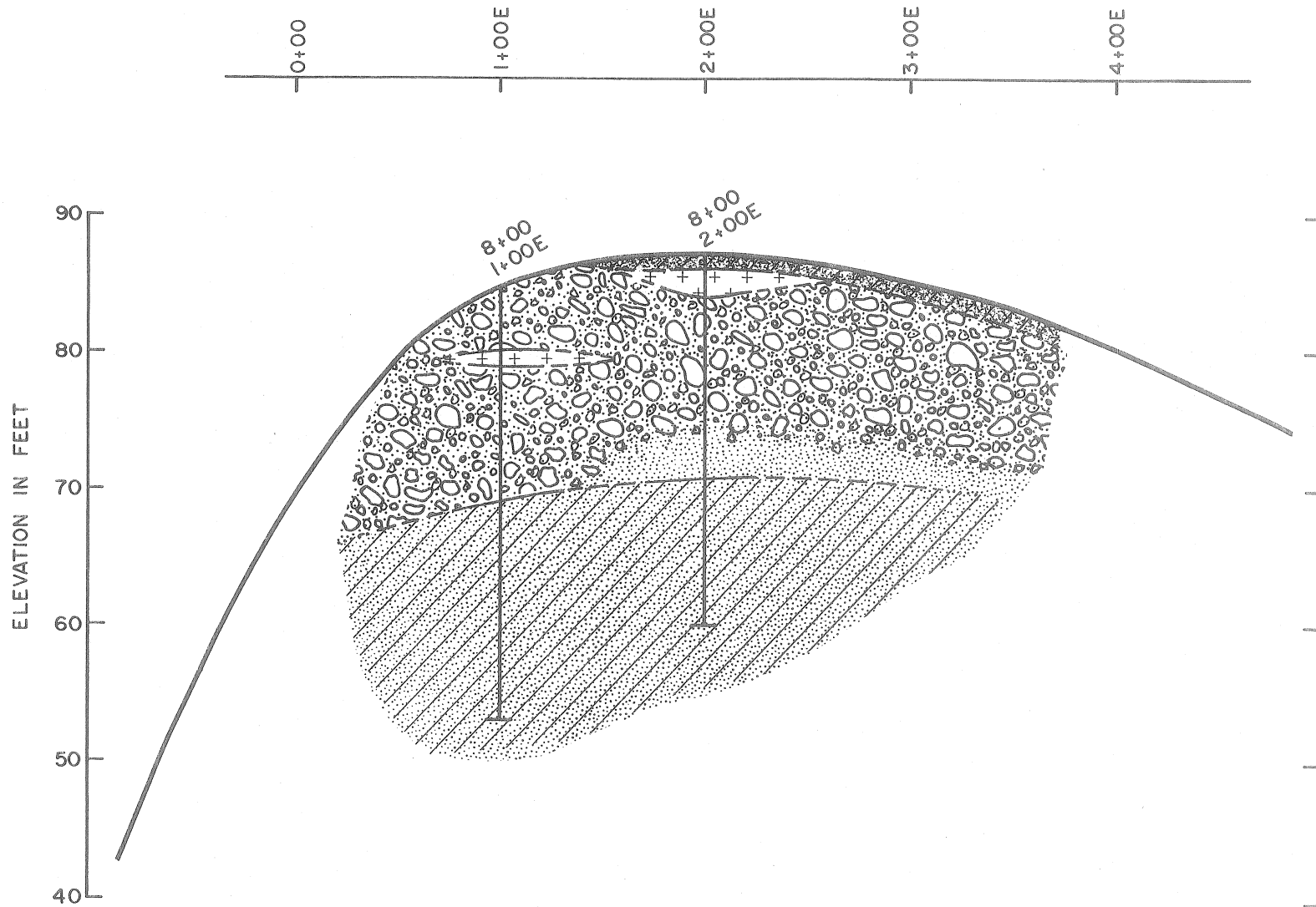


SOURCE 303 A , CROSS-SECTION 2+00

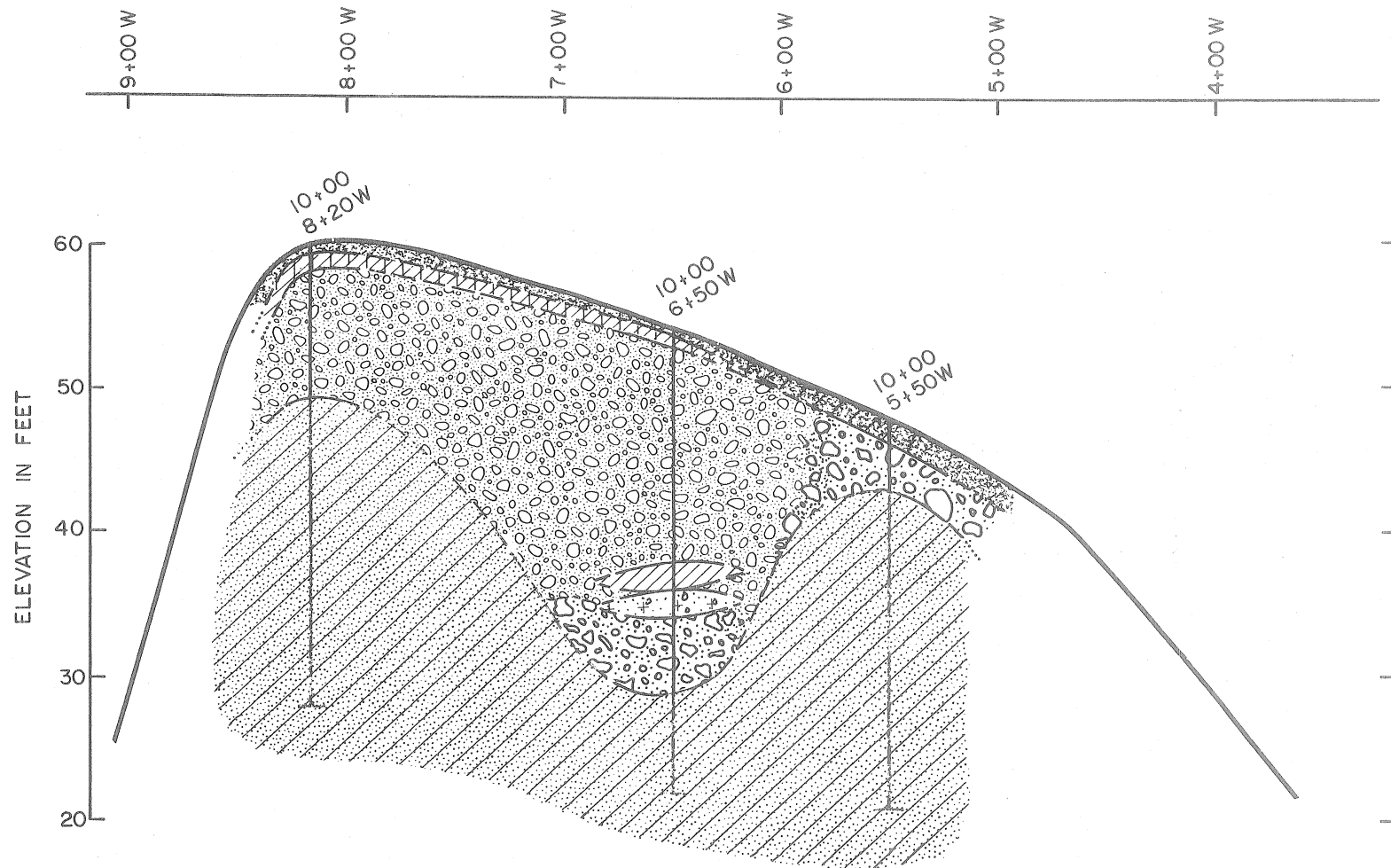


SOURCE 303B, CROSS-SECTION 4+00

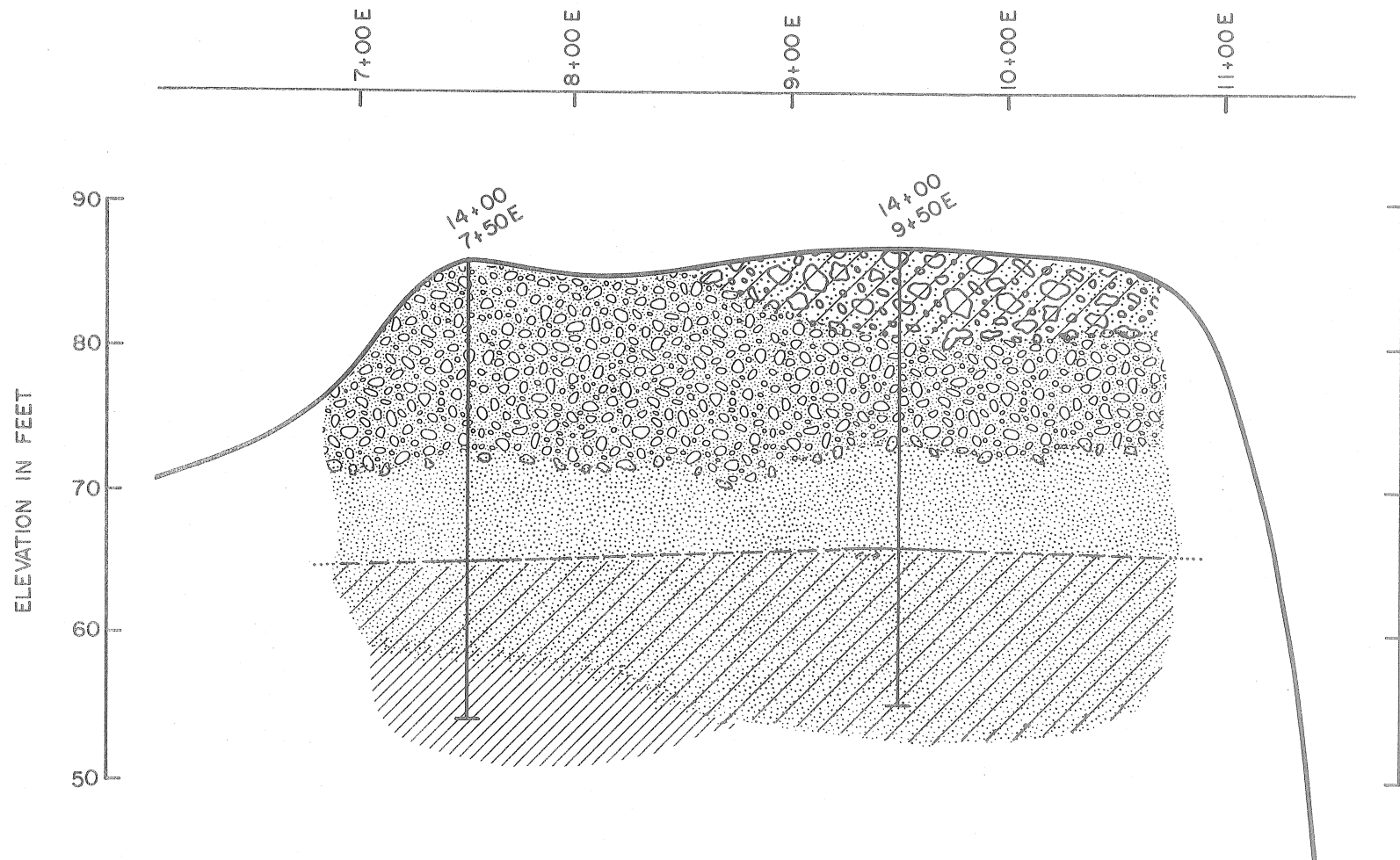




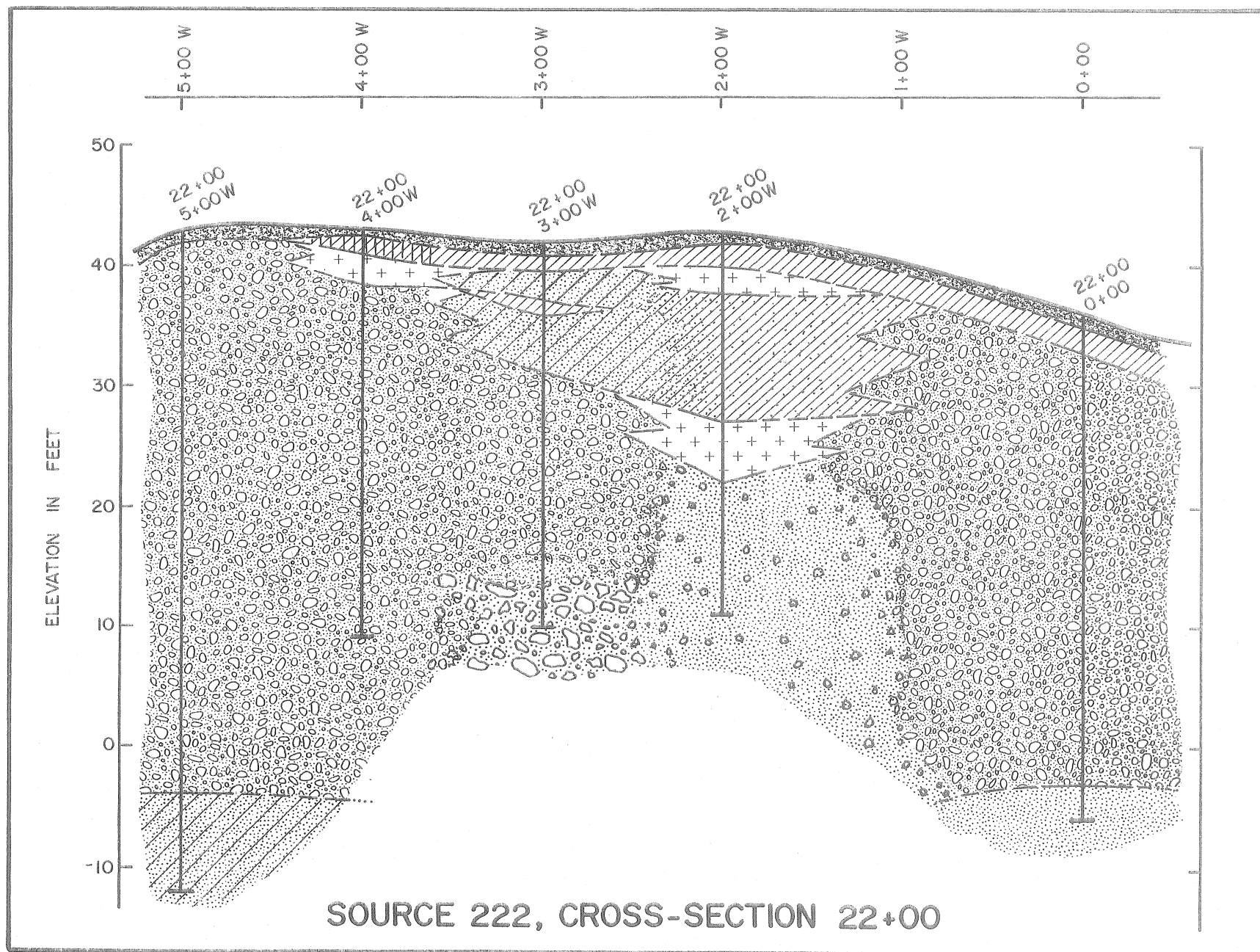
SOURCE 222, CROSS-SECTION 8+00



SOURCE 222, CROSS-SECTION 10+00



SOURCE 222, CROSS-SECTION 14+00



Survey Data



Canadian Engineering Surveys
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EBA Engineering Consultants
Soil Samples 1976

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of 4

Job No. C-8337

Appendix No. 1-8337-M-1

By :

Checked

AREA : Source 326, Devil's Lake
(98 Holes)

UTM ZONE 8
(Shoran '65 Datum, July '69 Adjust.)

STATION	U.T.M. CO-ORDINATES		Remarks	Elevations (feet)
	N.	E.		
<u>DRILLED CORE</u>	<u>HOLE LOCATIONS</u>	(Plus Chainages Are Metres)		(Derived from Shell Oil Station Iris # 3-Assumed To Be 386.4'.
<u>Baseline EorW</u>				
2+00 0+00	7 640 730	524 635	Iron Bar, Marker	317'
" 1+00E	7 640 825	524 660		311'
4+00 2+00W	7 640 595	524 385		316'
" 0+00	7 640 790	524 440		319'
" 1+00E	7 640 885	524 470		318'
" 2+00E	7 640 980	524 500		317'
6+00 0+00	7 640 845	524 250		318'
" 1+00E	7 640 940	524 280		318'
" 2+00E	7 641 035	524 305		318'
7+00 0+00	7 640 875	524 155		318'
8+00 0+00	7 640 905	524 060		317'
" 1+00E	7 641 000	524 085		318'
9+00 0+00	7 640 930	523 965		317'
10+00 3+00W	7 640 670	523 780		317'
" 2+00W	7 640 770	523 810		319'
" 1+00W	7 640 865	523 840		317'
" 0+00	7 640 960	523 865		316'
" 1+00E	7 641 055	523 895		315'
11+00 0+00	7 640 990	523 770		317'
12+00 1+00W	7 640 920	523 645		318'
" 0+00	7 641 015	523 675		318'
" 2+00E	7 641 210	523 730		315'
13+00 0+00	7 641 045	523 580		317'
14+00 0+00	7 641 075	523 485		310'
" 1+00E	7 641 170	523 510		316'
16+00 9+00W	7 640 270	523 035		339'
" 1+00E	7 641 225	523 320		308'



Canadian Engineering Surveys
Co. Ltd.

EBA Engineering Consultants
Soil Samples 1976

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of 4

Job No.: C-8337

Appendix No.: 1-8337-M-1

By :

Checked

AREA : Source 326, Devil's Lake

UTM ZONE 8

(98 Holes)

(Shoran '65 Datum, July '69 Adjust.)

STATION		U.T.M. CO-ORDINATES		Remarks	Elevations (feet)
		N.	E.		
<u>DRILLED CORE</u>		<u>HOLE LOCATIONS</u>	(Plus Chainages Are Metres)		
<u>Baseline ForW</u>					
18+00	9+00W	7 640 325	522 845		328'
"	0+00	7 641 185	523 100		310'
19+00	0+00	7 641 215	523 005		308'
20+00	10+00W	7 640 285	522 625		305'
"	4+00W	7 640 860	522 795		278'
"	1+00E	7 641 340	522 935		308'
22+00	3+00W	7 641 015	522 630		291'
"	10+00W	7 640 345	522 435		315'
24+00	7+00W	7 640 685	522 325		296'
"	2+00W	7 641 165	522 470		294'
"	1+00W	7 641 260	522 495		305'
"	0+00	7 641 360	522 525		305'
"	1+00E	7 641 455	522 555		297'
26+00	7+00W	7 640 745	522 135		313'
28+00	1+00W	7 641 375	522 115		277'
30+00	1+00E	7 641 625	521 980		299'
32+00	2+00W	7 641 395	521 700		313'
"	0+00	7 641 585	521 760		309'
"	2+00E	7 641 775	521 815		283'
"	4+00E	7 641 970	521 875		248'
34+00	5+00W	7 641 164	521 425		310'
"	3+00W	7 641 355	521 480		315'
"	1+00W	7 641 545	521 540		313'
"	1+00E	7 641 740	521 595		300'
"	3+00E	7 641 930	521 655		266'
36+00	10+00W	7 640 740	521 090		330'
"	0+00	7 641 700	521 375		312'



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EBA Engineering Consultants
Soil Samples 1976

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Job No.: C-8337

Appendix No.: 1-8337-M-1

By :

Checked

AREA : Source 326, Devil's Lake
(98 Holes)

UTM ZONE 8
(Shoran '65, Datum, July '69 Adjust.)

(98 Holes)

(Shoran '65, Datum, July '69 Adjust.)

STATION	U.T.M. CO-ORDINATES		Remarks	Elevations (feet)
	N.	E.		
<u>DRILLED CORE</u>	<u>HOLE LOCATIONS</u>	(Plus Chainages Are Metres)		
<u>Baseline ForW</u>				
38+00	14+00W	7 640 415	520 785	332'
"	12+00W	7 640 605	520 845	337'
"	8+00W	7 640 990	520 955	330'
"	0+80W	7 641 680	521 165	314'
"	1+00E	7 641 850	521 210	303'
40+00	11+00W	7 640 760	520 680	334'
"	9+00W	7 640 950	520 735	336'
"	7+00W	7 641 140	520 795	331'
"	0+00	7 641 815	520 990	309'
42+00	10+00W	7 640 910	520 515	317'
44+00	0+00	7 641 925	520 610	294'
"	2+00E	7 642 120	520 665	304'
46+00	0+00	7 642 090	520 490	295'
"	3+00E	7 642 265	520 735	298'
48+00	2+00E	7 642 370	520 535	288'
49+00	0+00	7 642 330	520 315	295'
52+00	3+00W	7 642 395	519 900	314'
"	1+00W	7 642 515	520 060	305'
54+00	2+00W	7 642 655	519 860	304'
"	0+50E	7 642 765	520 080	279'
56+00	3+00W	7 642 785	519 680	281'
"	2+00W	7 642 830	519 770	287'
"	1+00W	7 642 875	519 855	291'
"	0+00	7 642 920	519 945	286'
58+00	1+00W	7 643 055	519 765	272'
"	1+00E	7 643 145	519 945	282'



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Job No. C-8337

Appendix No. 1-8337-M-1

By

Checked

AREA: Source 326, Devil's Lake

UTM ZONE 8

(98 Holes)

(Shoran '65 Datum, July '69 Adjust.)

(98 Holes)

(Shoran '65 Datum, July '69 Adjust.)

STATION		U.T.M. CO-ORDINATES		Remarks	Elevations (feet)
		N.	E.		
<u>DRILLED CORE HOLE LOCATIONS</u>		(Plus Chainages Are Metres)			
<u>Baseline EorW</u>					
60+00	0+00	7 643 280	519 765		276'
"	2+00E	7 643 370	519 940		268'
64+00	0+00	7 643 635	519 580		276'
"	2+00W	7 643 545	519 405		263'
66+00	1+00W	7 643 765	519 400		280'
"	2+00E	7 643 905	519 670		270'
67+00	0+00	7 643 900	519 445		291'
69+00	0+00W	7 644 080	519 355		273'
70+00	1+00W	7 644 125	519 220		265'
74+00	0+00	7 644 525	519 125	Iron Bar Marker	258'
77+00	0+00	7 644 790	518 990		237'
37+50	10+50E	7 642 755	521 525	EH-1	259'
40+60	12+80E	7 643 060	521 290	EH-2	253'
59+10	13+00E	7 643 780	520 965	EH-3	264'
64+60	4+50E	7 643 885	519 960	326-1	246'
64+00	2+80E	7 643 750	519 835	326-2	263'
64+30	1+90E	7 643 735	519 740	326-3	276'
64+40	1+10E	7 643 720	519 670	326-4	283'



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Job No.: C-8337

Appendix No.: 2-8337-M-2

By: J.K. Smith

Checked

AREA: Source 303, Lucas Point
(42 Holes)

U.T.M. ZONE 8
(Shoran '65 Daum, July '69 Adjustment)

STATION	U.T.M. CO-ORDINATES		Remarks	Elevations (feet)
	N.	E.		
<u>DRILLED CORE HOLE LOCATIONS</u>			Plus Chainages are Metres)	Datum-MacKenzie River Ice-Assumed to be 100.0'
<u>Baseline A</u>				
Base- Line	N or S			
0+00	0+00	7 660 580	517 400	Iron Bar,Marker 185'
2+00	0+00	7 660 640	517 595	198'
"	1+00S	7 660 540	517 620	186'
"	1+00N	7 660 735	517 565	192'
4+00	0+00	7 660 695	517 785	194'
"	1+00S	7 660 600	517 815	192'
6+00	0+00	7 660 750	517 975	188'
"	1+00S	7 660 655	518 005	171'
7+50	0+00	7 660 795	518 120	177'
8+00	0+00	7 660 810	518 170	166'
"	1+00N	7 660 905	518 140	167'
10+00	0+00	7 660 865	518 360	172'
12+00	0+00	7 660 925	518 550	148'
<u>Baseline B</u>				
Base- Line	N or S			
0+00	0+00	7 662 015	517 230	151'
1+68	0+00	7 661 965	517 390	147'
4+00	0+00	7 661 900	517 615	140'
"	1+00S	7 661 805	517 585	142'
"	1+00N	7 661 995	517 645	142'
"	2+00N	7 662 095	517 670	143'
6+00	0+00	7 661 845	517 805	128'



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Job No.: C-8337

Appendix No.: 2-8337-M-2

By: J.K. Smith

Checked

AREA: Source 303, Lucas Point
(42 Holes)

U.T.M. ZONE 8
(Shoran '65 Datum, July '69 Adjustment)

STATION	U.T.M. CO-ORDINATES		Elevations (feet)
	N.	E.	
DRILLED CORE HOLE LOCATIONS (Plus Chainages are Metres)			
<u>Baseline B</u>			
Base- Line N or S			
8+00 0+00	7 661 790	518 000	122'
10+00 1+00N	7 661 830	518 220	123'
11+00 0+00	7 661 705	518 285	125'
12+00 0+00	7 661 680	518 385	122'
" 1+00S	7 661 580	518 355	120'
" 2+00N	7 661 870	518 440	122'
<u>Baseline C</u>			
Base- Line N or S			
0+90 1+10S	7 662 860	518 045	128'
2+65 1+50S	7 662 820	518 220	132'
4+00 0+00	7 662 970	518 360	149'
6+00 1+00S	7 662 865	518 560	173'
" 1+00N	7 663 065	518 565	174'
" 2+00N	7 663 165	518 565	173'
8+00 0+00	7 662 960	518 760	187'
" 2+00N	7 663 160	518 765	199'
" 4+00N	7 663 360	518 770	194'
10+00 1+00S	7 662 855	518 960	192'
" 1+00N	7 633 055	518 965	188'
" 3+00N	7 663 255	518 970	205'
" 5+00N	7 663 450	518 975	201'
" 6+50N	7 663 600	518 980	179'



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Job No.: C-8337

Appendix No.: 2-8337-M-2

By: J.K. Smith

Checked

AREA: Source 303, Lucas Point
(42 Holes)

UTM ZONE 8
(Shoran '65 Datum, July '69 Adjustment)

STATION		U.T.M. CO-ORDINATES		Elevations (feet)
		N.	E.	
<u>DRILLED CORE HOLE LOCATIONS</u> (Plus Chainages are Metres)				
<u>Baseline C</u>				
Base-				
<u>Line N or S</u>				
12+00	1+50S	7 662 795	519 155	198'
"	3+00N	7 663 245	519 170	
"	7+75N	7 663 720	519 185	194'



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Job No. : C-8337

Appendix No. : 3-8337-M-3

By :

Checked

AREA : Source 222, Swimming Point

U.T.M. ZONE 8

44 Holes

(Shoran '65 Datum, July '69 Adjust.)

STATION		U.T.M. CO-ORDINATES		Remarks	Elevation (Feet)
		N.	E.		
<u>CO-ORDINATES OF DRILLED LOCATIONS</u>					(Assumed, See Dwg. 8337-M-3 for Reference Datum)
Base- Line	E or W				
1+00	0+00	7 666 010	523 360		77'
2+00	1+00W	7 666 015	523 215		80'
"	0+00	7 666 085	523 290		81'
"	1+00E	7 666 155	523 365		80'
4+00	1+00W	7 666 165	523 080		80'
"	0+00	7 666 230	523 155		85'
6+00	0+00	7 666 380	523 020		85'
"	1+00E	7 666 445	523 090		86'
"	6+50E	7 666 820	523 495		87'
7+00	5+50W	7 666 075	522 545		44'
8+00	1+00E	7 666 590	522 955		85'
"	2+00E	7 666 660	523 030		87'
"	6+50E	7 666 965	523 355		87'
10+00	8+20W	7 666 110	522 145		60'
"	6+50W	7 666 225	522 270		54'
"	5+50W	7 666 295	522 345		48'
"	2+00E	7 666 805	522 890		85'
"	6+50E	7 667 115	523 220		83'
"	8+50E	7 667 250	523 365		84'
12+00	8+50 E	7 667 395	523 230		86'
14+00	9+50W	7 666 315	521 780		61'
"	7+50W	7 666 450	521 925		56'
"	7+50E	7 667 475	523 020		86'
"	9+50E	7 667 610	523 165		87'



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Job No.: C-8337

Appendix No.: 3-8337-M-3

By :

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AREA : Source 222, Swimming Point

U.T.M. ZONE 8

44 Holes

(Shoran '65 Datum, July '69 Adjust.)

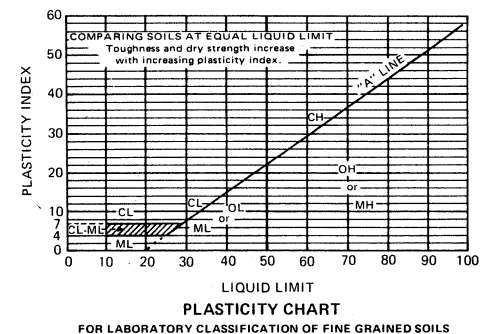
STATION		44 Holes		(Shoran '65 Datum, July '69 Adjust.)	
		U.T.M. CO-ORDINATES			
		N.	E.	Remarks	Elevation (Feet)
<u>CO-ORDINATES OF DRILLED LOCATIONS</u>					
Base-	Line	E or W			
16+00	8+50W	7 666 530	521 715		57'
"	8+50E	7 667 690	522 960		80'
18+00	8+50W	7 666 675	521 580		52'
"	8+50E	7 667 835	522 820		79'
"	10+50E	7 667 970	522 970		74'
22+00	5+00W	7 667 205	521 560		43'
"	4+00W	7 667 275	521 635		43'
"	3+00W	7 667 345	521 705		42'
"	2+00W	7 667 410	521 780		43'
"	0+00	7 667 550	521 925		36'
"	2+00E	7 667 685	522 075		35'
"	4+00E	7 667 820	522 220		28'
26+00	5+00W	7 667 500	521 290		35'
"	4+00W	7 667 565	521 360		38'
"	0+00	7 667 840	521 655		39'
33+00	0+00	7 668 350	521 175		81'
35+00	0+00	7 668 500	521 040		100'
36+00	2+00E	7 668 705	521 120		118'
38+00	0+00	7 668 715	520 835		128'
40+00	2+00W	7 668 725	520 555		120'

Borehole Logs
Symbols and Terms

UNIFIED SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION															
FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 3 inches and basing fractions on estimated weights)				GROUP SYMBOLS (1)	TYPICAL NAMES	INFORMATION REQUIRED FOR DESCRIBING SOILS	LABORATORY CLASSIFICATION CRITERIA								
COARSE GRAINED SOILS More than half of material is larger than No. 200 sieve size 12 More than half of material is about the smallest particle visible to the naked eye	SANDS More than half of coarse fraction is smaller than No. 4 sieve size. (For visual classifications, the 1/4" size may be used as equivalent to the No. 4 sieve size.)	GRAVELS More than half of coarse fraction is larger than No. 4 sieve size.	CLEAN GRAVELS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes	GW	Well graded gravels, gravel-sand mixtures, little or no fines.	Give typical name, indicate approximate percentages of sand and gravel, mdx. size; angularity, surface condition, and hardness of the coarse grains; local or geologic name and other pertinent descriptive information, and symbol in parentheses. For undisturbed soils add information on stratification, degree of compactness, cementation, moisture conditions and drainage characteristics. EXAMPLE:— Silty sand, gravelly; about 20% hard, angular gravel particles 1/2 in. maximum size; rounded and subangular sand grains coarse to fine; about 15% non-plastic fines with low dry strength; well compacted and moist in place; alluvial sand; (SM)	Determine percentages of gravel and sand from grain size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size) coarse grained soils are classified as follows:— GW, GP, SW, SP, GM, GC, SM, SC. Borderline cases requiring use of dual symbols.	Cu = $\frac{D_{60}}{D_{10}}$ Greater than 4 Cc = $\frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between one and 3						
				Predominantly one size or a range of sizes with some intermediate sizes missing	GP	Poorly graded gravels, gravel-sand mixtures, little or no fines.			Not meeting all gradation requirements for Gw						
			GRAVELS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below.)	GM	Silty gravels, poorly graded gravel-sand-silt mixtures.			Atterberg limits below "A" line, or PI less than 4	Above "A" line with PI between 4 and 7 are borderline cases requiring use of dual symbols.					
				Plastic fines (for identification procedures see CL below.)	GC	Clayey gravels, poorly graded gravel-sand-clay mixtures.			Atterberg limits above "A" line with PI greater than 7						
	SANDS WITH FINES (Appreciable amount of fines)	CLEAN SANDS (Little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate particle sizes	SW	Well graded sands, gravelly sands, little or no fines.	EXAMPLE:— Silty sand, gravelly; about 20% hard, angular gravel particles 1/2 in. maximum size; rounded and subangular sand grains coarse to fine; about 15% non-plastic fines with low dry strength; well compacted and moist in place; alluvial sand; (SM)			Cu = $\frac{D_{60}}{D_{10}}$ Greater than 4 Cc = $\frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between one and 3	Not meeting all gradation requirements for SW					
			Predominantly one size or a range of sizes with some intermediate sizes missing.	SP	Poorly graded sands, gravelly sands, little or no fines.										
		SANDS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below.)	SM	Silty sands, poorly graded sand-silt mixtures.						Atterberg limits below "A" line or PI less than 4	Above "A" line with PI between 4 and 7 are borderline cases requiring use of dual symbols.			
			Plastic fines (for identification procedures see CL below.)	SC	Clayey sands, poorly graded sand-clay mixtures.						Atterberg limits above "A" line with PI greater than 7				
			IDENTIFICATION PROCEDURES ON FRACTION SMALLER THAN No. 40 SIEVE SIZE												
FINE GRAINED SOILS More than half of material is smaller than No. 200 sieve size (The No. 200 sieve size is about the smallest particle visible to the naked eye)	SILTS AND CLAYS Liquid limit less than 50	DRY STRENGTH (CRUSHING CHARACTERISTICS)	DILATANCY (REACTION TO SHAKING)	TOUGHNESS (CONSISTENCY NEAR PLASTIC LIMIT)	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity	Give typical name; indicate degree and character of plasticity, amount and maximum size of coarse grains; color in wet condition, odor if any, local or geologic name, and other pertinent descriptive information; and symbol in parentheses. For undisturbed soils add information on structure, stratification, consistency in undisturbed and remolded states, moisture and drainage conditions. EXAMPLE:— Clayey silt, brown, slightly plastic, small percentage of fine sand; numerous vertical root holes; firm and dry in place; loess; (ML)	Use grain size curve in identifying the fractions as given under field identification							
										None to slight	Quick to slow	None	CL	Inorganic clays of low to medium plasticity, gravelly clays, silty clays, lean clays	
										Medium to high	None to very slow	Medium	CL	Organic silts and organic silt-clays of low plasticity.	
		SILTS AND CLAYS Liquid limit greater than 50	Slight to medium	Slow	Slight	CL				Organic silts and organic silt-clays of low plasticity.					
			Slight to medium	Slow to none	Slight to medium	MH				Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.					
			High to very high	None	High	CH				Inorganic clays of high plasticity, fat clays.					
	HIGHLY ORGANIC SOILS	Readily identified by color, odor, spongy feel and frequently by fibrous texture.				Peat and other highly organic salts.									

- (1) **Boundary classifications:—** Soils possessing characteristics of two groups are designated by combinations of group symbols. For example GW-GC, well graded gravel-sand mixture with clay binder.
 (2) All sieve sizes on this chart are U.S. standard.

Use grain size curve in identifying the fractions as given under field identification



GROUND ICE DESCRIPTION

(taken from Guide to Field Description of Permafrost for Engineering Purposes NRC 7576, Technical Memorandum 79)

ICE - NOT VISIBLE

GROUP SYMBOL	S U B G R O U P	
	Symbol	Description
N	Nf	Poorly bonded or friable
	Nb	No excess ice
		Well bonded
	Nbe	Excess ice



VISIBLE ICE LESS THAN 1 INCH THICK

GROUP SYMBOL	S U B G R O U P	
	Symbol	Description
V	Vx	Individual ice crystals or inclusions
	Vc	Ice coatings on particles
	Vs	Stratified or distinctly oriented ice formations
	Vr	Random or irregularly oriented ice formations

VISIBLE ICE GREATER THAN 1 INCH THICK

GROUP SYMBOL	S U B G R O U P	
	Symbol	Description
ICE	ICE + soil type	Ice with soil inclusions
	ICE	Ice without soil inclusions

SYMBOLS USED ON BOREHOLE LOGS

Symbol	Description
	VTM Core Sample
	Grab sample, air return



Devil's Lake, Source 326

Borehole Logs

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
		PEAT								
-2		SAND (SM) - black, organic, some silt				Nbn				
-4		SAND (SW) - medium brown, fine to medium, some coarse, trace of silt				V 0-5%				
-6										
-8										
-10		- trace of gravel								
-12										
-14		GRAVEL (GW) - sandy								
-16										
-18		ICE				ICE				
-20		SAND (SW) - medium grey, fine to coarse, trace of fine gravel								
-22										
-24		- some gravel, trace of silt	4	79	17	Nbn, Nbe				
-26										
-28										
-30		SILT (TILL) (ML-GM) - medium brown, sandy, some gravel				V 5-10%				
-32										
		END OF HOLE								



ELEVATION: 317 (ft)
96.6 (m)

UTM: 7640 730 (N)
524 635 (E)

DATE DRILLED: 22/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

2+00 0+00

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
		PEAT								
-2		SILT (ML) - medium grey, some sand				V 50-60%				
-4		SAND (SW) - medium brown, trace of silt, fine to medium grained, trace of gravel	6	87	7	V 5-15%		●		
-6										
-8		ICE				ICE				
-10										
-12		ICE and SAND and GRAVEL				ICE +				
-14										
-16										
-18		SAND (SP) - medium brown, fine to medium, trace of silt and fine gravel	10	86	4	V 5-15%			●	
-20										
-22										
-24		- fine, uniform, trace of silt				V 0-5%				
-26										
-28						V 5-15%			●	
-30		END OF HOLE								
-32										



ELEVATION: 311 (ft)
94.8 (m)

UTM: 7640 825 (N)
524 660 (E)

DATE DRILLED: 22/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

2+00 1+00E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SP) - grey, fine to medium, uniform - some silt - trace of coal chips - trace of gravel	10	87	3	V 0-5%				
4										
6										
8										
10		SAND (SW) - some gravel - becoming coarser with depth, clean - maximum size 1/2" - some gravel, trace of silt	3	83	14	Nbn				
12										
14										
16										
18		ICE				ICE				
20										
22										
24										
26		SAND (SP) - light brown, some silt				V 0-5%				
28										
30										
32										



ELEVATION: 316 (ft)
96.3 (m)
 UTM: 7640595 (N)
524385 (E)

DATE DRILLED: 22/1/76
 SITE: Devil's Lake
 BASELINE: 326A

HOLE No.
 4+00 2+00W
 PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		SAND (SP) - light brown, some silt				V 0-5%				
34										
36										
38		END OF HOLE								
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 316 (ft)
96.3 (m)

UTM: 7 640 595 (N)
524 385 (E)

DATE DRILLED: 22/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

4+00 2+00W

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		PEAT - some silt				Nbe				
4		SAND (SM) - light brown, some silt, medium grained				Nbn				
6		SAND (SP) - fine to medium, uniform, trace of gravel	2	97	1					
8		- some coal chips, trace of silt and gravel								
10										
12		- full recovery								
14		SAND (SW) - gravelly, light grey, clean, up to 1" gravel	1	73	26	Nbn				
16		- coarser with depth				Vx trace				
18										
20		- 2' recovery								
22		SAND (SM) - dark brown, fine, silty, trace of gravel				Nbn V 10-20%				
24		ICE				ICE				
26										
28										
30										
32										



ELEVATION: 319 (ft)
97.3 (m)

UTM: 7 640 790 (N)
524 440 (E)

DATE DRILLED: 22/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.
4+00 0+00

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		ICE				ICE				
34		ICE and SAND - trace of fine gravel				ICE+				
36										
38		END OF HOLE								
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 319 (ft)
97.3 (m)

UTM: 7 640 790 (N)
524 440 (E)

DATE DRILLED: 22/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.
 4+00 0+00

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SILT and SAND (ML-SM) - brown, - very organic				Nbn				
4										
6			67	33		V trace				
8		SAND (SP) - grey brown, medium to fine grained - fine grained, silty				Nbn				
10		ICE				ICE				
12		SAND and GRAVEL (SW-GW)								
14										
16		SAND (SW) - medium to coarse grained, some gravel, trace of silt	3	84	13	Nbn				
18										
20										
22		SAND and GRAVEL (SW-GW) - coarse, clean								
24										
26		- fine sand matrix - trace of silt				V 0-5%				
28										
30										
32										



ELEVATION: 318 ft
97.0 m

UTM: 7 640 885 N
524 470 E

DATE DRILLED: 22/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

4+00 1+00E

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		SAND and GRAVEL (SW-GW)								
34		SAND (SP) - some silt, fine grained, uniform				V 5-15%				
36										
38		END OF HOLE								
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 318 (ft)
97.0 (m)

UTM: 7 640 885 (N)
524 470 (E)

DATE DRILLED: 22/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

4+00 1+00E

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
		PEAT								
2		SAND (SM) - dark brown, silty, organic, fine grained				V 30-40%				
4		SAND (SP) - light grey, fine to medium grained, trace to some silt				V 5-15%		●		
6		- organic laminations				Vx trace				
8		- coarse grained, trace of gravel				Nbn, Nbe				
10		- full recovery				Vc 0-5%			●	
12		- dark brown organics				V 30-40%				
14		- fine to medium grained trace of silt and fine gravel	9	89	2				●	
16		- clean, coarse grained				Vc 0-5%				
18		- some fine gravel				Nbn		●		
20		- 2' recovery								
22		- thinly laminated with organics				Nbe				
24		- poor recovery				Vx trace				●
26		SILT (TILL) (ML-GM) - medium grey brown, sandy, trace of gravel				V 10-20%				
28		END OF HOLE								
30										
32										

Bulk Density
113.8 lbs/cu.ft.



ELEVATION: 317 (ft)
96.6 (m)
UTM: 7 640 980 (N)
524 500 (E)

DATE DRILLED: 23/1/76
SITE: Devil's Lake
BASELINE: 326A

HOLE No.
4+00 2+00E
PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION-1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
		PEAT								
-2		SAND (SM) - brown, fine, silty				Nbn				
-4		SAND (SP) - fine to medium grained, trace of fine gravel and silt	7	88	5					
-6										
-8										
-10		SAND (SW) - gravelly, trace of silt, well graded up to 1" maximum				V trace				
-12										
-14			3	73	24					
-16										
-18										
-20		SAND and GRAVEL (SW-GW) - trace of silt, medium to coarse sand, fine gravel up to 1" maximum				Nbn				
-22										
-24										
-26										
-28										
-30										
-32										
		ICE				ICE				



ELEVATION: 318 (ft)
97.0 (m)

UTM: 7 640 845 (N)
524 250 (E)

DATE DRILLED: 22/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

6+00 0+00

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		SAND and GRAVEL (SW-GW)								
34		ICE				ICE				
36		ICE, SAND and SILT - brown, fine grained				ICE+				
38		END OF HOLE								
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 318 (ft)
97.0 (m)

UTM: 7 640 845 (N)
524 250 (E)

DATE DRILLED: 22/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

6+00 0+00

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
0		SAND (SM) - silty, organic								
2		SAND (SP) - light brown, fine grained, uniform, some silt, trace of gravel				Nbn				
4			18	81	1					
6										
8		- medium to coarse								
10		- clean								
12		- coarser with depth								
14										
16						V 0-5%				
18										
20										
22		ICE and GRAVEL and SAND				ICE +				
24										
26										
28										
30		ICE				ICE				
32		SAND and SILT (SM-ML) - fine, grey, possible till				Nbn				



ELEVATION: 318 (ft)
97.0 (m)

UTM: 7 640 940 (N)
524 280 (E)

DATE DRILLED: 22/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

6+00 1+00E

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		SAND and SILT (SM-ML) - fine grained, grey				Nbn				
34		ICE				ICE				
36										
38		END OF HOLE								
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 318 (ft)
97.0 (m)

UTM: 7 640 940 (N)
524 280 (E)

DATE DRILLED: 22/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

6+00 1+00E

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SILT and SAND (ML-SM) - organic				Nbn				
4		SAND (SW) - trace of gravel and silt								
6										
8										
10		- numerous coal chips - trace of gravel and silt	5	87	8	V 0-5%				
12										
14										
16		SAND and GRAVEL (SP-GW) - light grey, trace of silt, poorly graded								
18										
20			2	58	40	Nbn				
22										
24										
26										
28										
30						V 5-15%				
32										
		ICE and SAND and GRAVEL				ICE+				



ELEVATION: 318 (ft)
97.0 (m)

UTM: 7 641 035 (N)
524 305 (E)

DATE DRILLED: 22/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

6+00 2+00E

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		SAND and GRAVEL (SP-GW)				V 5-15%				
34		ICE and SAND and GRAVEL				ICE+				
36										
38		END OF HOLE								
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 318 (ft)
97.0 (m)

UTM: 7 641 035 (N)
524 305 (E)

DATE DRILLED: 22/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

6+00 2+00E

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
		PEAT								
-2		SAND (SP) - medium brown, fine grained, uniform				V 0-5% Nbe				
-4		- light to medium grey, some fine gravel								
-6										
-8										
-10		- some silt	13	85	2					
-12										
-14		- coarse, light to medium grey								
-16		- some fine to medium gravel				Nbn, V trace				
-18		SAND and GRAVEL (SW-GW) - trace of silt to clean								
-20			1	57	42					
-22										
-24		SAND (SP) - fine, uniform, laminated with organics								
-26										
-28		GRAVEL (GP) - medium grey, sandy interbeds				Nbe, Nbn				
-30		- thin laminations of organics								
-32										
		END OF HOLE								



ELEVATION: 318 (ft)
97.0 (m)
UTM: 7 640 875 (N)
524 155 (E)

DATE DRILLED: 23/1/76
SITE: Devil's Lake
BASELINE: 326A

HOLE No.

7+00 0+00

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SM) - medium brown, fine, uniform, trace to some silt				Nbn				
4		SAND (SP) - medium to light grey, fine to medium, trace of coarse	10	87	3	Nbn, Vtrace				
6		- thinly interbedded with black organics								
8		- trace of fine gravel and silt								
10		- full recovery								
12		SAND (SW) - medium to light grey, gravelly, trace of silt				Nbn				
14		- full recovery								
16		- some gravel, trace of silt	2	80	18	Vc 0-5%				
18		GRAVEL (GW) - sandy, clean								
20		- 3' recovery								
22										
24		- trace of silt								
26		SAND (SW) - gravelly				Vc,Vr 0-5%				
28		SAND (SP) - medium to light grey, fine, uniform								
30		- black organic lamin- ations				Nbe, Nbn				
32		END OF HOLE								



ELEVATION: 317 (ft)
96.6 (m)
 UTM: 7 640 905 (N)
524 060 (E)

DATE DRILLED: 23/1/76
 SITE: Devil's Lake
 BASELINE: 326A

HOLE No.

8+00 0+00

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		ORGANICS								
4		SAND (SP-SM) - brown, medium to fine, trace of organics, silty, trace of gravel				Nbn				
6										
8										
10										
12										
14		SAND (SW) - brown, gravelly, trace of silt, well graded	2	75	23					
16										
18										
20										
22										
24										
26										
28		ICE				ICE				
30										
32										



ELEVATION: 318 (ft)
97.0 (m)
 UTM: 7 641 000 (N)
524 085 (E)

DATE DRILLED: 23/1/76
 SITE: Devil's Lake
 BASELINE: 326A

HOLE No. 8+00 1+00E
 PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976 ^M

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		ICE				ICE				
34										
36										
38										
40		ICE and SAND and SILT - fine grained				ICE+				
42										
44		END OF HOLE								
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 318 (ft)
97.0 (m)

UTM: 7 641 000 (N)
524 085 (E)

DATE DRILLED: 23/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.
8+00 1+00E

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SM-ML) - silty, organic	3	78	19	Nbn				
4		SAND (SP) - brown, medium to fine grained, trace of silt and coal chips and gravel								
6		SAND (SW) - medium grained, well graded, clean, trace of fine gravel - some fine gravel, trace of silt								
8										
10										
12										
14										
16										
18										
20		SAND and GRAVEL (SW-GW) - clean, fine grained								
22										
24		ICE - some sand and gravel							ICE+	
26										
28										
30		SAND (SM) - silty, trace of fine gravel, possible till			Nbn					
32										



ELEVATION: 317 (ft)
96.6 (m)
UTM: 7 640 930 (N)
523 965 (E)

DATE DRILLED: 23/1/76
SITE: Devil's Lake
BASELINE: 326A

HOLE No.
9+00 0+00
PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		SAND (SM) - silty, trace of fine gravel, possible till				Nbn				
34										
36										
38		END OF HOLE								
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 317 (ft)
96.6 (m)
 UTM: 7 640 930 (N)
523 965 (E)

DATE DRILLED: 23/1/76
 SITE: Devil's Lake
 BASELINE: 326A

HOLE No.
 9+00 0+00
 PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SILT (ML) - clayey				Nbn				
4		SAND (SW) - medium brown				V 5-10%				
6		- gravelly, trace of silt	4	74	22	V trace				
8										
10										
12		GRAVEL (GW) - sandy, fine grained				V 0-5%				
14										
16										
18		ICE				ICE				
20										
22										
24										
26										
28										
30										
32										



ELEVATION: 317 (ft)
96.6 (m)

UTM: 7 640 670 (N)
523 780 (E)

DATE DRILLED: 24/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

10+00 3+00W

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		ICE				ICE				
34										
36										
38		END OF HOLE								
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 317 (ft)
96.6 (m)

UTM: 7 640 670 (N)
523 780 (E)

DATE DRILLED: 24/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

10+00 3+00W

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
-2		ORGANIC SILT and SAND (CL-SM)								
-4		SAND (SP) - medium grained, some silt, trace of gravel				Nbn				
-6		SAND and GRAVEL (SW-GW) - clean to trace of silt, trace of coal chips	2	63	35	Nbn Vc trace		●		
-8		- full recovery								
-10		SAND (SW) - some gravel, clean				Vx, Vs 0-5%				
-12		- full recovery	82		18			●		
-14		SAND (SP) - light grey brown, uniform, fine grained				Nbn				
-16		- medium grained - interbeds of ice lenses and organic silt				Nbn, Vtrace				
-18		ICE				ICE				
-20										
-22										
-24										
-26										
-28										
-30										
-32										



ELEVATION: 319 (ft)
97.3 (m)
UTM: 7 640 770 (N)
523 810 (E)

DATE DRILLED: 23/1/76
SITE: Devil's Lake
BASELINE: 326A

HOLE No.

10+00 2+00W

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		ICE				ICE				
34										
36										
38										
40		ICE and SILT and SAND - organic				ICE+				
42										
44		END OF HOLE								
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 319 (ft)
97.3 (m)

UTM: 7 640 770 (N)
523 810 (E)

DATE DRILLED: 23/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

10+00 2+00W

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		ORGANICS - some silt and sand				Nbn				
4		SAND (SP) - medium to fine grained, trace of silt and gravel								
6		SAND (SW) - medium to coarse, clean, some fine grained								
8										
10										
12										
14		- coarser materials								
16		- trace of silt	4	83	13					
18										
20										
22										
24										
26										
28		ICE				ICE				
30										
32										



ELEVATION: 317 (ft)
96.6 (m)

UTM: 7 640 895 (N)
523 840 (E)

DATE DRILLED: 23/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

10+00 1+00W

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		ICE				ICE				
34										
36										
38										
40										
42										
44										
46										
48										
50		ICE and SAND and SILT				ICE+				
52										
54										
56		END OF HOLE								
58										
60										
62										



ELEVATION: 317 (ft)
96.6 (m)

UTM: 7 640 895 (N)
523 840 (E)

DATE DRILLED: 23/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.
 10+00 1+00W

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SILT, SAND and ORGANICS (ML-SM)				V trace				
4		SAND and SILT (SM-ML)								
6										
8		SAND (SW) - medium grained, well graded, clean, some gravel				V trace Nbn				
10										
12										
14										
16						V 40-50%				
18										
20		- slight increase in ice content								
22										
24										
26		ICE				ICE				
28										
30										
32										



ELEVATION: 316 (ft)
96.3 (m)
 UTM: 7 640 960 (N)
523 865 (E)

DATE DRILLED: 23/1/76
 SITE: Devil's Lake
 BASELINE: 326A

HOLE No.
10+00 0+00
 PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		ICE				ICE				
34		ICE and SAND and SILT				ICE+				
36										
38		END OF HOLE								
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 317 (ft)
96.3 (m)
 UTM: 7 640 960 (N)
523 865 (E)

DATE DRILLED: 23/1/76
 SITE: Devil's Lake
 BASELINE: 326A

HOLE No.
 10+00 0+00
 PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		ORGANIC SILT and SAND (CL-SM)				Nbe, Nbn				
4		SAND (SM) - brown, trace of organics and gravel, silty								
6										
8		SAND (SW) - some gravel, trace of silt to clean, gravel to 3/4"				Nbn				
10										
12										
14										
16			2	80	18					
18		- coarser, gravelly								
20										
22										
24										
26		ICE - some fine sand near top				ICE+				
28		SAND and SILT (SM-ML)				Nbe				
30		- dark brown, trace of organics								
32		ICE				ICE				



ELEVATION: 315 (ft)
96.0 (m)

UTM: 7 641 055 (N)
523 895 (E)

DATE DRILLED: 23/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

10+00 1+00E

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		SAND and SILT (SM-ML)				Nbe				
		ICE				ICE				
34		SAND and SILT (SM-ML) - dark brown, trace of organics				Nbe				
36										
38		END OF HOLE								
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 315 (ft) 96.0 (m)	DATE DRILLED: 23/1/76
UTM: 7 641 055 (N) 523 895 (E)	SITE: Devil's Lake
	BASELINE: 326A

HOLE No.
10+00 1+00E
PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND and SILT (SM-ML) - trace of organics								
		SAND (SM) - fine silty, organic								
4		SAND (SW) - brown, medium to fine grained, some gravel, trace of silt - coarser and cleaner with depth - medium to coarse grained	10	74	16	Nbn				
6										
8										
10										
12										
14										
16										
18		ICE				ICE				
20										
22										
24										
26										
28										
30										
32										



ELEVATION: 317 (ft)
96.6 (m)

UTM: 7 640 990 (N)
523 770 (E)

DATE DRILLED: 23/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.
11+00 0+00

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		ICE				ICE				
34										
36										
38										
40										
42										
44										
46		ICE - some organic silt, trace of fine sand				ICE+				
48		END OF HOLE								
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 317 (ft)
96.6 (m)

UTM: 7 640 990 (N)
523 770 (E)

DATE DRILLED: 23/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

11+00 0+00

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SILT (ML) - medium brown				V 0-5%				
4		SAND (SW) - medium grey, fine to medium grained								
6		- trace of organics				Nbn V trace		●		
8										
10						Nbn		●		
12										
14		- trace of coarse sand								
16										
18										
20		- trace of fine gravel and silt	5	86	9	Nbn V trace		●		
22										
24										
26		- gravelly								
28		ICE and SAND - coarse grained				ICE+				
30										
32		END OF HOLE								



ELEVATION: 318 (ft)
97.0 (m)
UTM: 7 640 920 (N)
523 645 (E)

DATE DRILLED: 24/1/76
SITE: Devil's Lake
BASELINE: 326A

HOLE No.
12+00 1+00W
PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
		PEAT and SILT								
2		SAND (SW) - medium to fine grained, trace of gravel - some gravel, trace of silt, light grey - trace of silt lamina- tions, trace of coal chips - full recovery - gravelly, trace of silt	1	87	12	Nbn				
4										
6										
8										
10										
12										
14										
16										
18										
20										
22										
		SAND and GRAVEL (SW-GW) - clean	2	72	26					
16										
18		- 3' recovery								
20		- silty horizon								
22										
24										
26										
28										
30										
32										
		ICE							ICE	



ELEVATION: 318 (ft)
97.0 (m)
UTM: 7 641 015 (N)
523 675 (E)

DATE DRILLED: 23/1/76
SITE: Devil's Lake
BASELINE: 326A

HOLE No.

12+00 0+00

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		ICE				ICE				
34		ICE and SAND and SILT				ICE+				
36										
38		END OF HOLE								
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 318 (ft)
97.0 (m)

UTM: 7 641 015 (N)
523 675 (E)

DATE DRILLED: 23/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

12+00 0+00

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
0		PEAT								
2		SAND (SM) - medium brown, silty, very fine grained				Nbn				
4		SAND (SW) - medium brown, well graded				Nbn				
6		- trace of organics and fine gravel								
8										
10		- some gravel, trace of silt	2	85	13	Nbn V trace				
12										
14										
16		GRAVEL (GW) - sandy								
18										
20										
22										
24		SAND (SP) - fine, uniform				Nbn				
26		SILT (TILL) (ML-GM) - medium grey brown, trace to some fine gravel								
28										
30										
32						V 5-10%				
		END OF HOLE								



ELEVATION: 315 (ft)
96.0 (m)

UTM: 7 641 210 (N)
523 730 (E)

DATE DRILLED: 24/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

12+00 2+00E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
		PEAT								
2		SAND (SM) - medium brown, silty, fine grained				V 5-10%				
4		SAND (SP) - medium brown, fine to medium grained, trace of gravel				V 0-5%				
6										
8						Nbn				
10		- interbedded organics gravel, and sand				V trace				
12						Nbn				
14										
16		- medium to coarse sand - some fine gravel, trace of silt	5	84	11					
18										
20		SAND (SP) - fine grained uniform, thin laminations of organics				ICE				
22		ICE								
24		SAND (SW) - medium grey, medium to coarse grained, some fine gravel				V 5-15%				
26										
28		ICE - thin beds of gravel, sand and silt				ICE+				
30										
32										



ELEVATION: 317 (ft)
96.6 (m)
UTM: 7 641 045 (N)
523 580 (E)

DATE DRILLED: 24/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

13+00 0+00

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		ICE - thin beds of gravel, sand and silt				ICE+				
34										
36										
38										
40										
42										
44										
46										
48										
50										
52										
54		END OF HOLE								
56										
58										
60										
62										



ELEVATION: 317 (ft)
96.6 (m)

UTM: 7 641 045 (N)
523 580 (E)

DATE DRILLED: 24/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.
 13+00 0+00

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
0		PEAT				Nbn				
2		SILT (ML) - sandy				V 5-10%				
4		SAND (SW) - medium brown, well graded, trace of fine gravel								
6										
8										
10		- interbeds of fine and coarse sand and organics				V trace				
12										
14		- trace of gravel and silt				Nbn				
16			7	85	8					
18		SAND (SM) - fine, silty								
20		- some silt								
22										
24										
26		SAND (SW) - medium to coarse grained, trace of fine gravel								
28		ICE				ICE				
30		ICE and SILT				ICE+				
32		END OF HOLE								



ELEVATION: 310 (ft)
94.5 (m)
 UTM: 7 641 075 (N)
523 485 (E)

DATE DRILLED: 24/1/76
 SITE: Devil's Lake
 BASELINE: 326A

HOLE No.

14+00 0+00

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		PEAT								
4		SAND (SW) - medium brown, fine to coarse, trace of fine gravel				Nbn, Nf				
6		- interbeds of fine silty sand								
8		- 2.5' recovery								
10		- full recovery	17	82	1					
12		SAND (SP-SM) - fine, some silt, trace of gravel				Nbn				
14		SAND (SW) - gravelly, clean, some interbeds of fine sand		73	27	Vx trace				
16		- trace of coal chips								
18						Nbn				
20										
22										
24		ICE - some gravel and silty sand				ICE+				
26										
28										
30										
32		END OF HOLE								



ELEVATION: 316 (ft)
96.3 (m)
 UTM: 7 641 170 (N)
523 510 (E)

DATE DRILLED: 24/1/76
 SITE: Devil's Lake
 BASELINE: 326A

HOLE No. 14+00 1+00E
 PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SILT (ML) - medium brown				V 20-25%				
4		SAND and GRAVEL (SW-GW) - trace of silty, well graded	7	59	34	Nf, Nbn	●			
6		ICE and SILT				ICE+				
8										
10										
12										
14										
16		SILT (TILL) (ML-GM) - medium grey brown, sandy, trace to some gravel				V 5-10%				
18										
20						Nbe V trace				
22										
24						Nbe V 0-5%				
26										
28		END OF HOLE								
30										
32										



ELEVATION: 339 (ft)
103.3 (m)

UTM: 7 640 270 (N)
523 035 (E)

DATE DRILLED: 26/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

16+00 9+00W

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SILT and SAND (CL-SM) - highly organic								
4		SAND (SW) - brown, some silt and gravel				Nbn				
6										
8		- well graded, clean								
10		- some gravel, trace of silt	4	82	14					
12										
14										
16										
18										
20										
22										
24		SILT (TILL) (ML-GM) - some sand and gravel				V 20-30%				
26										
28										
30										
32		END OF HOLE								



ELEVATION: 308 (ft.)
93.9 (m)
 UTM: 7 641 225 (N)
523 320 (E)

DATE DRILLED: 24/1/76
 SITE: Devil's Lake
 BASELINE: 326A

HOLE No.
16+00 1+00 E
 PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND and GRAVEL (SW-GW) - medium brown, trace of silt	5	63	32	Nf, Nbn	●			
4		SAND (SW) - some gravel, trace of silt	4	81	15		●			
6		SILT (TILL) (ML-GM) - medium grey, some sand and fine gravel								
8										
10						V 30-40%				
12										
14										
16										
18		END OF HOLE								
20										
22										
24										
26										
28										
30										
32										



ELEVATION: 328 (ft)
100.0 (m)
 UTM: 7 640 325 (N)
522 845 (E)

DATE DRILLED: 26/1/76
 SITE: Devil's Lake
 BASELINE: 326A

HOLE No.
18+00 9+00W
 PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND and SILT (SM-CL) - highly organic								
4		SAND (SW) - brown, medium to coarse grained, well graded, trace of gravel				Nbn				
6										
8		- possible ice lensing				V 30-40%				
10							●			
12										
14										
16		- trace to some silt				V 5-10%				
18										
20		SAND and GRAVEL (SW-GW) - well graded, some silt	10	64	26			●		
22										
24										
26										
28		SILT (TILL) (ML-GM) - some sand and gravel				V 30-40%				
30										
32		END OF HOLE								



ELEVATION: 310 (ft)
94.5 (m)

UTM: 7 641 185 (N)
523 100 (E)

DATE DRILLED: 24/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

18+00 0+00

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SP) - medium to fine, oxidized				Nbn				
4		SAND (SW) - medium to coarse, trace of gravel, well graded								
6										
8										
10										
12										
14		SAND and GRAVEL (SW-GW) - trace of silt, well graded								
16						Nbn				
18										
20										
22										
24										
26		- gap graded	2	63	35	V 10-20%				
28										
30										
32										
		END OF HOLE								



ELEVATION: 308 (ft)
93.9 (m)
UTM: 7 641 215 (N)
523 005 (E)

DATE DRILLED: 24/1/76
SITE: Devil's Lake
BASELINE: 326A

HOLE No.
19+00 0+00
PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		PEAT - reddish brown				V 5-10%				
4										
6		SILT (CL) - organic				V 40-50%				
8		SAND (SP) - medium brown, fine to medium grained, trace of gravel								
10		- interbeds of sandy silt (till)								
12		SILT and CLAY (TILL) (ML-CL) - medium grey brown, some sand and gravel				Nbn V trace				
14										
16										
18		- medium grey				Nbn				
20										
22										
24										
26										
28		END OF HOLE								
30										
32										



ELEVATION: 305 (ft)
93.0 (m)

UTM: 7 640 285 (N)
522 625 (E)

DATE DRILLED: 26/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

20+00 10+00W

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		PEAT								
4		SILT (ML) - medium grey brown, sandy, trace of gravel				V 40-50%				
6		ICE and SAND - medium grey				ICE+				
8										
10		SAND and GRAVEL (SW-GW) - some silt	16	46	38	Nbn, Nf	●			
12										
14		- thin interbeds of sand and brown organics				Nbn	●			
16										
18										
20										
22		SILT and CLAY (TILL) (ML-CL) - grey brown, sandy, trace to some gravel				Nbn				
24										
26										
28		END OF HOLE								
30										
32										



ELEVATION: 278 (ft)
84.8 (m)
UTM: 7 640 860 (N)
522 795 (E)

DATE DRILLED: 25/1/76
SITE: Devil's Lake
BASELINE: 326A

HOLE No.

20+00 4+00W

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION-1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SW) - medium to coarse grained, some silt and gravel				Nbn				
4										
6										
8										
10		- interbedded with coarse sand and gravel, clean - 2.5' recovery	1	68	31	Nbn Vc 0-5%				
12		SILT (TILL) (ML-GM) - medium grey brown, sandy, trace of gravel - 2' recovery				Vr 0-5% Nbn				
14										
16										
18										
20		- very sandy, some fine gravel								
22										81.5%
24										
26		- some sand				V 5-10%				
28										
30										
32		END OF HOLE								



ELEVATION: 308 (ft)
93.9 (m)
 UTM: 7 641 340 (N)
522 935 (E)

DATE DRILLED: 25/1/76
 SITE: Devil's Lake
 BASELINE: 326A

HOLE No.
 20+00 1+00E
 PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		PEAT - reddish brown				V 5-10%				
4										
6		SILT (CL) - organic				V 40-50%				
8		SAND (SP) - medium brown, fine to medium grained, trace of gravel								
10		- interbeds of sandy silt (till)								
12		SILT and CLAY (TILL) (ML-CL) - medium grey brown, some sand and gravel				Nbn V trace				
14										
16										
18		- medium grey				Nbn				
20										
22										
24										
26										
28		END OF HOLE								
30										
32										



ELEVATION: 305 (ft)
93.0 (m)

UTM: 7 640 285 (N)
522 625 (E)

DATE DRILLED: 26/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

20+00 10+00W

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SP) - medium yellow brown, fine, uniform				Nf				
4		- some medium gravel								
6		- fine to medium sand				Nbn				
8										
10		- thin interbeds of gravel and organics, trace of silt	5	79	16					
12										
14		- thin silt laminations				V 15-20%				
16										
18		SILT (ML) - medium grey brown								
20										
22										
24		SILT (TILL) (ML-GM) - medium grey brown, sandy, some fine gravel				V 5-10%				
26										
28		- trace to some clay				Nbn V trace				
30										
32		END OF HOLE								



ELEVATION: 291 (ft)
88.7 (m)

UTM: 7 641 015 (N)
523 630 (E)

DATE DRILLED: 25/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.
22+00 3+00W

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
		PEAT								
2		SILT (ML) - medium grey brown				V 50-60%				
		ICE				ICE				
4		SAND (SW) - medium brown, gravelly								
6		- some silt								
8		- poor recovery	15	58	27	Nbn				
10		- silty				Vc 0-5%				
12		SILT and CLAY (TILL) (ML-CL)								
14		- some sand and gravel								
16		ICE				ICE				
18										
20		ICE and SILT				ICE+				
22										
24										
26		SILT (ML-GM) (TILL) - medium grey, some sand and fine gravel				V 30-40%				
28										
30						V 5-10%				
32		END OF HOLE								



ELEVATION: 296 (ft)
90.2 (m)
UTM: 7 640 685 (N)
522 325 (E)

DATE DRILLED: 26/1/76
SITE: Devil's Lake
BASELINE: 326A

HOLE No.
24+00 7+00W
PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SILT (ML) - dark brown - organic				V 10-15%				
4										
6										
8		SAND (SP) - medium grey, fine, uniform				Nbn, V trace				
10		- fine to medium sand, trace of gravel, trace of silt	9	83	8					
12										
14		SILT (ML) - dark brown, organic, some coarse sand				V 5-10%				
16										
18		SILT and CLAY (TILL) (ML-CL) - medium grey brown, some sand and fine gravel				Nbn				
20										
22										
24						V 5-10%				
26										
28										
30										
32		END OF HOLE								



ELEVATION: 294 (ft)
89.6 (m)

UTM: 7 641 165 (N)
522 470 (E)

DATE DRILLED: 25/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.
24+00 2+00W

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
		PEAT								
2		CLAY (CL) - medium brown, silty				Nbn				
4		SAND (SM) - medium brown, fine grained, silty, uniform				Nbe				
6		SAND (SW) - medium grey, fine to medium, clean				Nbn				
8										
10		- gravelly, trace of silt, well graded	7	66	27	Nbn, V trace				
12										
14		- silty								
16										
18		SILT (ML) - medium grey								
20		SAND and SILT (TILL) (SM-ML) - medium grey brown				V 20-25%				
22						V 5-10%				
24										
26										
28										
30		- horizon of silty sand, some fine gravel								
32										
		END OF HOLE								



ELEVATION: 305 (ft)
93.0 (m)
UTM: 7 641 260 (N)
522 495 (E)

DATE DRILLED: 25/1/76
SITE: Devil's Lake
BASELINE: 326 A

HOLE No.

24+00 1+00W

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SM) - organic, fine				V 5-10%				
4		SAND (SP) - brown, fine grained, uniform, some silt								
6										
8		- medium to fine grained				Nbn				
10										
12		- trace of gravel - 1' recovery								
14										
16		SAND and GRAVEL (SW-GW) - well graded, clean - full recovery	1	75	24	Nbn				
18										
20		- some silt								
22						Vx 10-20%				
24		- silty								
26		SILT (TILL) (ML-GM) - trace of fine sand and gravel								
28						Vx 20-30%				
30										
32										
		END OF HOLE								



ELEVATION: 305 (ft)
93.0 (m)

UTM: 7 641 360 (N)
522 525 (E)

DATE DRILLED: 25/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

24+00 0+00

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION-1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
		SILT (CL) - dark brown, organic								
-2		SAND (SW) - medium brown, fine to medium, some gravel				Nbn				
-4										
-6										
-8		SAND and GRAVEL (SW-GW) - medium grey brown, clean to trace of silt	1	59	40	Nbn V trace				
-10										
-12										
-14						Nf, Nbn				
-16										
-18										
-20		SILT (TILL) (ML-GM) - sandy, some gravel				V 15-20%				
-22										
-24										
-26		- gravelly				V 5-10%				
-28						V 0-5%				
-30										
-32										
		END OF HOLE								



ELEVATION: 297 (ft)
90.5 (m)

UTM: 7 641 455 (N)
522 555 (E)

DATE DRILLED: 25/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.

24+00 1+00E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %				
							10	20	30	40	
2		SAND (SW) - medium brown, gravelly, clean - some gravel, trace of silt	4	79	17	Nf					
4											
6											
8											
10		ICE and SILT				ICE+					
12											
14											
16											
18		SILT (TILL) (ML-GM) - medium grey, brown, sandy, trace to some fine gravel				V 40-50%					
20											
22											
24											
26											
28											
30											
32											
		END OF HOLE									



ELEVATION: 313 (ft)
95.4 (m)

UTM: 7 640 745 (N)
522 135 (E)

DATE DRILLED: 26/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.

26+00 7+00W

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SM) - brown, medium to fine grained, silty								
4		SAND (SP) - brown, trace to some silt, medium to fine grained				V 15-25%				
6		ICE				ICE				
8										
10										
12										
14		- some gravel and sand				ICE+				
16										
18										
20										
22										
24										
26										
28										
30										
32										
		END OF HOLE								



ELEVATION: 277 (ft)
84.5 (m)

UTM: 7 641 375 (N)
522 115 (E)

DATE DRILLED: 25/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.

28+00 1+00W

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SP) - medium to fine grained, uniform, trace of silt				Nbn				
4										
6										
8		SAND (SW) - medium brown, gravelly, trace of silt, well graded	2	74	24	Nbn V 20-30%				
10										
12										
14						V 20-30%				
16										
18										
20		ICE				ICE				
22		ICE, SAND, SILT and GRAVEL				ICE+				
24		ICE				ICE				
26		ICE, SAND, SILT and GRAVEL				ICE+				
28										
30		ICE				ICE				
32		END OF HOLE								



ELEVATION: 299 (ft)
91.2 (m)
UTM: 7 641 625 (N)
521 980 (E)

DATE DRILLED: 25/1/76
SITE: Devil's Lake
BASELINE: 326 A

HOLE No.
30+00 1+00E
PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND and GRAVEL (SW-GW) - clean, well graded				Nbn				
4										
6		SAND (SM) - fine grained, silty, trace of fine gravel				V trace		●		
8										
10		SAND and SILT (TILL) (SM-ML) - trace of gravel				V 10-20%				
12										
14										
16		SAND (SP) - medium to coarse grained, some fine gravel				V 5-10%		●		
18										
20										
22		SAND (SP) - fine to medium grained, gravelly, trace of silt				V trace				
24										
26			5	72	23			●		
28										
30										
32		END OF HOLE								



ELEVATION: 313 (ft)
95.4 (m)

UTM: 7 641 395 (N)
521 700 (E)

DATE DRILLED: 25/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.
32+00 2+00W

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND and GRAVEL (SW-GW) - brown, well graded				Nbn				
4		SAND (SW) - grey, trace of silt, some gravel								
6		GRAVEL (GP)- sandy, trace of silt, gap graded in sand sizes	8	27	65		●			
8								●		
10		SAND (SP)- grey, medium to fine grained, trace of gravel	3	95	2	Nbn Vc 0-5%			●	
12										
14		- full recovery						●		
16		SILT (TILL) (ML-GM)- some sand, trace of gravel								
18		SAND and GRAVEL (SW-GW)- well graded, clean				Nbn			●	
20		- 1' recovery								
22										
24		ICE- thin gravel interbeds				ICE+				
26										
28										
30										
32										



ELEVATION: 309 (ft)
94.2 (m)
 UTM: 7 641 585 (N)
521 760 (E)

DATE DRILLED: 25/1/76
 SITE: Devil's Lake
 BASELINE: 326 A

HOLE No.
 32+00 0+00
 PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		ICE - thin gravel interbeds				ICE+				
34		- silt and fine sand								
36										
38		END OF HOLE								
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 309 (ft)
94.2 (m)

UTM: 7 641 585 (N)
521 760 (E)

DATE DRILLED: 25/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

32+00 0+00

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SW) - organic, trace of gravel				ICE				
4										
6										
8										
10		SAND (SM) - medium grained, silty, some fine gravel				Nbn				
12										
14		SILT (TILL) (ML-GM) - grey, trace of fine gravel and sand								
16										
18										
20										
22										
24		ICE				ICE				
26		- trace of silt				ICE+				
28		END OF HOLE								
30										
32										



ELEVATION: 283 (ft)
86.3 (m)

UTM: 7 641 775 (N)
521 815 (E)

DATE DRILLED: 25/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.
32+00 2+00E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SW)- medium to coarse grained, trace of gravel, well graded				Nbn				
4										
6						V 5-10%				
8		SAND and GRAVEL (SW-GW) - well graded								
10										
12		SAND (SP) - fine to medium grained, some silt, trace of fine gravel	13	83	4	Nbn				
14						V 0-5%				
16										
18		ICE				ICE				
20		SAND (SP) - medium grained				Nbn				
22						V 10-20%				
24		ICE				ICE				
26										
28		SILT (TILL) (ML-GM)- grey, trace of fine sand and gravel				Nbn				
30						6" ice lenses				
32										
		END OF HOLE								



ELEVATION: 248 (ft)
75.6 (m)
 UTM: 7 641 970 (N)
521 875 (E)

DATE DRILLED: 25/1/76
 SITE: Devil's Lake
 BASELINE: 326 A

HOLE No.
32+00 4+00E
 PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SP)- medium grained, oxidized, trace of silt and organics				Nbn				
4		SAND (SW)- medium to coarse, some fine gravel, clean				Nbn				
6										
8										
10		SILT (TILL) (ML-GM) - brown, some fine sand, trace of gravel				V 10-20%				
12										
14		SILT and CLAY (TILL) (ML-CL)								
16										
18										
20		END OF HOLE								
22										
24										
26										
28										
30										
32										



ELEVATION: 310 (ft)
94.5 (m)

UTM: 7 641 165 (N)
521 425 (E)

DATE DRILLED: 26/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.

34+00 5+00W

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND and SILT (SM-ML) - organic				Nbn				
4		SAND and GRAVEL (SW-GW) - well graded								
6		SAND (SP-SM) - fine grained, uniform, silty				V 10-20%				
8		SILT (ML) - grey, some fine sand				Nbn interbeds of massive ice				
10		SILT and ICE				ICE+				
12										
14										
16										
18						V 20-30%				
20										
22										
24		SAND (SP) - medium grained, uniform, trace of silt and gravel	7	87	6	Nbn				
26										
28										
30										
32		END OF HOLE								



ELEVATION: 315 (ft)
96.0 (m)

UTM: 7 641 355 (N)
521 480 (E)

DATE DRILLED: 26/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.
34+00 3+00W

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SM) - silty, organic, some fine gravel								
4		SAND (SP) - medium to fine grained, trace of fine gravel				Nbn				
6		- some silt	19	78	3			●		
8		SAND (SP-SM) - grey, fine grained, silty, uniform				Nbe				
10									●	
12										
14										
16		SILT and SAND (ML-SM) - grey, uniform				Nbn				
18										
20										
22		SAND (SP) - medium to fine grained, clean, some fine gravel				Nbn				
24										
26										
28										
30		ICE - traces of gravel and sand				ICE+				
32		END OF HOLE								



ELEVATION: 313 (ft)
95.4 (m)

UTM: 7 641 545 (N)
521 540 (E)

DATE DRILLED: 26/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.

34+00 1+00W

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND and SILT (SM-ML)- organ- ic, fine grained								
4		SAND (SP-SM)- grey, medium to fine grained, uniform, silty, trace of gravel				Nbn				
6		ICE				ICE				
8										
10										
12										
14		SAND (SP) - medium to coarse grained, clean, some fine gravel								
16										
18						Nbn V 5-10%				
20										
22										
24		ICE and SILT - grey, trace of sand and gravel				ICE+				
26										
28										
30										
32		END OF HOLE								



ELEVATION: 300 (ft)
91.5 (m)

UTM: 7 641 740 (N)
521 595 (E)

DATE DRILLED: 26/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.
34+00 1+00E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		GRAVEL (GP-GM) - medium brown, sandy				Nbn V trace				
4		- silty								
6		- very silty								
8										
10		SAND (SM) - silty				ICE to 50%				
12										
14		ICE				ICE				
16		SILT (ML) - medium grey brown, thin interbeds of fine to medium sand								
18		SILT (TILL) (ML-GM) - medium brown, sandy, trace to some gravel				V 10-15%				
20										
22		ICE				ICE				
24										
26		ICE and SILT				ICE+				
28										
30		SILT (ML) - medium brown				Nbn				
32										



ELEVATION: 266 (ft)
81.1 (m)

UTM: 7 641 930 (N)
521 655 (E)

DATE DRILLED: 26/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.

34+00 3+00E

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		SILT (ML) - medium brown				Nbn				
34		SAND (SP) - medium brown, fine grained, uniform, some silt								
36										
38										
40										
42		END OF HOLE								
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 266 (ft)
81.1 (m)

UTM: 7 641 930 (N)
521 655 (E)

DATE DRILLED: 26/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.
 34+00 3+00E

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SILT (ML) - medium brown				V 40-50%				
		ICE				ICE				
4		SAND (SW) - medium brown, trace to some fine gravel								
6		SAND and GRAVEL (SW-GW) trace of silt, well graded	3	64	33	Nbn Vc trace				
8		- full recovery				Nbn				
10		- medium to coarse grained sand				Vc trace				
12						Vx Vc3-5%				
14		GRAVEL and SAND (GW-SW) -medium grey, trace of silt, well graded -2' recovery	2	42	56	Vc trace Nbn				
16		ICE				ICE				
18										
20										
22										
24										
26										
28										
30										
32										



ELEVATION: 330 (ft)
100.6 (m)

UTM: 7 640 740 (N)
521 090 (E)

DATE DRILLED: 27/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.

36+00 10+00W

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		ICE				ICE				
34										
36										
38										
40		ICE and SILT				ICE+				
42										
44										
46										
48										
50		SILT and SAND (ML-SM) - medium grey brown				V 40-50%				
52										
54		END OF HOLE								
56										
58										
60										
62										



ELEVATION: 330 (ft)
100.6 (m)
 UTM: 7 640 740 (N)
521 090 (E)

DATE DRILLED: 27/1/76
 SITE: Devil's Lake
 BASELINE: 326A

HOLE No.
 36+00 10+00W
 PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SW) - brown, some gravel and organics				Nbn				
4		SAND (SP-SM) - grey, fine grained, uniform				Nbn				
6										
8										
10		- silty, trace of gravel								
12										
14		SAND (SP) - grey, medium to fine grained, some silt, trace of gravel	15	81	4	Nbn				
16										
18		- well graded								
20										
22										
24										
26										
28		- fine, uniform, some silt, some gravel	11	79	10					
30										
32		END OF HOLE								



ELEVATION: 313 (ft)
95.4 (m)
 UTM: 7 641 700 (N)
521 375 (E)

DATE DRILLED: 26/1/76
 SITE: Devil's Lake
 BASELINE: 326A

HOLE No.

36+00 0+00

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SILT (ML) - grey, some clay with ice				Nbn V trace				
4										
6										
8										
10										
12		SILT and CLAY (TILL) (ML-CL) - trace of gravel								
14										
16										
18		END OF HOLE								
20										
22										
24										
26										
28										
30										
32										



ELEVATION: 259 (ft)
79.0 (m)

UTM: 7 642 755 (N)
521 525 (E)

DATE DRILLED: 29/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.

37+50 10+50E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		GRAVEL (GP) - sandy, trace of silt - well graded - return is segregated - gravel to 2" - 6" recovery	1	26	73	Nf				
4										
6										
8										
10										
12		Sloughing - END OF HOLE								
14										
16										
18										
20										
22										
24										
26										
28										
30										
32										



ELEVATION: 332 (ft)
101.2 (m)

UTM: 7 640 415 (N)
520 785 (E)

DATE DRILLED: 27/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.
38+00 14+00W

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND and GRAVEL (SW-GW) - brown, well graded, clean, oxidized to 2 feet - gravelly, trace of silt	4	71	25	Nf				
4										
6										
8										
10										
12										
14										
16										
18										
20										
22		ICE				ICE				
24										
26										
28										
30										
32										
		END OF HOLE								



ELEVATION: 337 (ft)
102.7 (m)

UTM: 7 640 605 (N)
520 845 (E)

DATE DRILLED: 27/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.
38+00 12+00W

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SP) - medium brown, gravelly, fine to medium grained				Nbn				
4		SAND (SW) - medium brown, gravelly, trace of silt, well graded				Nbn				
6						V trace				
8										
10			4	74	22					
12										
14										
16										
18		SAND and SILT (SM-ML) - medium grey brown, trace of gravel in sand horizons				interbed- ded with Ice				
20						V 50-60%				
22										
24										
26										
28										
30		ICE and SILT				ICE+				
32										
		END OF HOLE								



ELEVATION: 330 (ft)
100.6 (m)

UTM: 7 640 990 (N)
520 955 (E)

DATE DRILLED: 27/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

38+00 8+00W

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND and GRAVEL (SW-GW) - brown, medium to coarse, clean, well graded				Nbn				
4										
6										
8										
10										
12										
14										
16										
18										
20										
22		- interbedded silty sand				Nbn				
24										
26										
28										
30										
32										
26						V 5-10%				
28										
30		END OF HOLE								
32										



ELEVATION: 314 (ft)
95.7 (m)

UTM: 7 641 680 (N)
521 165 (E)

DATE DRILLED: 26/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

38+00 0+80W

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION-1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND and GRAVEL (SW-GW) - well graded, clean				Nbn				
4						Nbn				
6		- full recovery				Nbn		•		
8						Nbe			•	
10										
12		- 3.5' recovery								
14		- trace of silt	2	64	34	Vc 0-5% Vx 10-20%		•		
16		- full recovery								
18										
20		SAND (SP) - brown, medium to fine grained, thin beds of ice and coal				Vs 0-5% Nbn			•	
22										
24		SAND and GRAVEL (SW-GW) - well graded, few interbeds of sand with trace of coal and ice beds				Nbn			•	
26			76	24		Vs 0-5%				
28		- clean								
30		- full recovery								
32		END OF HOLE								



ELEVATION: 303 (ft)
92.4 (m)
UTM: 7 641 850 (N)
521 210 (E)

DATE DRILLED: 26/1/76
SITE: Devil's Lake
BASELINE: 326A

HOLE No.
38+00 1+00E
PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
		PEAT								
2		SAND and GRAVEL (SW-GW)				Nbn				
4		- medium brown, trace of silt, well graded				V trace				
6										
8										
10		- medium grey								
12										
14										
16			3	55	42					
18										
20						Nbn				
22										
24										
26		ICE				ICE				
28										
30										
32										
		END OF HOLE								



ELEVATION: 334 (ft)
101.8 (m)

UTM: 7 640 760 (N)
520 680 (E)

DATE DRILLED: 27/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

40+00 11+00W

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		PEAT								
4		SAND and GRAVEL (SW-GW) - trace of silt, well graded				Nbn V trace				
6										
8		- 3' recovery - trace of silt	2	65	33	Nbn Vc trace				
10										
12										
14		- 3.5' recovery				Nbn Vc, Vx trace				
16										
18		- 3' recovery								
20										
22		- gravel and sand trace of silt, gravel to 1½"	3	34	63	Nbn				
24		- 1' recovery								
26		ICE				ICE				
28										
30										
32										



ELEVATION: 336 (ft)
102.4 (m)

UTM: 7 640 950 (N)
520 735 (E)

DATE DRILLED: 27/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.
40+00 9+00W

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		ICE				ICE				
34										
36										
38										
40										
42										
44										
46										
48										
50										
52										
54		END OF HOLE								
56										
58										
60										
62										



ELEVATION: 336 (ft)
102.4 (m)

UTM: 7 640 950 (N)
520 735 (E)

DATE DRILLED: 27/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

40+00 9+00W

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %								
							10	20	30	40					
2		SILT (CL) - organic													
4		ICE, SILT and CLAY				ICE+									
6		SILT and CLAY (TILL) (ML-CL) - trace of gravel - trace of sand				Nbn									
8															
10															
12															
14															
16															
18															
20															
22															
24															
26															
28															
30															
32															
26							END OF HOLE								



ELEVATION: 253 (ft)
77.1 (m)
 UTM: 7 643 060 (N)
521 290 (E)

DATE DRILLED: 29/1/76
 SITE: Devil's Lake
 BASELINE: 326A

HOLE No.
 40+60 12+80E
 PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND and GRAVEL (SW-GW) - well graded, oxidized to 5 ft. - clean				Nf				
4										
6										
8										
10										
12										
14										
16										
18										
20										
22		Sloughing END OF HOLE								
24										
26										
28										
30										
32										



ELEVATION: 317 (ft)
96.6 (m)
 UTM: 7 640 910 (N)
520 515 (E)

DATE DRILLED: 27/1/76
 SITE: Devil's Lake
 BASELINE: 326A

HOLE No.
 42+00 10+00W
 PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND and GRAVEL (SW-GW) - clean				Nf				
4										
6		SAND (SW) - medium to coarse grained - well graded, clean				Nf				
8										
10										
12		- coarser material, trace gravel								
14		- some gravel, trace of silt	5	77	18					
16										
18		- medium grained - trace of gravel								
20										
22		- some gravel								
24		- interbedded sand and gravel				Nbn				
26										
28		SILT (ML) - grey, sandy, some to a trace of gravel, possible till				V 20-30%				
30										
32		END OF HOLE								



ELEVATION: 294 (ft)
89.6 (m)
UTM: 7 641 925 (N)
520 610 (E)

DATE DRILLED: 27/1/76
SITE: Devil's Lake
BASELINE: 326A

HOLE No.
44+00 0+00
PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SW) - gravelly, trace of silt to clean, oxidized to 3'				Nbn				
4										
6			2	72	26					
8										
10										
12										
14										
16										
18		- coarser with depth								
20						V 10-20%				
22		ICE				ICE				
24		SAND and GRAVEL (SW-GW) - some silt and clay chips								
26		SILT and CLAY (TILL) (ML-CL) - grey, sandy				V trace				
28										
30										
32		END OF HOLE								



ELEVATION: 304 (ft)
92.7 (m)

UTM: 7 642 120 (N)
520 665 (E)

DATE DRILLED: 27/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

44+00 2+00E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SW) - medium brown, fine to medium grained, gravelly				Nf				
4										
6		- 2' recovery	2	68	30					
8		- medium to coarse grained				Nbn Vc trace				
10		SAND and GRAVEL (SW-GW) - medium grey, well graded, clean								
12		- 1.5' recovery	1	61	38	Nbn				
14										
16		SILT (TILL) (ML-GM) - medium grey brown, sandy, some fine gravel				V 15-20%				
18										
20										
22		GRAVEL (GP) - sandy, fine grained								
24		SILT (TILL) (ML-GM) - sandy, trace of gravel				Nbe V 0-5%				
26										
28										
30										
32										
		END OF HOLE								



ELEVATION: 295 (ft)
89.9 (m)

UTM: 7 642 090 (N)
520 490 (E)

DATE DRILLED: 28/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

46+00 0+00

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SW) - medium brown, gravelly, trace of silt, well graded	4	77	29	Nbn	●			
4		- medium grey								
6		- some gravel	6	80	14		●			
8										
10		- interbeds of fine sand				Nbn, Nbe V 0-5%	●			
12										
14										
16						Nbn	●			
18										
20		SILT (TILL) (ML-GM) - medium grey brown, sandy, some gravel				V 15-20%				
22		ICE				ICE				
24		SILT (TILL) (ML-GM) - as above				V 15-20%				
26										
28										
30		ICE and SILT				ICE+				
32										
		END OF HOLE								



ELEVATION: 298 (ft)
90.9 (m)

UTM: 7 642 265 (N)
520 735 (E)

DATE DRILLED: 28/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

46+00 3+00E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		GRAVEL (GW) - medium brown, very sandy				Nbn V trace				
4										
6						Nbn				
8										
10										
12										
14		SAND (SP-SM) - fine, silty, some gravel								
16		SAND (SP) - medium brown, medium to coarse grained, trace to some gravel								
18		GRAVEL (GW) - medium grey, sandy				V trace Nbn				
20		ICE				ICE				
22		SILT (TILL) (ML-GM) - medium grey, sandy, trace of gravel, - some gravel				V 20-25%				
24										
26										
28						V 30-40%				
30		- gravelly								
32		END OF HOLE								



ELEVATION: 298 (ft)
87.8 (m)
UTM: 7 642 370 (N)
520 535 (E)

DATE DRILLED: 28/1/76
SITE: Devil's Lake
BASELINE: 326A

HOLE No.
48+00 2+00E
PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		GRAVEL (GW) - medium brown, sandy				Nbn				
4						Nf				
6		SAND (SW) - gravelly, trace of silt	3	69	28	Nf				
8		- 1' recovery								
10		- full recovery								
12		- medium brown								
14		- fine to medium grained								
16		- trace of coal				Nbn				
18		- horizons of gravel and coarse sand								
20		SAND and GRAVEL (SW-GW)								
22		- medium grey, trace of silt								
24		- 6" recovery	2	51	47	Vc, Vx 0-5%				
26										
28		SILT (TILL) (ML-GM) - medium grey brown, gravelly				V 30-40%				
30										
32		END OF HOLE								



ELEVATION: 295 (ft)
89.9 (m)

UTM: 7 642 330 (N)
520 315 (E)

DATE DRILLED: 28/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

49+00 0+00

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		GRAVEL and SAND (GW-SW) - clean to trace of silt, oxidized				Nf				
4										
6		SAND (SW) - well graded, trace of silt and gravel								
8		- some silt pockets around gravel (probable eroded till)	5	59	36	Vc 0-5%		●		
10		- full recovery				Nbn				
12		GRAVEL and SAND (GW-SW)				Nbn				
14										
16		- interbeds of silt	3	39	58	Vc 5-10%		●		
18									●	
20										
22		- no recovery - coarse, clean								
24										
26										
28		SAND (SP) - brown, trace of silt, medium to coarse grained, trace of gravel	4	94	2	V 10-20%			●	
30										
32		END OF HOLE								



ELEVATION: 314 (ft)
95.7 (m)

UTM: 7 642 395 (N)
519 900 (E)

DATE DRILLED: 28/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

52+00 3+00W

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND and GRAVEL (SW-GW) - trace of silt, medium to coarse sand				Nbn				
4										
6										
8										
10										
12										
14										
16			3	58	39					
18		- silty				V 10-20%				
20										
22		- clean								
24										
26										
28		END OF HOLE								
30										
32										



ELEVATION: 305 (ft)
93.0 (m)

UTM: 7 642 515 (N)
520 060 (E)

DATE DRILLED: 28/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.

52+00 1+00W

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SW) - some gravel, trace of silt, well graded, oxidized to 2'	6	74	20	Nbn				
4										
6										
8		SAND (SP-SM) - medium to fine grained, silty, some gravel - interbeds of sand and gravel - silt pockets - some gravel, trace of silt				Nbn				
10										
12										
14										
16										
18										
20										
22										
24										
26										
28			3	81	16	V 20-30%				
30										
32		END OF HOLE								



ELEVATION: 304 (ft)
92.7 (m)

UTM: 7 642 655 (N)
519 860 (E)

DATE DRILLED: 28/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.

54+00 2+00W

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND and GRAVEL (SW-GW) - silty, well graded				V 5-10%				
4		SAND (SW) - well graded, some gravel								
6										
8										
10		ICE				ICE				
12										
14										
16		ICE and SILT - some sand, trace of gravel				ICE+				
18										
20		ICE				ICE				
22										
24		ICE and SILT - some sand, trace of gravel				ICE+				
26										
28										
30										
32		END OF HOLE								



ELEVATION: 279 (ft)
85.1 (m)

UTM: 7 642 765 (N)
520 080 (E)

DATE DRILLED: 28/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.

54+00 0+50E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SW) - brown, medium to fine grained, oxidized near surface, some gravel - well graded, clean - gravelly, trace of silt				Nbn V 10-20%				
4										
6										
8		ICE	3	67	30	ICE				
10										
12										
14										
16		ICE and SILT - grey, some fine sand				ICE+				
18										
20		ICE				ICE				
22										
24										
26		ICE and SILT - trace of gravel				ICE+				
28										
30										
32										



ELEVATION: 281 (ft)
85.7 (m)

UTM: 7 642 785 (N)
519 680 (E)

DATE DRILLED: 28/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.

56+00 3+00W

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		ICE and SILT - trace of gravel				ICE+				
34										
36										
38		END OF HOLE								
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 281 (ft)
87.7 (m)

UTM: 7 642 785 (N)
519 680 (E)

DATE DRILLED: 28/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

56+00 3+00W

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %					
							10	20	30	40		
2		SAND (SW) - grey medium grained, oxidized to 3 feet, some gravel, clean				Nbn V 10-20%						
4												
6												
8												
10												
12												
14			SAND (SP) - grey, fine grained, some silt and gravel					Nbn				
16												
18			SAND (SW) - well graded, some gravel					V 10-20%				
20												
22												
24												
26												
28												
30		ICE - some silt, trace of gravel					ICE +					
32												



ELEVATION: 287 (ft) 87.5 (m)	DATE DRILLED: 28/1/76
UTM: 7 642 830 (N) 519 770 (E)	SITE: Devil's Lake
	BASELINE: 326 A

HOLE No.
56+00 2+00W
PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		ICE - some silt, trace of gravel				ICE+				
34										
36										
38		END OF HOLE								
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 287 (ft)
87.5 (m)

UTM: 7 642 830 (N)
519 770 (E)

DATE DRILLED: 28/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.
 56+00 2+00W

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SW) - medium to coarse grained clean, some gravel				Nbn Vc 5-10%				
4										
6		- full recovery								
8		- some silt horizons				Vr,Vs 20-30%				
10		- full recovery				Nbe				
12		- gravelly, trace of silt	3	71	26	Vx 10-20%				
14		SAND (SP) - brown, medium to fine grained, trace of gravel and silt pockets				Nbn				
16		- trace of coal								
18		SAND (SW) - gravelly, clean	1	74	25	Nbn Vc 0-5%				
20		- 3' recovery								
22		- oxidized beds of sand								
24		- poor recovery								
26		ICE- silty, sandy, grey				ICE+				
28										
30										
32		END OF HOLE								



ELEVATION: 291 (ft)
88.7 (m)

UTM: 7 642 875 (N)
519 855 (E)

DATE DRILLED: 28/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.

56+00 1+00W

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SW) - well graded, some gravel				V 10-20% Nbn				
4										
6										
8										
10		ICE				ICE				
12										
14										
16										
18		ICE and SILT - sandy, trace of gravel				ICE+				
20										
22										
24										
26										
28		SILT (ML)- grey, some fine sand				V 20-30%				
30										
32										



ELEVATION: 286 (ft)
87.2 (m)

UTM: 7 642 920 (N)
519 945 (E)

DATE DRILLED: 28/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.

56+00 0+00

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		SILT (ML) - grey, some fine sand				V 20-30%				
34										
36		END OF HOLE								
38										
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 286 (ft)
87.2 (m)

UTM: 7 642 920 (N)
519 945 (E)

DATE DRILLED: 28/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

56+00 0+00

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SW) - well graded, clean, some gravel				Nbn				
4										
6		- trace of silt	6	81	13					
8										
10										
12										
14										
16		- interbedded with fine uniform sand				Nbn				
18		- trace of silt								
20										
22		- coarser material								
24										
26						V 5-10%				
28										
30										
32		END OF HOLE								



ELEVATION: 272 (ft)
82.9 (m)

UTM: 7 643 055 (N)
519 765 (E)

DATE DRILLED: 28/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.
58+00 1+00W

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SW) - medium brown, well graded, trace of gravel - gravelly - full recovery				Nbn				
4										
6										
8		ICE				ICE				
10		ICE and SAND and GRAVEL				ICE+				
12										
14										
16		ICE				ICE				
18										
20										
22										
24										
26		SILT (TILL) (ML-GM) - medium grey, sandy, gravelly				V 30-40%				
28										
30										
32										
		END OF HOLE								



ELEVATION: 282 (ft)
86.0 (m)

UTM: 7 643 145 (N)
519 945 (E)

DATE DRILLED: 29/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.

58+00 1+00E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SILT and CLAY (TILL) (ML-CL) - trace gravel - interbed of massive ice				some beds of massive ICE				
4										
6										
8		ICE				ICE				
10										
12										
14		ICE and SILT				ICE+				
16										
18										
20		SAND (SP) - fine, trace of silt				Nbn V 20-30%				
22										
24										
26		END OF HOLE								
28										
30										
32										



ELEVATION: 264 (ft)
80.5 (m)

UTM: 7 643 780 (N)
520 965 (E)

DATE DRILLED: 29/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.
59+10 13+00E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
		PEAT								
2		SAND (SP) - medium grey, fine to medium grained trace of gravel, trace of silt				Nbn				
4										
6		SAND (SP) - medium to coarse, trace to some gravel								
8		SAND and SILT (SM-ML) fine grained, inter- bedded with coarse sand, trace of gravel and organics	34	65	1	Nbn Vc, Vr trace				
10										
12										
14		SAND and GRAVEL (SW-GW) - trace of silt								
16										
18		- 2' recovery								
20			1	64	35	Vx, Vc 0-5%				
22		GRAVEL (GW) - medium grey, sandy								
24		- poor recovery				Nbn				
26		SILT (TILL) (ML-GM) - medium grey, sandy, gravelly				V 5-10%				
28						V 40-50%				
30										
32										
END OF HOLE										



ELEVATION: 276 (ft)
84.1 (m)

UTM: 7 643 280 (N)
519 765 (E)

DATE DRILLED: 29/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.

60+00 0+00

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		PEAT and ORGANIC SILT				V 10-20%				
4		ICE and SAND and SILT				ICE+				
6										
8		ICE and SAND and GRAVEL								
10										
12										
14		GRAVEL (GW) - medium grey, sandy, clean				V 5-10%				
16										
18										
20						V 0-5%				
22										
24		SILT (TILL) (ML-GM) - medium grey brown, sandy, some gravel				V 15-25%				
26										
28		- gravelly				V 5-10%				
30										
32										
		END OF HOLE								



ELEVATION: 268 (ft)
81.7 (m)

UTM: 7 643 370 (N)
519 940 (E)

DATE DRILLED: 29/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.

60+00 2+00E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		PEAT								
2		SILT (ML) - medium brown, clayey				Nbn				
4		SAND (SM) - medium to dark grey, silty, fine grained - black organic laminations - trace of coarse sand and fine gravel layers				Nbn				
6										
8						V 30-40%				
10										
12		SILT (TILL) (ML-GM) - medium grey, sandy, trace of gravel								
14										
16						V 40-50%				
18		- some gravel								
18		END OF HOLE								
20										
22										
24										
26										
28										
30										
32										



ELEVATION: 263 (ft)
80.2 (m)

UTM: 7 643 545 (N)
519 405 (E)

DATE DRILLED: 29/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

64+00 2+00W

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		PEAT and ORGANIC SILT								
4		SAND (SW) - medium brown, well graded, trace to some gravel				Nbn				
6										
8						Nbn				
10		- some gravel, trace of silt	4	79	17					
12										
14		SAND (SP-SM) - medium to dark grey, silty, fine grained				Nbn				
16										
18										
20										
22										
24		- thin laminations of organics								
26										
28										
30		GRAVEL (GW) - medium grey, sandy								
32		ICE and SAND and GRAVEL				ICE+				
		END OF HOLE								



ELEVATION: 276 (ft)
84.1 (m)

UTM: 7 643 635 (N)
519 580 (E)

DATE DRILLED: 29/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.

64+00 0+00

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %								
							10	20	30	40					
2		SAND (SP-SM) - medium to dark brown, silty, trace of gravel	20	77	3	Nbe V trace									
4															
6															
8		ICE and SAND and GRAVEL				ICE+									
10															
12															
14															
16															
18															
20															
22															
24															
26															
28															
30															
32															
							SAND (SP) - clean, medium to coarse, trace of fine gravel				Nbn				
							END OF HOLE								



ELEVATION: 263 (ft)
80.2 (m)

UTM: 7 643 750 (N)
519 835 (E)

DATE DRILLED: 21/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.

64+00 2+80E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
		PEAT								
2		SAND (SP) - medium brown, fine to coarse, trace of gravel	15	77	8	Nbe V 0-5%				
4		- fine, uniform, some silt								
6		- full recovery								
8		- trace of gravel inter- beds				Nbn, Vc trace				
10		SAND (SP) - medium grey, gravelly, trace to some silt								
12		- black organic lamina- tions				Vc, Vr 0-5%				
14						Nbe, Nbn				
16		- silty fine sand, inter- bedded with silt								
18		- full recovery								
20						Vx, Vc 5-10%				
22										
24						V 10-15%				
26										
28		ICE and SAND and GRAVEL				ICE+				
30										
32										
		END OF HOLE								



ELEVATION: 276(ft)
84.1(m)

UTM: 7 643 735 (N)
519 740 (E)

DATE DRILLED: 21/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.

64+30 1+90E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SP) - medium brown, fine grained, uniform, trace of gravel				Nf, Nbn				
4		SAND (SP)- medium grey, fine to medium grained, trace of gravel				V 5-10%				
6										
8										
10										
12										
14						V 20-25%				
16										
18										
20		- interbeds of silt and fine sand				V 5-10%				
22										
24		- trace of organics								
26		- wood fragments				V 0-5%				
28										
30		ICE and SAND and SILT				ICE+				
32		END OF HOLE								



ELEVATION: 283 (ft)
86.3 (m)

UTM: 7 643 720 (N)
519 670 (E)

DATE DRILLED: 22/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.
64+40 1+10E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
		PEAT								
2		SILT (TILL) (ML-GM) - trace sand and gravel				V 60-70%				
4										
6										
8										
10						V 30-40%				
12										
14										
16										
18		- some coarse gravel								
20		ICE				ICE				
22										
24										
26										
28		END OF HOLE								
30										
32										



ELEVATION: 246 (ft)
75.0 (m)

UTM: 7 643 885 (N)
519 960 (E)

DATE DRILLED: 21/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.
64+60 4+50E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SW) - medium brown, some gravel, trace of silt	1	86	13	Nf				
4		SAND and GRAVEL (SW-GW)								
6		- medium grey, trace of silt, trace of coal								
8		- some interbeds of fine sand	2	66	32	Nbn				
10		- 4' recovery								
12		SAND (SP) - medium grey, some silt, trace of coal, clean, fine sand interbeds				Nbn				
14		- full recovery				Vx, Vc				
16		ICE and SILT				0-5%				
18		SAND (SP-SM) - medium grey brown, fine to medium grained, silty to some silt				Vx trace				
20		- trace of thin silt laminations								
22										
24										
26		- well graded								
28		- trace of gravel				V 0-5%				
30										
32		END OF HOLE								



ELEVATION: 280 (ft)
85.4 (m)

UTM: 7 643 765 (N)
519 400 (E)

DATE DRILLED: 29/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.
66+00 1+00W

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
		PEAT and ORGANIC SILT								
-2		SAND (SM) - medium brown, silty, fine grained				Nbn				
-4		SAND and GRAVEL (SW-GW) - medium grey, well graded				Nbn				
-6										
-8										
-10		- coarser sand								
-12		ICE and SAND and GRAVEL				ICE+				
-14										
-16		SAND (SW) - medium brown, trace of silt and gravel	8	84	8	V 10-20%				
-18										
-20										
-22		ICE and SAND and GRAVEL				ICE+				
-24		ICE and SILT								
-26		SILT (TILL) (ML-GM) - medium grey brown, sandy, trace of gravel				V 40-50%				
-28						V 50-60%				
-30						V 40-50%				
-32										
		END OF HOLE								



ELEVATION: 270 (ft)
82.3 (m)
UTM: 7 643 905 (N)
519 670 (E)

DATE DRILLED: 29/1/76
SITE: Devil's Lake
BASELINE: 326 A

HOLE No.

66+00 2+00E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (Sw) - medium brown, some gravel to gravelly, well graded				Nbn, Nf				
4										
6										
8										
10										
12										
14										
16										
18										
20										
22		- trace of gravel and silt	5	86	9	Nbn				
24										
26										
28										
30										
32										
		- medium to coarse sand				Nbn				



ELEVATION: 291 (ft)
88.7 (m)

UTM: 7 643 900 (N)
519 445 (E)

DATE DRILLED: 29/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.

67+00 0+00

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		SAND (SW) - some gravel to gravelly								
34						V 5-10%				
36		ICE				ICE				
38		SILT (TILL) (ML-GM) - medium grey brown, sandy, some gravel								
40										
42		END OF HOLE								
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 291 (ft)
88.7 (m)

UTM: 7 643 900 (N)
519 445 (E)

DATE DRILLED: 29/1/76

SITE: Devil's Lake

BASELINE: 326A

HOLE No.

67+00 0+00

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SM) - silty, organic				V 10-20%				
4		SAND (SW) - well graded, some gravel				Nbn				
6						V 0-5%				
8										
10		ICE - some sand and gravel				ICE+				
12										
14										
16										
18		ICE and SILT (TILL) - some sand and gravel								
20										
22										
24										
26										
28										
30										
32		END OF HOLE								



ELEVATION: 273 (ft)
83.2 (m)

UTM: 7 644 080 (N)
519 355 (E)

DATE DRILLED: 29/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.

69+00 0+00

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
		PEAT								
2		SAND (SP) - medium grey, fine grained, trace of silt				Nbn				
4		- some silt								
6		- trace of fine gravel	19	78	3	Nbe		●		
8		ICE				ICE				
10										
12										
14										
16		ICE and SAND				ICE+				
18										
20										
22		SAND (SW) - medium grey, well graded				V 50%				
24		ICE and SILT				ICE+				
26										
28		SILT (TILL) (ML-GM) - dark grey, some sand and gravel				V 50-60%				
30						V 30-40%				
32		END OF HOLE								



ELEVATION: 265 (ft)
80.8 (m)
UTM: 7 644 125 (N)
519 220 (E)

DATE DRILLED: 29/1/76
SITE: Devil's Lake
BASELINE: 326 A

HOLE No.
70+00 1+00W
PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SM) - brown, fine grained, silty organic								
4		SAND and GRAVEL (SW-GW) - well graded, clean				Nbn				
6		ICE				ICE				
8										
10		ICE and SILT - trace of gravel				ICE+				
12										
14										
16										
18										
20										
22										
24										
26										
28		END OF HOLE								
30										
32										



ELEVATION: 258 (ft)
78.7 (m)

UTM: 7 644 525 (N)
519 125 (E)

DATE DRILLED: 29 /1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.

74+00 0+00

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		PEAT and SILT - brown , organic								
4		SILT (TILL) (ML-GM) - grey, some clay, trace gravel				V 20-30%				
6										
8		SAND (SP-SM)- medium to coarse grained, silty, trace of gravel				Nbn V trace				
10		SILT and CLAY (ML-CL) - grey				V 20-30%				
12										
14										
16		ICE and SILT - grey				ICE+				
18										
20										
22										
24										
26										
28		END OF HOLE								
30										
32										



ELEVATION: 232 (ft)
70.7 (m)

UTM: 7 644 790 (N)
518 990 (E)

DATE DRILLED: 29/1/76

SITE: Devil's Lake

BASELINE: 326 A

HOLE No.

77+00 0+00

PAGE 1 OF 1

Lucas Point , Source 303 A

Borehole Logs

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		GRAVEL (GW) - medium brown, sandy, clean				Nf				
4						Nbn				
6		SAND (SP) - medium brown, gravelly, trace of silt, gap graded				Nbn				
8		- 2' recovery	2	75	23	Vc 0-5%				
10										
12		ICE and SILT				ICE+				
14		- no recovery								
16										
18										
20										
22										
24										
26										
28										
30		SILT (ML) - medium grey brown				V 50-60%				
32										
		END OF HOLE								



ELEVATION: 185 (ft)
56.4 (m)

UTM: 7 660 580 (N)
517 400 (E)

DATE DRILLED: 30/1/76

SITE: Lucas Point

BASELINE: 303A

HOLE No.

A0+00 0+00

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		PEAT - dark brown				V 40-50%				
4		GRAVEL (GW) - medium brown, sandy, clean				Nbn Vc trace				
6		SAND and GRAVEL (SW-GW) - well graded, trace of coal and silt				Nbn				
8		- 1' recovery, very coarse, some silt	1	50	49	Vc, Vx 0-5%				
10										
12										
14		- no recovery bit blocked 3" rock								
16		ICE and SAND - silty				ICE+				
18										
20										
22		ICE and SILT - some sand								
24										
26										
28										
30										
32										



ELEVATION: 186 (ft)
56.7 (m)
UTM: 7 660 540 (N)
517 620 (E)

DATE DRILLED: 30/1/76
SITE: Lucas Point
BASELINE: 303A

HOLE No.
A2+00 1+00S
PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		ICE and SILT				ICE+				
34										
36		END OF HOLE								
38										
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 185 (ft)
56.7 (m)

UTM: 7 660 540 (N)
517 620 (E)

DATE DRILLED: 30/1/76

SITE: Lucas Point

BASELINE: 303A

HOLE No.

A2+00 1+00S

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SW) - grey, well graded, some silt, trace of gravel - clean - coarse material indicated (drill returns are fine grained due to grinding)				Nbn				
4										
6										
8										
10										
12										
14										
16										
18										
20										
22										
24		ICE				ICE				
26										
28										
30		ICE and SILT (TILL)				ICE+				
32										



ELEVATION: 198 (ft)
60.3 (m)

UTM: 7 660 640 (N)
517 595 (E)

DATE DRILLED: 30/1/76

SITE: Lucas Point

BASELINE: 3Q3A

HOLE No.
A2+00 0+00

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		ICE and SILT (TILL)				ICE+				
34										
36										
38		END OF HOLE								
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 198 (ft)
60.3 (m)

UTM: 7 660 640 (N)
517 595 (E)

DATE DRILLED: 30/1/76

SITE: Lucas Point

BASELINE: 303A

HOLE No.

A2+00 0+00

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SW) - well graded, clean, trace gravel				Nbn				
4		SAND and GRAVEL (SW-GW) - trace of silt	3	60	37					
6										
8						Nbn				
10		- well graded, clean								
12										
14						V 0-5%				
16										
18		- coarse material indicated								
20										
22		ICE				ICE				
24										
26										
28		ICE and SILT (TILL)				ICE+				
30										
32										



ELEVATION: 192 (ft)
58.5 (m)

UTM: 7 660 735 (N)
517 565 (E)

DATE DRILLED: 30/1/76

SITE: Lucas Point

BASELINE: 303A

HOLE No.

A2+00 1+00N

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		ICE and SILT (TILL)				ICE+				
34										
36										
38		END OF HOLE								
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 192 (ft)
58.5 (m)

UTM: 7 660 735 (N)
517 565 (E)

DATE DRILLED: 30/1/76

SITE: Lucas Point

BASELINE: 303A

HOLE No.

A2+00 1+00N

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND and GRAVEL (SW-GW) - clean, oxidized to 2 feet, well graded				Nbn				
4										
6		- coarse horizon of gravel				V 0-5%				
8										
10		SAND (SW) - clean, medium to coarse grained, gravelly, trace of silt	5	67	28					
12										
14		ICE				ICE				
16										
18										
20										
22		ICE and SILT (TILL) - trace of gravel				ICE+				
24										
26										
28		- large gravel sizes								
30										
32										



ELEVATION: 192 (ft)
58.5 (m)

UTM: 7 660 600 (N)
517 815 (E)

DATE DRILLED: 30/1/76

SITE: Lucas Point

BASELINE: 303A

HOLE No.
A4+00 1+00S

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		ICE and SILT (TILL)				ICE+				
34										
36										
38		END OF HOLE								
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 192 (ft)
58.5 (m)

UTM: 7 660 600 (N)
517 815 (E)

DATE DRILLED: 30/1/76

SITE: Lucas Point

BASELINE: 303A

HOLE No.
A4+00 1+00S

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND and GRAVEL (SW-GW) - silty, oxidized to 3 feet				Nbn				
4										
6		ICE - trace of silty sand				ICE+				
8										
10										
12										
14										
16										
18										
20										
22										
24										
26										
28										
30										
32										



ELEVATION: 194 (ft)
59.1 (m)

UTM: 7 660 675 (N)
517 785 (E)

DATE DRILLED: 30/1/76

SITE: Lucas Point

BASELINE: 303A

HOLE No.

A4+00 0+00

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		ICE - trace of silty sand				ICE+				
34		ICE and SILT (TILL)								
36										
38		END OF HOLE								
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 194 (ft)
59.1 (m)

UTM: 7 660 675 (N)
517 785 (E)

DATE DRILLED: 30/1/76

SITE: Lucas Point

BASELINE: 303A

HOLE No.
A4+00 0+00

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %				
							10	20	30	40	
2		SAND and SILT (SM-ML)				Nf					
4		GRAVEL and SAND (GW-SW) - coarse grained									
6											
8											
10		ICE and SILT (TILL)				ICE+					
12											
14											
16											
18											
20											
22											
24											
26											
28											
30		END OF HOLE									
32											



ELEVATION: 171 (ft)
52.1 (m)

UTM: 7 660 655 (N)
518 005 (E)

DATE DRILLED: 30/1/76

SITE: Lucas Point

BASELINE: 303A

HOLE No.

A6+00 1+00S

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND and GRAVEL (SW-GW) - well graded, clean				Nf				
4		- coarse return								
6										
8		Sloughing END OF HOLE								
10										
12										
14										
16										
18										
20										
22										
24										
26										
28										
30										
32										



ELEVATION: 188 (ft)
57.3 (m)

UTM: 7 660 750 (N)
517 975 (E)

DATE DRILLED: 30/1/76

SITE: Lucas Point

BASELINE: 303A

HOLE No.

A6+00 0+00

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SW) - some gravel, oxidized				Nf				
4		Sloughing END OF HOLE								
6										
8										
10										
12										
14										
16										
18										
20										
22										
24										
26										
28										
30										
32										



ELEVATION: 177 (ft)
53.9 (m)

UTM: 7 660 795 (N)
518 120 (E)

DATE DRILLED: 30/1/76

SITE: Lucas Point

BASELINE: 303A

HOLE No.

A7+50 0+00

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SILT (ORGANIC) and PEAT								
4		SAND and GRAVEL (SW-GW) - coarse, clean, well graded				V 10-20%				
6										
8										
10		- coarse gravel								
12		SILT (TILL) - trace gravel								
14										
16		ICE and SILT (TILL)				ICE+				
18										
20										
22										
24										
26										
28		END OF HOLE								
30										
32										



ELEVATION: 166 (ft)
50.6 (m)

UTM: 7 660 810 (N)
518 170 (E)

DATE DRILLED: 30/1/76

SITE: Lucas Point

BASELINE: 303A

HOLE No.

A8+00 0+00

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
0		PEAT - brown, silty, some sand								
2		SAND and GRAVEL (SW-GW) - well graded, clean				Nbn				
4										
6										
8		SILT (TILL) (ML-GM) - grey, trace of gravel				ICE+				
10										
12										
14		ICE - trace of silt (TILL)								
16										
18										
20										
22										
24										
26		SILT (TILL) (ML) - some massive ice inter- beds								
28										
30		END OF HOLE								
32										



ELEVATION: 167 (ft)
50.9 (m)

UTM: 7 660 905 (N)
518 140 (E)

DATE DRILLED: 30/1/76

SITE: Lucas Point

BASELINE: 303A

HOLE No.

A8+00 1+00 N

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SW) - well graded, clean, top 2 feet oxidized, some gravel								
4		- coarser grained								
6		- some gravel, trace of silt, fine to medium grained, uniform	6	84	10	Nf				
8										
10		SILT (TILL) (ML-GM) - trace of gravel								
12		ICE - trace of silt (TILL)				ICE+				
14										
16										
18										
20		SILT (TILL) (ML-GM) - trace of sand and gravel				Nbn V 20-30%				
22										
24										
26										
28		END OF HOLE								
30										
32										



ELEVATION: 172 (ft)
52.4 (m)

UTM: 7 660 865 (N)
518 360 (E)

DATE DRILLED: 30/1/76

SITE: Lucas Point

BASELINE: 303A

HOLE No.

A10+00 0+00

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		ORGANIC SILT (CL)								
4		ICE				ICE				
6										
8		END OF HOLE								
10										
12										
14										
16										
18										
20										
22										
24										
26										
28										
30										
32										



ELEVATION: 148 (ft)
45.1 (m)

UTM: 7 660 925 (N)
518 550 (E)

DATE DRILLED: 30/1/76

SITE: Lucas Point

BASELINE: 303A

HOLE No.
A12+00 0+00

PAGE 1 OF 1

Lucas Point , Source 303B

Borehole Logs

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
		PEAT								
2		SAND (SM) - medium brown, silty, fine grained				Nbn				
4		ICE and SILT				ICE+				
6		SILT (ML) - medium grey brown, sandy, trace of fine gravel				V 20-25%				
8		SAND and SILT (SM-ML) - medium grey brown, trace of gravel, sand is fine uniform	41	58	1	Nbn, Nbe		●		
10										
12										
14		- trace of coal				Nbn		●		
16										
18										
20		- trace of gravel								
22										
24										
26		- silty, fine grained				Nbn		●		
28										
30		- trace to some gravel								
32										
		END OF HOLE								



ELEVATION: 151.5 (ft)
46.2 (m)
UTM: 7 662 010 (N)
517 230 (E)

DATE DRILLED: 31/1/76
SITE: Lucas Point
BASELINE: 303B

HOLE No.
B0+00 0+00
PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION-1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SW) - medium brown, gravelly, trace of silt				Nf, Nbn V 0-5%	●			
4		GRAVEL (GW) - some sand to sandy, trace to some silt								
6										
8										
10										
12							●			
14						V trace				
16		- very coarse grained								
18										
20		SAND (SW) - gravelly, trace of silt, sand is medium to coarse grained	3	70	27	V 0-5% Nbn	●			
22										
24										
26						V trace				
28										
30						V 0-5%	●			
32										



ELEVATION: 147 (ft)
44.8 (m)

UTM: 7 661 965 (N)
517 390 (E)

DATE DRILLED: 31/1/76

SITE: Lucas Point

BASELINE: 303B

HOLE No.

B1+68 0+00

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		SAND (SW) - gravelly, trace of silt				V 0-5%				
34										
36										
38										
40										
42		END OF HOLE								
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: <u>147</u> (ft) <u>44.8</u> (m)	DATE DRILLED: 31/1/76
UTM: <u>7 661 965</u> (N) <u>517 390</u> (E)	SITE: Lucas Point
	BASELINE: 303B

HOLE No.
B1+68 0+00
PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND and GRAVEL (SP-GW) - trace of silt, medium brown	3	59	38	Nf, Nbn				
4		Sloughing END OF HOLE								
6										
8										
10										
12										
14										
16										
18										
20										
22										
24										
26										
28										
30										
32										



ELEVATION: 142 (ft)
43.3 (m)

UTM: 7 661 805 (N)
517 585 (E)

DATE DRILLED: 31/1/76

SITE: Lucas Point

BASELINE: 303B

HOLE No.

B4+00 1+00S

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		GRAVEL (GW) - medium brown, some sand to sandy				Nf				
4						V trace				
6		SAND (SW) - gravelly, trace of silt, sand is medium to coarse grained								
8		- trace of silt								
10		- 1' recovery	2	75	23	Vx, Vc 0-5%				
12		- cobble								
14		- no recovery								
16						V 5-10%				
18		SILT (TILL) (ML-GM) - medium grey brown, some gravel, sandy				V 15-20%				
20										
22										
24										
26						Nbn				
28										
30										
32										
END OF HOLE										



ELEVATION: 140 (ft)
42.7 (m)
UTM: 7 661 900 (N)
517 615 (E)

DATE DRILLED: 31/1/76
SITE: Lucas Point
BASELINE: 303B

HOLE No.
B4+00 0+00
PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
		PEAT and ORGANIC SILT				V trace				
2		GRAVEL (GW) - medium grey brown, sandy				Nbn, V trace				
4		SAND (SP) - medium grey brown, fine grained, uniform, some silt				Nbn				
6										
8		GRAVEL (GW) - medium grey brown, sandy				V 20-25%				
10		ICE and SAND and GRAVEL				ICE+				
12										
14		GRAVEL (GW) - medium grey, sandy				V 10-15%				
16										
18										
20		- very coarse				Nbn V trace				
22										
24										
26		- some silt - thin interbeds of fine sand				V 5-10%				
28										
30		SAND (SM) - silty, some fine gravel, possible till				V 10-15%				
32										
		END OF HOLE								



ELEVATION: 142 (ft)
43.3 (m)
UTM: 7 661 995 (N)
517 645 (E)

DATE DRILLED: 31/1/76
SITE: Lucas Point
BASELINE: 303B

HOLE No.
B4+00 1+00 N
PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		GRAVEL (GW) - medium brown, sandy, clean				Nf				
4		SAND (SP) - medium grey brown, fine grained, trace of gravel, some silt				Nbn				
6										
8										
10										
12										
14										
16										
18										
20										
22										
24		SAND (SW) - medium to coarse grained, medium grey brown, some silt, trace of gravel	12	73	5	Nbn V trace				
26										
28										
30										
32		END OF HOLE								



ELEVATION: 143 (ft)
43.6 (m)
 UTM: 7 662 095 (N)
517 670 (E)

DATE DRILLED: 31/1/76
 SITE: Lucas Point
 BASELINE: 303B

HOLE No.
 B4+00 2+00N
 PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SP) - medium grained, oxidized organic								
4		SILT and SAND and ICE				ICE+				
6		SAND (SP) - fine to medium grained, medium brown grey - clean, uniform				Nbn				
8										
10										
12		SILT (TILL) and ICE				ICE+				
14		SAND (SW) - medium to coarse grained, some fine gravel, trace of silt	8	73	19	V 10-20%				
16										
18										
20										
22										
24		SILT (ML)								
26		SAND and GRAVEL (SW-GW) - medium to coarse grained silty				V 20-30%				
28										
30										
32		SILT (TILL) (ML-GM) - some sand and gravel				V 25-30%				



ELEVATION: 128 (ft)
39.0 (m)
UTM: 7 661 845 (N)
517 805 (E)

DATE DRILLED: 31/1/76
SITE: Lucas Point
BASELINE: 303B

HOLE No.
B6+00 0+00
PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		SAND and GRAVEL (SW-GW)								
34		SILT (TILL) (ML-GM) - some sand and gravel				V 25-35%				
36		END OF HOLE								
38										
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 128 (ft)
39.0 (m)

UTM: 7 661 845 (N)
517 805 (E)

DATE DRILLED: 31/1/76

SITE: Lucas Point

BASELINE: 303B

HOLE No.
B6+00 0+00

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
0		PEAT and ORGANIC SAND								
2		SILT (ML) - grey brown, sandy, some massive ice				ICE beds				
4										
6		SAND (SW) - grey brown, clean, gravelly, some silt				Nbn V 5-10%				
8										
10		- 2' recovery	12	60	28					
12		ICE				ICE				
14										
16		SAND (SW) - medium to coarse, well graded, trace of fine gravel				V 40-50%				
18										
20		- silty				V 10-20%				
22										
24		SILT (TILL) (ML-GM) - sandy, gravelly, well graded				Vx Vc 10-20%				
26										
28		- full recovery								
30		END OF HOLE								
32										



ELEVATION: 122 (ft)
37.2 (m)
UTM: 7 661 790 (N)
518 000 (E)

DATE DRILLED: 31/1/76
SITE: Lucas Point
BASELINE: 303B

HOLE No.
B8+00 0+00
PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SM) - brown, oxidized to 2 ft., fine grained silty - some silt				Nbn				
4										
6										
8										
10										
12		SAND (SP) - medium to fine grained, clean, trace of silt and gravel - medium to coarse - interbeds of sand and gravel	7	92	1	V 10-20%				
14										
16										
18										
20										
22										
24										
26										
28										
30										
32			4	89	7					



ELEVATION: 123 (ft)
37.5 (m)
UTM: 7 661 830 (N)
518 220 (E)

DATE DRILLED: 31/1/76
SITE: Lucas Point
BASELINE: 303B

HOLE No.
B10+00 1+00N
PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		SAND (SP) - interbeds of gravel								
34										
36										
38		END OF HOLE								
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 123 (ft)
37.5 (m)

UTM: 7 661 830 (N)
518 220 (E)

DATE DRILLED: 31/1/76

SITE: Lucas Point

BASELINE: 303B

HOLE No.
 B10+00 1+00N

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION-1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
0-2		PEAT and ORGANIC SILT				ICE+				
2-4		ICE and SILT								
4-14		SILT (ML) - medium brown, some clay - clayey				V 50-60% V 30-40% V trace Nbn Nbn				
14-24		SAND (SW) - medium grey, well graded, some silt and fine gravel, some coal - some gravel, trace of silt	7	81	12	V 0-2% Nbn	•			
24-28		GRAVEL (GW) - medium grey, sandy, trace of coal, clean				Nbn V trace	•			
28-32		SAND (SP) - fine to medium grained, trace of fine gravel				Nbn				



ELEVATION: 125 (ft)
38.1 (m)
UTM: 7 661 705 (N)
518 285 (E)

DATE DRILLED: 1/2/76

SITE: Lucas Point

BASELINE: 303B

HOLE No.

B11+00 0+00

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		SAND (SP) - fine to medium grained, trace of gravel				Nbn V 0-5%				
34		SAND (SM) - silty, fine grained								
36		SAND (SP) - medium grey, gravelly, some silt, trace of clay, possible till								
38		END OF HOLE								
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 125 (ft)
38.1 (m)

UTM: 7 661 705 (N)
518 285 (E)

DATE DRILLED: 1/2/76

SITE: Lucas Point

BASELINE: 303B

HOLE No.

B11+00 0+00

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		PEAT and ORGANIC SILT - dark brown				V 40-50%				
4		GRAVEL and SAND (GW-SM) - medium brown, trace of silt				Nbn				
6		- very coarse, clean				V 0-5%				
8										
10		- trace of silt	6	40	54	V 10-20%	●			
12						Nbn				
14										
16										
18		COAL								
20		GRAVEL and SAND (GW-SW) - trace of silt				V 0-5%				
22										
24										
26		- trace of silt				Nbn V trace				
28										
30		SAND (SW) - medium grey, trace of gravel, trace to some silt				Nbe, Nbn				
32						Nbn				



ELEVATION: 120 (ft)
36.6 (m)

UTM: 7 661 580 (N)
518 355 (E)

DATE DRILLED: 1/2/76

SITE: Lucas Point

BASELINE: 303B

HOLE No.

B12+00 1+00S

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		SAND (SW) - medium grey, trace of gravel, trace to some silt				Nbn				
34										
36										
38										
40		- trace of silt	8	85	5	V 0-5%				
42										
44		END OF HOLE								
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 120 (ft)
36.6 (m)

UTM: 7 661 580 (N)
518 355 (E)

DATE DRILLED: 1/2/76

SITE: Lucas Point

BASELINE: 303B

HOLE No.

B12+00 1+00S

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		GRAVEL (GW) - coarse, some sand, oxidized				Nf Nbn				
4		SAND and GRAVEL (SW-GW) - well graded								
6		- very loose								
8		Sloughing END OF HOLE								
10										
12										
14										
16										
18										
20										
22										
24										
26										
28										
30										
32										



ELEVATION: 122 (ft)
37.2 (m)

UTM: 7 661 680 (N)
518 385 (E)

DATE DRILLED: 31/1/76

SITE: Lucas Point

BASELINE: 303B

HOLE No.
B12+00 0+00

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND and GRAVEL (SW-GW) - organic near surface, some silt				Nf				
4		SILT (TILL) (ML-GM) - brown, sandy, some fine gravel				Nbn				
6										
8										
10										
12										
14		SAND (SP) - medium to fine grained, uniform, clean, trace of gravel				Nbn				
16						beds of massive ice				
18		- interbeds of massive ice								
20										
22		SILT and GRAVEL (TILL) (ML-GM) - sandy								
24										
26										
28										
30		END OF HOLE								
32										



ELEVATION: 122 (ft)
37.2 (m)
UTM: 7 661 870 (N)
518 440 (E)

DATE DRILLED: 31/1/76
SITE: Lucas Point
BASELINE: 303B

HOLE No.
B12+00 2+00N
PAGE 1 OF 1

Lucas Point , Source 303 C

Borehole Logs

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
		PEAT - dark brown				V 40-50%				
2		SILT (ML) - medium grey				V 50-60%				
4		SAND and GRAVEL (SW-GW) - medium grey, sandy, coarse grained								
6		- trace to some silt				V 0-5%				
8										
10			7	48	45	V 0-5%				
12										
14										
16										
18						V trace				
20		SAND (SM) - medium olive brown, fine grained, silty				V trace				
22						Nbn				
24										
26										
28										
30		- some silt								
32		SILT (ML) - medium grey brown, sandy				Nbn				
		END OF HOLE								



ELEVATION: 128 (ft)
39.0 (m)

UTM: 7 662 860 (N)
518 045 (E)

DATE DRILLED: 2/2/76

SITE: Lucas Point

BASELINE: 303C

HOLE No.

C0+90 1+10S

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		PEAT - dark brown ICE and SILT				V 30-40% ICE+				
4		SAND (SM) - medium olive brown, silty, fine grained, uniform				Nbe, Nbn				
6		GRAVEL (GW) - medium grey brown, sandy - poor recovery - no fines in sample								
8										
10		SAND (SM) - medium grey, silty trace to some gravel				V 5-10%				
12										
14		SAND (SP) - some silt, fine grained, uniform				Nbn				
16										
18		SAND (SW) - medium grey, fine grained, trace of fine gravel				V 0-5%				
20										
22										
24		- gravelly, clean	4	70	26					
26										
28										
30										
32										
		END OF HOLE								



ELEVATION: 132 (ft)
40.2 (m)
UTM: 7 662 820 (N)
518 220 (E)

DATE DRILLED: 2/2/76
SITE: Lucas Point
BASELINE: 303C

HOLE No.
C2+65 1+50S
PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
		PEAT								
2		SILT (TILL) (ML-GM) - medium grey, sandy, some gravel				V 20-25%				
4		- gravelly								
6										
8		SAND (SM) - medium olive brown, silty, fine grained, uniform				Nbn				
10						Nbe, Nbn				
12										
14		- some silt								
16		- medium grey								
18										
20		- fine grained, uniform, trace of silt and gravel	7	89	4					
22										
24		- silty								
26						Nbn				
28										
30										
32		END OF HOLE								



ELEVATION: 149 (ft)
45.4 (m)

UTM: 7 662 970 (N)
518 360 (E)

DATE DRILLED: 2/2/76

SITE: Lucas Point

BASELINE: 303C

HOLE No.

C4+00 0+00

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND and GRAVEL (SW-GW) - medium brown, trace of silt, well graded				Nf, Nbn				
4										
6						V trace				
8										
10			2	66	32	V 0-5%				
12										
14		- trace to some silt				V 0-5%				
16						V 20-25%				
18		SAND (SM) - medium grey brown, silty, fine grained				Nbn				
20										
22		- very silty								
24										
26										
28										
30						Nbn, Nbe				
32										
END OF HOLE										



ELEVATION: 173 (ft)
52.7 (m)

UTM: 7 662 865 (N)
518 560 (E)

DATE DRILLED: 2/2/76

SITE: Lucas Point

BASELINE: 303C

HOLE No.

C6+00 1+00S

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
0		PEAT								
2		GRAVEL (GW) - medium to dark brown, sandy, some silt to silty				V 10-15% Nbe				
4										
6										
8		- poor core recovery - no fines	1	7	93					
10										
12										
14		SILT and CLAY (TILL) (ML-CL) - medium grey, trace of gravel				V 0-5%				
16		- gravelly								
18										
20		ICE and SILT (TILL)				ICE+				
22										
24										
26										
28		END OF HOLE								
30										
32										



ELEVATION: 174 (ft)
53.0 (m)

UTM: 7 663 065 (N)
518 565 (E)

DATE DRILLED: 2/2/76

SITE: Lucas Point

BASELINE: 303C

HOLE No.
C6+00 1+00N

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		PEAT								
2		GRAVEL (GW) - medium brown, coarse grained, sandy, trace of silt	7	22	71	Nf				
4		Sloughing END OF HOLE								
6										
8										
10										
12										
14										
16										
18										
20										
22										
24										
26										
28										
30										
32										



ELEVATION: 173 (ft)
52.7 (m)
 UTM: 7 663 165 (N)
518 565 (E)

DATE DRILLED: 2/2/76
 SITE: Lucas Point
 BASELINE: 303C

HOLE No.
C6+00 2+00N
 PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
0		PEAT and ORGANIC SILT								
2		SAND and ICE - silty				ICE+				
4										
6		SAND and GRAVEL (SW-GW) - coarse grained, clean - no recovery				Nf, Nbn				
8										
10		- silty								
12		- sand, gravelly, some silt	12	67	21					
14		SILT (TILL) (ML-GM) - grey some sand and gravel								
16										
18										
20										
22										
24										
26		ICE				ICE				
28										
30		END OF HOLE								
32										



ELEVATION: 187 (ft)
57.0 (m)
 UTM: 7 662 960 (N)
518 760 (E)

DATE DRILLED: 1/2/76
 SITE: Lucas Point
 BASELINE: 303C

HOLE No.

C8+00 0+00

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND and GRAVEL (SW-GW) - oxidized to 3 ft., coarse grained				Nf, Nbn				
4										
6		- well graded, clean				V 5-10%				
8										
10										
12										
14										
16		SAND (SP) - bronze to olive, very fine grained, trace of silt				Nbn				
18										
20										
22										
24										
26										
28										
30										
32		END OF HOLE								



ELEVATION: 199 (ft)
60.7 (m)

UTM: 7 663 160 (N)
518 765 (E)

DATE DRILLED: 1/2/76

SITE: Lucas Point

BASELINE: 303C

HOLE No.

C8+00 2+00N

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		ORGANICS - dark brown, silty, sandy								
4		SILT (ML) - grey, sandy, trace of gravel				V 42-50%				
6		SAND (SW) - gravelly, some silt, well graded	11	61	28	Nbn V 5-10%				
8										
10		ICE				ICE				
12										
14										
16										
18										
20										
22										
24		SAND (SP) - olive brown, fine grained, uniform, trace of silt				Nbn				
26										
28										
30										
32										



ELEVATION: 194 (ft)
59.1 (m)

UTM: 7 663 360 (N)
518 770 (E)

DATE DRILLED: 1/2/76

SITE: Lucas Point

BASELINE: 303C

HOLE No.

C8+00 4+00N

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		SAND (SP) - olive brown, fine grained, uniform, trace of silt				Nbn				
34										
36										
38		END OF HOLE								
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 194 (ft)
59.1 (m)
 UTM: 7 663 360 (N)
518 770 (E)

DATE DRILLED: 1/2/76
 SITE: Lucas Point
 BASELINE: 303C

HOLE No.
 C8+00 4+00N
 PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SM) - organic, silty								
4		SAND (SW) - gravelly, trace of silt								
6			7	71	22	Nf, Nbn				
8										
10		SILT (TILL) (ML-GM) - grey, some sand and gravel				Nbn				
12										
14										
16		- gravelly								
18		END OF HOLE								
20										
22										
24										
26										
28										
30										
32										



ELEVATION: 192 (ft)
58.5 (m)

UTM: 7 662 855 (N)
518 960 (E)

DATE DRILLED: 1/2/76

SITE: Lucas Point

BASELINE: 303C

HOLE No.

C10+00 1+00S

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		PEAT								
4		SILT and SAND (ML-SM) - organic								
6		SAND (SP) - brown, fine grained, clean				Nbn				
8		ICE and SAND				ICE+				
10		SAND and GRAVEL (SW-GW) - some silt, well graded	12	58	30	Nbn	●			
12		ICE				ICE				
14		SAND and GRAVEL (SW-GW) - clean, well graded				Nbn	●			
16										
18										
20		- coarse grained								
22										
24										
26										
28										
30										
32		END OF HOLE								



ELEVATION: 187 (ft)
57.0 (m)

UTM: 7 633 055 (N)
518 965 (E)

DATE DRILLED: 1/2/76

SITE: Lucas Point

BASELINE: 303C

HOLE No.
C10+00 1+00N

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
—2		SILT (CL) - sandy, organic								
		ICE				ICE				
—4		SAND-GRAVEL (SW-GW) - trace of silt	9	52	39	Nf	•			
—6		SAND (SP) - medium to fine grained, uniform				Nbn Vc 0-5%	•			
—8										
—10		GRAVEL and SAND (GW-SW) - well graded, clean - 4' recovery				Nbn				
—12										
—14		SAND (SP) - fine uniform, clean, - 4' recovery							•	
—16		SAND (SP) - some gravel, clean gap-graded				Nbn Vc 0-5%				
—18			80	20						
—20		- 4' recovery					•			
—22										
—24										
—26		- 4' recovery				Vc 0-5%				
—28		- silty				V 5-10%				
—30										
—32										



ELEVATION: 205 (ft)
62.5 (m)

UTM: 7 663 255 (N)
518 970 (E)

DATE DRILLED: 1/2/76

SITE: Lucas Point

BASELINE: 303C

HOLE No.

C10+00 3+00N

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		SAND (SP) - some gravel				V 5-10%				
34										
36										
38		END OF HOLE								
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 205 (ft)
62.5 (m)

UTM: 7 663 255 (N)
518 970 (E)

DATE DRILLED: 1/2/76

SITE: Lucas Point

BASELINE: 303C

HOLE No.

C10+00 3+00N

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SW) - well graded, some gravel								
4		SAND and SILT and GRAVEL (TILL) (SM-GM) - well graded								
6		SAND (SW) - gravelly, some silt				Nbn				
8		- clean, well graded								
10		- some silt	14	58	28					
12		- coarse gravel				Nf				
14										
16		SAND (SW) - coarse grained, clean, some fine gravel								
18										
20		- very coarse gravel								
22		SAND (TILL) (SM-GM) - medium to fine grained, very silty, some fine gravel				Nbn V 20-30%				
24										
26										
28		END OF HOLE								
30										
32										



ELEVATION: 201 (ft)
61.3 (m)
 UTM: 7 663 450 (N)
518 975 (E)

DATE DRILLED: 1/2/76
 SITE: Lucas Point
 BASELINE: 303C

HOLE No.
 C10+00 5+00N
 PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		PEAT								
4		GRAVEL (GW) - medium brown, sandy, some silt				V trace Nbn				
6										
8										
10						V 0-5%	●			
12										
14		- very sandy				Nbn	●			
16										
18		- very coarse								
20							●			
22		SILT (TILL) (ML-SM) - medium grey brown, sandy				V 5-10%				
24						Nbe				
26										
28		ICE and SILT				ICE+				
30										
32										
		END OF HOLE								



ELEVATION: 179 (ft)
54.6 (m)

UTM: 7 663 600 (N)
518 980 (E)

DATE DRILLED: 1/2/76

SITE: Lucas Point

BASELINE: 303C

HOLE No.

C10+00 6+50N

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SILT and CLAY (ML-CL) - medium brown				Nbn				
4		GRAVEL (GW) - medium brown, sandy, trace of silt				Nbn				
6										
8		- coarse grained gravel								
10		- very sandy								
12		ICE and SILT				ICE+				
14										
16										
18										
20		SILT (TILL) (ML-GM) - medium grey brown, sandy, trace to some gravel				V 20-25%				
22						V 5-10%				
24										
26										
28										
30						V 0-5%				
32		END OF HOLE								



ELEVATION: 198 (ft)
60.4 (m)

UTM: 7 663 795 (N)
519 155 (E)

DATE DRILLED: 1/2/76

SITE: Lucas Point

BASELINE: 303C

HOLE No.
C12+00 1+50S

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		PEAT - dark brown				V 40-50%				
4		SILT (ML) - medium grey				V 50-60%				
6		GRAVEL (GW) - dark brown, coarse grained, trace to some silt, some sand								
8		SAND (SW) - brown, clean, fine to medium grained - interbedded with fine gravel and silt				Nbn				
10										
12										
14		- gravelly, some silt	16	62	22					
16		GRAVEL (GM) - sandy, coarse grained, some silt				Nbn				
18										
20		- very silty								
22		SAND and GRAVEL (SW-GW) - interbedded, trace of silt								
24										
26		SILT (TILL) (ML-GM) - medium grey, sandy, trace of gravel				V 5-10%				
28										
30		END OF HOLE								
32										



ELEVATION: N/A (ft)
N/A (m)
 UTM: 7 663 245 (N)
519 170 (E)

DATE DRILLED: 1/2/76
 SITE: Lucas Point
 BASELINE: 303C

HOLE No.
 C12+00 3+00N
 PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SW) - medium to dark brown, gravelly								
4		- traces of silt	9	69	22	V trace Nbn				
6										
8										
10		- very sandy								
12										
14		SILT (TILL) (ML-GM) - medium grey brown, some sand and fine gravel				V 30-40%				
16						V 15-20%				
18										
20		- sandy				V 5-10%				
22										
24										
26		- gravelly				V 0-5%				
28										
30		- trace of fine gravel								
32						V trace Nbe				
		END OF HOLE								



ELEVATION: 194 (ft)
59.1 (m)

UTM: 7 663 720 (N)
519 185 (E)

DATE DRILLED: 1/2/76

SITE: Lucas Point

BASELINE: 303C

HOLE No.

C12+00 7+75N

PAGE 1 OF 1

Swimming Point ,Source 222

Borehole Logs

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
		PEAT								
2		ICE and SAND - organic				ICE+				
4		SAND (SM) - light brown, silty, fine grained				Nbn				
6										
8		SAND and GRAVEL (SW-GW) - fine grained, some silt, gap graded	11	49	40					
10										
12										
14						Nbn				
16										
18										
20										
22										
24										
26		ICE and SILT - grey, sandy				ICE+				
28										
30										
32										



ELEVATION: 77 (ft)
23.4 (m)

UTM: 7 666 010 (N)
523 360 (E)

DATE DRILLED: 2/2/76

SITE: Swimming Point

BASELINE: 222 A

HOLE No.

1+00 0+00

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		ICE and SILT - grey, sandy				ICE+				
34										
36										
38		END OF HOLE								
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 77 (ft)
23.4 (m)

UTM: 7 666 010 (N)
523 360 (E)

DATE DRILLED: 2/2/76

SITE: Swimming Point

BASELINE: 222 A

HOLE No.

1+00 0+00

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
0		SILT (CL) - organic, black								
0		ICE and ORGANICS - silty				ICE+				
2		SAND (SM-SW) - some gravel				Nf				
4		- brown, well graded, very silty								
6										
8		- trace of coal chips and silt				Nbn				
10		- full recovery	2	85	13	Vc 0-5%				
12										
12		SAND (SP) - medium to fine grained, uniform, clean	5	95		Nbn				
14										
14		SAND and GRAVEL (SM-GW)								
16		- very silty, possible till, well graded								
18										
20		ICE				ICE				
22										
24		ICE and SILT and SAND				ICE+				
26										
26		SAND (TILL) (SW) - brown, fine grained, trace of gravel and silt				Nbn				
28										
30										
32										



ELEVATION: 80 (ft)
24.4 (m)

UTM: 7 666 015 (N)
523 215 (E)

DATE DRILLED: 2/2/76

SITE: Swimming Point

BASELINE: 222A

HOLE No.

2+00 1+00W

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		SAND (TILL) (SW) - brown, fine grained, trace of gravel				Nbn				
34										
36										
38		END OF HOLE								
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 80 (ft)
24.4 (m)
 UTM: 7 666 015 (N)
523 215 (E)

DATE DRILLED: 2/2/76
 SITE: Swimming Point
 BASELINE: 222A

HOLE No.
2+00 1+00W
 PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		PEAT				Nbn				
4		SAND (SM) - light brown, fine grained, silty								
6		GRAVEL and SAND (GW-SW) - well graded, clean								
8										
10						V 10-20%				
12										
14		- some silt	10	38	52					
16		- silty								
18										
20		- coarse grained gravel								
22										
24		SAND, GRAVEL and SILT (TILL) (SM-GM)				Nbn				
26										
28										
30										
32										
END OF HOLE										



ELEVATION: 81 (ft)
24.7 (m)

UTM: 7 666 085 (N)
523 290 (E)

DATE DRILLED: 2/2/76

SITE: Swimming Point

BASELINE: 222A

HOLE No.

2+00 0+00

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
		PEAT								
-2		SILT (ML) - medium grey				V 40-50%				
-4		GRAVEL (GW) - medium grey, sandy								
-6						Nbn, V trace				
-8		SAND (SP) - medium grey, fine to medium grained								
-10		- clean, trace of thin organic laminations				Nbn				
-12		- trace of gravel								
-14										
-16										
-18										
-20		SAND (SW-SM) - medium grey, some gravel to gravelly				Nbn				
-22										
-24										
-26		- silty, gravelly	23	56	21	V 0-5%				
-28										
-30		- some silt to silty								
-32		SAND (SM) - olive brown, fine grained, some silt				Nbn				
		END OF HOLE								



ELEVATION: 80 (ft)
24.4 (m)

UTM: 7 666 155 (N)
523 365 (E)

DATE DRILLED: 3/2/76

SITE: Swimming Point

BASELINE: 222A

HOLE No.

2+00 1+00E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		GRAVEL and SAND (GW-SW) - organic, brown, silty, oxidized to 2'								
4		- well graded, some silt				Nf				
6										
8										
10										
12										
14		- very silty				Nbn				
16										
18		- trace of silt	9	36	55					
20										
22										
24		SAND (SM) - olive brown, uniform, trace to some silt, trace of gravel								
26						Nbn				
28		END OF HOLE								
30										
32										



ELEVATION: 80 (ft)
24.4 (m)

UTM: 7 666 165 (N)
523 080 (E)

DATE DRILLED: 2/2/76

SITE: Swimming Point

BASELINE: 222A

HOLE No.
4+00 1+00W

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		GRAVEL (GM) - coarse grained, oxidized, some organic silty sand								
4		SAND and GRAVEL (SW-GW) - brown, gravelly, clean well graded				Nbn				
6										
8										
10		- full recovery		70	30					
12										
14						Nbn 6" ice lense				
16		SAND (SP) - medium grained, uniform, clean, trace of gravel								
18		- full recovery								
20		- 6" ice layer @ 15-15.5'								
22		SAND and GRAVEL (SM-GW) - silty								
24										
26		SAND (SM) - olive brown, fine grained, some silt, trace of gravel				Nbn				
28			14	81	5					
30										
32		END OF HOLE								



ELEVATION: 85 (ft)
25.9 (m)

UTM: 7 666 230 (N)
523 155 (E)

DATE DRILLED: 2/2/76

SITE: Swimming Point

BASELINE: 222A

HOLE No.

4+00 0+00

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		GRAVEL (GW) - medium brown, sandy, fine grained				Nf, Nbn				
4		- silty								
6		ICE				ICE				
8		GRAVEL and SAND (GW-SW) - well graded, trace of silt				Nbn V trace				
10		- some silt horizons	4	41	55					
12										
14		- clean								
16		ICE and SAND and GRAVEL				ICE+				
18		SAND (SM) - olive brown, silty fine, uniform				Nbn				
20										
22										
24										
26										
28		SILT (ML) - medium to dark brown, some fine grained sand				Nbn, Nbe				
30										
32										
		END OF HOLE								



ELEVATION: 85 (ft)
25.9 (m)

UTM: 7 666 380 (N)
523 020 (E)

DATE DRILLED: 3/2/76

SITE: Swimming Point

BASELINE: 222A

HOLE No.
6+00 0+00

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		PEAT								
4		SAND and GRAVEL (SW-GW) - brown, trace of silt				Nbn, Nf				
6		- full recovery	1	51	48	Vc trace Nbn	●			
8		SAND (SP) - medium grey, fine to medium grained				Vx 0-5% Nbe				
10		SAND (SW) - medium grey, gravelly, trace of silt								
12		- full recovery	9	68	23	Vr 10-20%			●	
14							Bulk density 105.1 lbs/cu.ft.			
16		SILT (ML) - medium grey brown, some fine sand				V 15-25%				
18										
20										
22										
24						V trace Nbn				
26		- sandy								
28		END OF HOLE								
30										
32										



ELEVATION: 86 (ft)
26.2 (m)

UTM: 7 666 445 (N)
523 090 (E)

DATE DRILLED: 3/2/76

SITE: Swimming Point

BASELINE: 222A

HOLE No.

6+00 1+00E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND and GRAVEL (SW-GW) - medium brown, trace of silt				V 0-5%				
4										
6										
8										
10			6	64	30					
12		SAND (SP) - brown, fine grained, trace of silt, uniform				Nbn				
14										
16										
18										
20										
22		SILT (ML) - brown, sandy				Nbn				
24										
26										
28		SAND and SILT (SM-ML) - brown, fine grained								
30										
32										
		END OF HOLE								



ELEVATION: 87 (ft)
26.5 (m)

UTM: 7 666 820 (N)
523 495 (E)

DATE DRILLED: 3/2/76

SITE: Swimming Point

BASELINE: 222A

HOLE No.

6+00 6+50E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		PEAT and SILT - organic				V 20-30%				
4		SAND and GRAVEL (SW-GW) - medium grey, trace of silt								
6			7	53	40	V 5-10%	●			
8										
10		SAND (SP) - medium grey, some silt, fine grained, uniform	7	44	49	Nbn V trace	●			
12										
14						Nbn				
16		- silty								
18										
20										
22										
24		SAND and SILT (SM-ML) - medium grey				Nbn				
26										
28		END OF HOLE								
30										
32										



ELEVATION: 44 (ft)
13.4 (m)
 UTM: 7 666 075 (N)
522 545 (E)

DATE DRILLED: 4/2/76
 SITE: Swimming Point
 BASELINE: 222A

HOLE No.
7+00 5+50W
 PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		GRAVEL (GW) - medium brown, sandy, some silt to silty				Nf				
4										
6		ICE and SAND and GRAVEL				ICE+				
8		SAND and GRAVEL (SW-GW) - medium brown, trace of silt				V 0-5%				
10		- trace to some silt				Nbe V 0-5%				
12										
14		- trace of silt	6	55	49					
16		SAND (SM) - olive brown, silty, fine grained, uniform				Nbe				
18										
20		- trace of gravel								
22		- some silt								
24										
26		- trace of silt				Nbn				
28										
30										
32										
END OF HOLE										



ELEVATION: 85 (ft)
25.9 (m)
UTM: 7 666 590 (N)
522 955 (E)

DATE DRILLED: 3/2/76
SITE: Swimming Point
BASELINE: 222A

HOLE No.
8+00 1+00E
PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
		PEAT								
		SILT and CLAY (ML-CL)								
		ICE and SILT				ICE+				
-2										
-4		GRAVEL and SAND (GW-SW) - medium brown, trace of silt	3	32	65	Nbn	●			
-6										
-8										
-10			8	37	55	V 10-15%	●			
-12										
-14		SAND (SP) - medium grey, fine to medium grained, some silt, trace of gravel								
-16										
-18		SAND (SM) - olive brown, fine grained, silty				Nbn, Nbe				
-20										
-22										
-24						V - 1" lenses				
-26										
-28		END OF HOLE								
-30										
-32										



ELEVATION: 87 (ft)
26.5 (m)
 UTM: 7 666 660 (N)
523 030 (E)

DATE DRILLED: 3/2/76
 SITE: Swimming Point
 BASELINE: 222A

HOLE No.
8+00 2+00E
 PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SM) - dark brown, medium grained, very silty								
4		SAND (SP) - some gravel, coarse, trace of silt				V 10-20%				
6										
8		- 3' recovery				Vc, Vr 10-20%				
10										
12		- 4' recovery	8	76	16	Nbn Vc 5-15%				
14		SAND (SP) - brown, uniform, fine grained, trace of silt and gravel	2	97	1	Nbn				
16		- 3" beds of silt								
18		- clean								
20		- full recovery	3	97						
22		SAND and SILT (SM-ML) - brown, fine grained				Nbn				
24										
26										
28										
30										
32										
END OF HOLE										



ELEVATION: 87 (ft)
26.5 (m)

UTM: 7 666 965 (N)
523 355 (E)

DATE DRILLED: 3/2/76

SITE: Swimming Point

BASELINE: 222A

HOLE No.

8+00 6+50E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
		PEAT								
2		SILT and CLAY (ML-CL)				Nbn				
4		SAND and GRAVEL (SW-GW) - medium grey brown, trace of silt	5	59	36	V 0-5%				
6		- some silt				Nbn				
10										
12		SAND (SM) - olive brown, silty, fine grained, uniform				Nbn				
14										
16										
18										
20		- some silt								
22										
24										
26										
28										
30										
32										
		END OF HOLE								



ELEVATION: 60 (ft)
18.3 (m)
UTM: 7 666 110 (N)
522 145 (E)

DATE DRILLED: 4/2/76
SITE: Swimming Point
BASELINE: 222A

HOLE No.
10+00 8+20W
PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
		PEAT and SILT - organic								
-2		SAND and GRAVEL (SW-GW)				V 5-10%				
-4		- medium brown, some silt								
-6		- poor recovery				Nbn Vc trace				
-8										
-10			10	55	35	V 0-5%				
-12		- interbeds of sand								
-14										
-16		SILT (ML) - medium grey				V 30-40%				
-18		ICE and SAND and GRAVEL				ICE+				
-20		GRAVEL (GM) - medium grey, sandy, silty				V 10-20%				
-22										
-24		SAND (SM) - olive brown, silty, fine, uniform				Nbn				
-26										
-28										
-30										
-32		END OF HOLE								



ELEVATION: 54 (ft)
16.5 (m)
UTM: 7 666 225 (N)
522 270 (E)

DATE DRILLED: 4/2/76
SITE: Swimming Point
BASELINE: 222A

HOLE No.
10+00 6+50W
PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
0		PEAT and SILT - organic				V 50-60%				
2		GRAVEL (GW) - medium to dark brown, sandy								
4										
6		SAND (SM) - olive brown, silty, fine grained, uniform				Nbn				
8		- some silt								
10										
12										
14		- silty, trace of fine gravel	25	72	3					
16										
18										
20										
22										
24										
26										
28		END OF HOLE								
30										
32										



ELEVATION: 48 (ft)
14.6 (m)
UTM: 7 666 295 (N)
522 345 (E)

DATE DRILLED: 4/2/76
SITE: Swimming Point
BASELINE: 222A

HOLE No.
10+00 5+50W
PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND and GRAVEL (SM-GW) - medium brown, some silt to silty				Nf				
4			19	45	36	V 0-5%				
6		- full recovery				Nbn				
8						Vc trace				
10		- 2' recovery - medium grey								
12		ICE and SILT				ICE+				
14										
16		SILT (ML) - medium grey brown, trace to some fine sand				V 5-15%				
18										
20		SAND (SM) - olive brown, silty, fine grained, uniform				Nbe, Nbn				
22										
24										
26						Nbe				
28										
30		SILT (ML) - medium to dark grey, organic				Nbn				
32										
		END OF HOLE								



ELEVATION: 85 (ft)
25.9 (m)

UTM: 7 666 805N (N)
522 890 (E)

DATE DRILLED: 3/2/76

SITE: Swimming Point

BASELINE: 222A

HOLE No.

10+00 2+00E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND and ICE - dark grey brown medium grained, silty				ICE+				
4										
6										
8		GRAVEL (GW) - some coarse sand, clean				Nbn				
10										
12		SAND (SP) - fine grained, uniform, trace of silt and gravel	9	88	3	Nbn				
14										
16										
18										
20										
22										
24										
26		SILT and SAND (ML-SM) - grey, fine grained								
28		SAND (SM) - brown, fine grained, uniform, some silt to silty				Nbn				
30										
32		END OF HOLE								



ELEVATION: 83 (ft)
25.3 (m)
 UTM: 7 667 115 (N)
523 220 (E)

DATE DRILLED: 3/2/76
 SITE: Swimming Point
 BASELINE: 222A

HOLE No. 10+00 6+50E
 PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SM) - organic, silty								
4		SAND and GRAVEL (SW-GW) - well graded, clean				Nf				
6		- trace of silt	4	62	34					
12		SAND (SP) - brown, fine grained, trace of silt				Nbn				
16										
22		GRAVEL and SAND (GP-SM) - some silt				V 15-25%				
24			12	31	57					
26		SAND (SP) - medium grained, uniform, trace of fine gravel				Nbn				
30										
32		END OF HOLE								



ELEVATION: 84 (ft)

25.6 (m)

UTM: 7 667 250 (N)

523 365 (E)

DATE DRILLED: 3/2/76

SITE: Swimming Point

BASELINE: 222A

HOLE No.

10+00 8+50E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		GRAVEL and SAND (GW-SW) - well graded, clean				Nf				
4						V 5-15%				
6							●			
8										
10										
12		SAND (SP) - brown, uniform, fine to medium grained clean				Nbn				
14		- some silt, trace of gravel	13	81	6					
16								●		
18										
20										
22										
24		GRAVEL and SAND (GW-SM) - well graded, silty				Nbn		●		
26										
28		SILT (ML) - grey				Nbn, Nbe				
30		ICE and SILT				ICE+				
32										
		END OF HOLE								



ELEVATION: 86 (ft)
26.2 (m)
UTM: 7 667 395 (N)
523 230 (E)

DATE DRILLED: 3/2/76
SITE: Swimming Point
BASELINE: 222A

HOLE No.
12+00 8+50E
PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
0-2		PEAT and SAND - silty, fine grained				V trace				
2-4		GRAVEL (GW) - medium grey brown, sandy, trace to some silt - no recovery				Nbn V trace				
4-6										
6-8										
8-10		SAND (SP) - medium grey, some gravel, some silt to silty	12	77	11	V 5-10%				
10-12										
12-14										
14-16						V 10-20%				
16-18										
18-20										
20-22		SAND (SM) - olive brown, silty, fine grained, uniform				Nbn				
22-24										
24-26										
26-28		END OF HOLE								
28-30										
30-32										
32-34										



ELEVATION: 61 (ft)
18.6 (m)
UTM: 7 666 315 (N)
521 780 (E)

DATE DRILLED: 4/2/76
SITE: Swimming Point
BASELINE: 222A

HOLE No.
14+00 9+50W
PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SILT and SAND (ML-SM) - black, organic								
4		ICE				ICE				
6										
8										
10		GRAVEL and SAND (GW-SW) - brown, well graded, trace of silt				Nbn	●			
12										
14										
16		SAND (SM) - olive brown, trace of silt, fine grained, trace of gravel	4	46	50	Nbn	●			
18										
20										
22										
24										
26										
28										
30										
32		END OF HOLE								



ELEVATION: 56 (ft)
17.1 (m)
 UTM: 7 666 450 (N)
521 925 (E)

DATE DRILLED: 4/2/76
 SITE: Swimming Point
 BASELINE: 222A

HOLE No.
14+00 7+50W
 PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		GRAVEL and SAND (GW-SW) - well graded, clean				Nbn				
4										
6										
8										
10		- trace of silt - 3' recovery	4	34	62					
12						Nbn, Vc 0-5%				
14		SAND (SP) - brown, uniform, medium to fine grained, trace of gravel and silt	2	95	3	Vr 5-10% Vs 5-10% Vc 0-5%				
16		- 4' recovery								
18										
20										
22		SAND (SM) - dark brown, very fine grained, silty				Nbn				
24										
26										
28		SILT (ML) - dark grey brown, some fine sand				Nbn				
30										
32										
		END OF HOLE								



ELEVATION: 86 (ft)
26.2 (m)
UTM: 7 667 475 (N)
523 020 (E)

DATE DRILLED: 3/2/76
SITE: Swimming Point
BASELINE: 222A

HOLE No.
14+00 7+50E
PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND and GRAVEL (GW-SM) - brown, silty				V 20-30%				
4										
6		SAND and GRAVEL (SW-GW) - brown, well graded, clean				Nbn				
8										
10		- trace of silt	2	55	43					
12										
14		SAND (SP) - brown, medium to fine grained, clean				Nbn				
16										
18										
20		SAND (SM) - brown, fine grained, uniform, silty				Nbn				
22										
24										
26										
28										
30										
32										
		END OF HOLE								



ELEVATION: 87 (ft)
26.5 (m)

UTM: 7 667 610 (N)
523 165 (E)

DATE DRILLED: 3/2/76

SITE: Swimming Point

BASELINE: 222A

HOLE No.
14+00 9+50E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SILT and SAND (ML-SM) - organic								
4		SAND (SW) - brown, well graded, clean, some gravel				Nbn				
6		- trace of silt	7	79	14					
8										
10										
12										
14										
16										
18										
20										
22										
24										
26										
28										
30										
32										
END OF HOLE										



ELEVATION: 57 (ft)
17.4 (m)
 UTM: 7 666 530 (N)
521 715 (E)

DATE DRILLED: 4/2/76
 SITE: Swimming Point
 BASELINE: 222A

HOLE No.
16+00 8+50W
 PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND and SILT (SM-ML) - fine grained				Nbn and ICE				
4										
6		SAND (SP) - brown, fine to medium grained, uniform, some silt, trace of gravel				Nbn				
8										
10			11	88	1					
12		GRAVEL (GW) - some fine sand								
14		SAND (SP) - brown, fine to medium grained, uniform								
16										
18		GRAVEL (GW) - some sand, interbedded								
20										
22		ICE				ICE				
24		SAND (SP) - brown, fine to medium grained								
26		SAND and GRAVEL (SW-GW) - brown well graded, some silt				Nbn				
28		SAND (SM) - brown, fine, silty								
30		ICE and SAND				ICE+				
32		SAND (SM) - brown, silty, fine grained				Nbn				
		END OF HOLE								



ELEVATION: 79 (ft)
24.1 (m)

UTM: 7 667 690 (N)
522 960 (E)

DATE DRILLED: 3/2/76

SITE: Swimming Point

BASELINE: 222A

HOLE No.
16+00 8+50E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SILT (CL) - organic				Nbn				
4		SAND (SM) - light brown, fine grained, silty								
6		ICE				ICE				
8		SILT and SAND (ML-SM) - grey, fine grained,								
10			52	48						
12		GRAVEL and SAND (GW-SM) - well graded, very silty - trace of silt beds				V 20-30%				
14										
16										
18										
20										
22		SILT (ML) - grey, some fine sand				Nbn				
24										
26										
28		END OF HOLE								
30										
32										



ELEVATION: 52 (ft)
15.9 (m)
UTM: 7 666 675 (N)
521 580 (E)

DATE DRILLED: 4/2/76
SITE: Swimming Point
BASELINE: 222A

HOLE No.
18+00 8+50W
PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %				
							10	20	30	40	
2		SAND (SM) - silty, organic				Nbn					
		SAND (SW) - medium to dark brown, well graded									
4		GRAVEL (GW) - medium to dark brown, trace of sand and silt									
6		- poor recovery	5	9	86						
8		SAND (SM) - olive brown, silty, fine grained, uniform, trace of coal				Nbn					
10											
12											
14											
16											
18		END OF HOLE									
20											
22											
24											
26											
28											
30											
32											



ELEVATION: 79 (ft)
24.1 (m)

UTM: 7 667 835 (N)
522 820 (E)

DATE DRILLED: 4/2/76

SITE: Swimming Point

BASELINE: 222A

HOLE No.
18+00 8+50E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
0		PEAT								
2		SILT (ML) - medium grey brown				V 30-40%				
4		ICE and SILT				ICE+				
6		SAND (SM) - olive brown, silty, fine grained, uniform				Nbe V 30-40%				
8		SILT (ML) - medium grey brown, trace to some sand								
10		SAND (SP) - medium grey, gravelly, trace of silt				V 0-5%				
12										
14		SAND (SM) - olive brown, some silt, fine grained, uniform				Nbn				
16										
18										
20			19	81						
22										
24										
26										
28		END OF HOLE								
30										
32										



ELEVATION: 74 (ft)
22.6 (m)
UTM: 7 667 970 (N)
522 970 (E)

DATE DRILLED: 4/2/76
SITE: Swimming Point
BASELINE: 222A

HOLE No.
18+00 10+50E
PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		PEAT and ORGANIC SILT				V 30-40%				
4		GRAVEL and SAND (GW-SW) - medium brown, trace of silt								
6						V 0-5%				
8										
10			3	33	64	V 0-5%				
12										
14										
16										
18										
20			2	53	45					
22										
24										
26										
28										
30		SAND and GRAVEL (SW-GW) - trace of silt								
32			2	66	32	V 0-5%				



ELEVATION: 43 (ft)
13.1 (m)

UTM: 7 667 205 (N)
521 560 (E)

DATE DRILLED: 5/2/76

SITE: Swimming Point

BASELINE: 222A

HOLE No.

22+00 5+00W

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		SAND and GRAVEL (SW-GW)				V 0-5%				
34		- trace of silt								
36										
38										
40										
42										
44										
46										
48		SAND (SM) - olive brown				V 5-15%				
50						Nbn				
52										
54										
56										
58		END OF HOLE								
60										
62										



ELEVATION: 43 (ft)
13.1 (m)

UTM: 7 667 205(N)
521 560(E)

DATE DRILLED: 5/2/76

SITE: Swimming Point

BASELINE: 222A

HOLE No.
22+00 5+00W

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		PEAT				Nbe				
		SILT and CLAY (ML-CL) dark brown				ICE+				
4		ICE and SILT								
6		SAND (SP) - medium brown, fine grained, trace to some gravel				Nbe V trace				
8		SAND and GRAVEL (SW-GW)								
10		- well graded, trace of silt and coal	2	57	41	Nbn Vc 0-5%				
12		- poor recovery								
14										
16		- no recovery								
18		- silty				V 10-15%				
20										
22										
24										
26										
28										
30		- trace of silt								
32		END OF HOLE								



ELEVATION: 43 (ft)
13.1 (m)
 UTM: 7667 275 (N)
521 635 (E)

DATE DRILLED: 5/2/76
 SITE: Swimming Point
 BASELINE: 222A

HOLE No.
22+00 4+00W
 PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
—2		PEAT and SILT - organic								
		GRAVEL (GW) - sandy				V 10-20%				
—4		SAND (SM) - olive brown, fine grained				Nbe				
		SILT (ML)				V 30-40%				
—6		GRAVEL (GW) - sandy								
—8		SAND (SM) - olive brown, fine grained								
—10		SAND and GRAVEL (SW-GW)								
—12		- medium grey, trace of silt				V 10-20%				
—14										
—16										
—18						Nbn V 0-5%				
—20			3	62	35					
—22										
—24		- trace to some silt								
—26		SAND (SP) - medium grey, uniform, fine to medium grained				Nbn				
—28		GRAVEL (GW) - medium grey, well graded, trace of silt				Nbn				
—30										
—32		END OF HOLE								



ELEVATION: 42 (ft)
12.8 (m)

UTM: 7 667 345 (N)
521 705 (E)

DATE DRILLED: 5/2/76

SITE: Swimming Point

BASELINE: 222A

HOLE No.

22+00 3+00W

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		PEAT and SILT and CLAY				V 30-40%				
		SILT (ML) - medium grey brown				ICE+				
4		ICE and SILT								
6		SILT and SAND (ML-SM) - olive brown, fine grained, trace of clay				Nbe				
8										
10			68	32						
12										
14										
16										
18		ICE and SILT				ICE+				
20										
22		SAND (SW) - medium grey well graded, trace of gravel and silt				V 0-5%				
24										
26										
28										
30		- gravelly								
32										
		END OF HOLE								



ELEVATION: 43 (ft)
13.1 (m)
 UTM: 7667 410 (N)
521 780 (E)

DATE DRILLED: 5/2/76
 SITE: Swimming Point
 BASELINE: 222A

HOLE No.
22+00 2+00W
 PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		PEAT				V 30-40%				
4		SILT (ML) - medium grey brown, sandy				Nbn, Vtrace				
6		SAND and GRAVEL (SW-GW) - trace of silt	7	53	40					
8										
10										
12										
14		- medium grey				Nbn, Vtrace				
16										
18										
20			4	54	42					
22										
24		- some silt								
26										
28										
30										
32										



ELEVATION: 36 (ft)
11.0 (m)
 UTM: 7667 550 (N)
521 925 (E)

DATE DRILLED: 5/2/76
 SITE: Swimming Point
 BASELINE: 222A

HOLE No.
 22+00, 0+00
 PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		SAND and GRAVEL (SW-GW)				Nbn-V trace				
34										
36										
38		SAND (SP) - medium grey, trace of silt, fine grained, uniform	10	90						
40										
42		END OF HOLE								
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 36 (ft)
11.0 (m)

UTM: 7 667 550 (N)
521 925 (E)

DATE DRILLED: 5/2/76

SITE: Swimming Point

BASELINE: 222A

HOLE No.
22+00 0+00

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
		PEAT								
2		SILT (CL) - organic				V 20-25%				
4		SAND (SP) - medium grey brown, trace of silt, fine grained, uniform	6	94						
6										
8										
10										
12										
14		- clean								
16										
18		- gravelly								
20										
22										
24		- silty				V 5-10%				
26										
28										
30		- trace to some silt				V 0-5%				
32										
		END OF HOLE								



ELEVATION: 35 (ft)
10.7 (m)

UTM: 7 667 685 (N)
522 075 (E)

DATE DRILLED: 5/2/76

SITE: Swimming Point

BASELINE: 222A

HOLE No.

22+00 2+00E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
		PEAT								
2		ICE and SILT - organic, some fine sand				ICE+				
4										
6										
8										
10		SILT (ML) - medium brown, trace to some fine sand				V 15-20%				
12										
14		SAND (SM) - olive brown, - silty, fine grained				Nbe				
16										
18		SAND (SP) - medium grey, fine to medium, trace of silt								
20		- laminated with organics - trace of fine gravel				Nbn				
22										
24		SAND and GRAVEL (SW-GW) - trace of silt	5	62	33					
26										
28		SAND (SP) - fine to medium, trace of silt				Nbn				
30										
32		END OF HOLE								



ELEVATION: 28 (ft)
8.5 (m)

UTM: 7 667 820 (N)
522 220 (E)

DATE DRILLED: 5/2/76

SITE: Swimming Point

BASELINE: 222A

HOLE No.
22+00 4+00E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION-1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		PEAT and SILT and SAND - organics								
4		ICE and SILT				ICE+				
6		SAND and GRAVEL (SW-GW) - medium to coarse grained, some silt	10	48	42	V 10-20% V 5-10%	●			
8										
10										
12										
14										
16							●			
18										
20							●			
22		- trace of silt								
24										
26			2	49	49		●			
28										
30										
32		EN. OF HOLE								



ELEVATION: 35 (ft)
10.7 (m)
 UTM: 7 667 500 (N)
521 290 (E)

DATE DRILLED: 5/2/76
 SITE: Swimming Point
 BASELINE: 222A

HOLE No.
26+00 5+00W
 PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SILT and SAND (CL-SM) - organic				Nbn				
4		SAND and GRAVEL (SW-GW) - well graded, clean								
6										
8										
10										
12										
14										
16			3	45	52					
18										
20										
22		SAND (SP) - grey, medium to fine grained, uniform, clean, trace of gravel				Nbn				
24		GRAVEL and SAND (GW-SW) - well graded, trace of silt								
26										
28										
30			2	31	67					
32										



ELEVATION: 38 (ft)
11.6 (m)
 UTM: 7 667 565 (N)
521 360 (E)

DATE DRILLED: 5/2/76
 SITE: Swimming Point
 BASELINE: 222A

HOLE No.
 26+00 4+00W
 PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		GRAVEL and SAND (GW-SW) - well graded								
34		SAND (SW) - coarse grained, well graded clean, some gravel				Nbn				
36										
38		END OF HOLE								
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 38 (ft)
11.6 (m)

UTM: 7 667 565 (N)
521 360 (E)

DATE DRILLED: 5/2/76

SITE: Swimming Point

BASELINE: 222A

HOLE No.

26+00 4+00W

PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION-1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND and SILT (SM-ML) - grey brown, fine grained				Nbn				
4		SAND and GRAVEL (SW-GW) - trace of silt				Nbn				
6			4	60	36					
8										
10		SILT (ML) - grey				V 20-30%				
12										
14										
16		- trace of fine gravel - trace of wood								
18										
20										
22		SAND (SP) - grey, uniform, clean to trace of silt				Nbn				
24										
26										
28										
30										
32										



ELEVATION: 39 (ft)
11.9 (m)

UTM: 7 667 840 (N)
521 655 (E)

DATE DRILLED: 4/2/76

SITE: Swimming Point

BASELINE: 222A

HOLE No.

26+00 0+00

PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		SAND (SP) - grey, uniform				Nbn				
34										
36		- some fine gravel								
38		END OF HOLE								
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 39 (ft)
11.9 (m)
 UTM: 7 667 840 (N)
521 655 (E)

DATE DRILLED: 4/2/76
 SITE: Swimming Point
 BASELINE: 222A

HOLE No.
 26+00 0+00
 PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		GRAVEL and SAND (GW-SW) - silty, well graded				V 5-10%				
4		SAND and SILT (SM-ML) - medium brown, fine grained, uniform				Nbn				
6										
8										
10										
12										
14										
16		ICE	31	69		ICE				
18		SAND and SILT (SM-ML) - same as above								
20		END OF HOLE								
22										
24										
26										
28										
30										
32										



ELEVATION: 81 (ft)
24.7 (m)

UTM: 7 668 350 (N)
521 175 (E)

DATE DRILLED: 4/2/76

SITE: Swimming Point

BASELINE: 222A

HOLE No.

33+00 0+00

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		GRAVEL and SAND (GW-SW) - clear, well graded				Nbn				
4		PEAT				Nbn, Vtrace				
6										
8		ICE and PEAT				ICE+				
10										
12										
14										
16		SILT (CL) - grey, organic				V 20-30%				
18		- pieces of wood								
20										
22		SILT and SAND and GRAVEL - grey								
24		SILT (ML) - grey, trace of gravel				Nbn				
26		SAND (SM) - olive brown, fine grained, silty								
28		END OF HOLE								
30										
32										



ELEVATION: 100 (ft)
30.5 (m)
 UTM: 7668 500 (N)
521 040 (E)

DATE DRILLED: 4/2/76
 SITE: Swimming Point
 BASELINE: 222A

HOLE No.
35+00 0+00
 PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SAND (SW) - brown, clean, well graded, some gravel				Nf				
4										
6										
8										
10		ICE				ICE				
12		SILT (ML) - grey, trace of fine sand				Nbe				
14										
16										
18		END OF HOLE								
20										
22										
24										
26										
28										
30										
32										



ELEVATION: 118 (ft)
36.0 (m)

UTM: 7668 705 (N)
521 120 (E)

DATE DRILLED: 4/2/76

SITE: Swimming Point

BASELINE: 222A

HOLE No.

36+00 2+00E

PAGE 1 OF 1

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	SOIL DESCRIPTION	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		PEAT and Organic SILT								
4		SAND and GRAVEL (SM-GW) - very silty								
6		SAND and GRAVEL (SW-GW) - well graded, trace of silt	5	55	40	Nbn, Nf				
10		SILT (ML)-grey, trace to some fine sand				Nbn				
16		SAND (SP) - grey, fine grained, silty				Nbn, Nbe				
30		ICE - trace of silt				V 15-20%				
32						ICE+				



ELEVATION: 128 (ft)
39.0 (m)
 UTM: 7668 715 (N)
520 835 (E)

DATE DRILLED: 4/2/76
 SITE: Swimming Point
 BASELINE: 222A

HOLE No.
38+00, 0+00
 PAGE 1 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
32		ICE - trace of silt				ICE+				
34										
36										
38		END OF HOLE								
40										
42										
44										
46										
48										
50										
52										
54										
56										
58										
60										
62										



ELEVATION: 128 (ft)
39.0 (m)
 UTM: 7 668 715 (N)
520 835 (E)

DATE DRILLED: 4/2/76
 SITE: Swimming Point
 BASELINE: 222A

HOLE No.
 38+00 0+00
 PAGE 2 OF 2

GRANULAR MATERIAL EVALUATION—1976

MACKENZIE DELTA AREA

DEPTH (FEET)	SAMPLE TYPE	S O I L D E S C R I P T I O N	SILT / CLAY	SAND	GRAVEL	GROUND ICE DESCRIPTION	MOISTURE CONTENT %			
							10	20	30	40
2		SILT (ML) - grey, trace of fine sand				V 30-40%				
4		- grey brown				Nbn				
6										
8		SILT (ML) - grey				Nbe				
10		- some massive ice layers				V 20-30%				
12										
14										
16										
18										
20										
22		SILT (ML)-trace of fine sand, grey brown				Nbn some ICE 50%				
24										
26										
28		END OF HOLE								
30										
32										



ELEVATION: 120 (ft)
36.6 (m)
 UTM: 7668 725 (N)
520 555 (E)

DATE DRILLED: 4/2/76
 SITE: Swimming Point
 BASELINE: 222A

HOLE No.
 40+00 2+00W
 PAGE 1 OF 1

Laboratory Test Results

SOURCE	BOREHOLE LOCATION	DEPTH (FT)	M.C. (%)	RELATIVE DENSITY (pcf)		LOS ANGELES ABRASION GRADING		SULPHATE SOUNDNESS % WEIGHT LOSS		ORGANIC CONTENT COLOR PLATE	REACTIVITY (HILLMOLES/LITER)		BULK FROZEN DENSITY (pcf)		SPECIFIC GRAVITY (COARSE)				SPECIFIC GRAVITY (FINE)				PETROGRAPHIC ANALYSIS	
				MIN.	MAX.	% WEAR	COARSE	FINE	COARSE		FINE	RC	SC	WET	DRY	(gm/cc)		(gm/cc)		(gm/cc)				
																BULK	BULK (SSD)	APPARENT	% ABSORPTION	BULK	BULK (SSD)	APPARENT		% ABSORPTION
326	Combined Sample 8+00-14+00, 2+00E-3+00W 4+00,2+00E	0-25	10.7	104.9	120.7											2.51 2.52	2.55 2.56	2.61 2.62	1.57 1.49	2.62 2.62	2.66 2.66	2.73 2.73	1.50 1.48	
	5 7-11 20-24	27.5							#5				113.8	89.24										
	4+00,0+00 8+00,0+00	4-5 8-13 19-24	24.0 31.2						#5				118.23 111.13	95.34 84.72										
	10+00,1+00E 10+00,1+00W	14-15 5	14.0						#5		270 280 300	43.3 46.6 58.3												Yes
	12+00,0+00	5-5.5 9-10 12-13	24.1 33.0 25.8										110.35 107.86 111.98	88.93 81.07 89.0										
	18+00,9+00W	0-1 6.8						4.18	2.14	#4						2.53 2.52	2.56 2.56	2.61 7.61	1.30 1.35	2.62 2.62	2.67 2.67	2.76 2.76	1.92 1.94	
	20+00,1+00E 24+00,1+00E	11-12 10	27.6							#4	80 60 65	214.1 236.1 427.2	113.2	88.71										
	24+00,0+00	17-18	23.1										118.17	95.96										
26	Combined Sample 32+00-36+00, 1+00W-4+00E 34+00,3+00E	0-10 5								#5	130 150 140	112.6 43.3 84.6								2.63 2.62	2.67 2.66	2.73 2.73	1.46 1.50	
	36+00,10+00W	0-1 7-7.5	6.2 16.8			17.39	3/4- $\frac{1}{2}$	$\frac{1}{2}$ -3/8		#3						2.51 2.52	2.55 2.56	2.62 2.63	1.70 1.70	2.62 2.62	2.65 2.66	2.71 2.73	1.39 1.43	Yes
26	Combined Sample 36+00-40+00, 7+00W-12+00W 38+00,1+00E 40+00,11+00W	0-25 19-20 10	8.3 19.2	108.92	128.9	17.8	$\frac{1}{2}$	#4			110 120 120	328.7 367.0 235.1	118.71	99.59										
26	Combined Sample 44+00-49+00, 0+00-3+50E 46+00,3+50E 49+00,0+00	0-20 0-1 10-13	9.1 7.3 19.8	110.2	124.6	17.0	3/8- $\frac{1}{2}$	$\frac{1}{2}$ -#4																Yes
26	Combined Sample 54+00-60+00, 3+00W-1+00E 56+00,1+00W 56+00,3+00W	0-30 9-9.5 5	8.7 20.2	106.9	139.9					#3	210 230 215	342.3 319.3 275.0	122.0	101.48		2.55 2.53	2.58 2.57	2.65 2.65	1.44 1.40	2.62 2.62	2.65 2.65	2.72 2.71	1.41 1.29	
	60+00,0+00 64+30,1+90E 66+00,1+00W	7.5-9 5.5-9 0-1	27.8 41.8 5.1								150 155 160	237.4 164.5 247.5	113.06 100.28	88.48 70.74		2.49 2.49	2.54 2.54	2.61 2.61	1.73 1.72	2.61 2.62	2.66 2.66	2.72 2.74	1.54 1.65	Yes
		9-9.5	20.2										122.0	101.48										
03A	Combined Sample 2+00,0+00	0-20 10	9.0	103.0	119.0				1.62	#4	165 155 135	145.2 99.6 118.5				2.53 2.53	2.57 2.57	2.63 2.63	1.50 1.50	2.63 2.64	2.67 2.68	2.74 2.74	1.48 1.48	Yes
03B	Combined Sample 1+68-12+00, 1+00S-2+00N 4+00,1+00S	0-40 0-1 15	7.5 3.9</																					

[illegible]

PETROGRAPHIC DESCRIPTION

- 1) QUARTZITE
 - white to grey in colour, some reddish varieties
 - very fine grained
 - medium roundness and sphericity, sometimes tabular in coarser fraction
 - smooth to pitted texture
 - buff brown to rust brown weathered surface
- 2) QUARTZ
 - mostly colourless, some yellow varieties
 - vitreous lustre
 - grains usually well rounded but sometimes sub-angular
- 3) CHERT-CHALCEDONY
FLINT-JASPER
 - milky white, light green to black varieties
 - conchoidal fracture
 - angular to subrounded
 - smooth
 - usually subangular in coarser fraction
- 4) SANDSTONE
 - light grey some buff brown variations
 - well cemented with silica
 - moderate roundness and sphericity
 - fine grained
 - some elongate pebbles in coarse fraction
 - weathered friable varieties often present
- 5) CONGLOMERATE
 - brown to green brown
 - sub rounded
 - slightly pitted to smooth texture
 - silica matrix present only in coarser fraction
- 6) ARGILLITE
 - light grey
 - moderate roundness and sphericity
 - pebbles often tabular or flat
- 7) BASALT
 - black
 - subangular to round
 - pitted
 - larger pebbles are polished
- 8) GRANITE
 - pink
 - angular pebbles
 - flat
 - present in coarser fractions

- 9) COAL
 - black
 - subangular, platy
 - conchoidal fracture
- 10) SCHIST
 - highly weathered
 - very soft
 - reddish black
 - friable
- 11) LIMESTONE
 - well rounded
 - buff brown

CALCULATION OF RESULTS OF PARTICLE COUNTS
COMPOSITION OF FRACTIONS RETAINED ON SIEVES
DEVIL'S LAKE, SOURCE 326
8+00 0+00 19'-24'

CONSTITUENTS	OVER 1"	1"-3/4"	3/4"-1/2"	1/2"-3/8"	3/8"-#4	#4-#8	#8-#16	#16-#30	#30-#50	#50-100	MINUS #100 TO PAN
	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %
1	2 67.0	5 62.5	15 26.3	14 24.6	37 26.4	44 21.2	19 14.8	5.0	2.0	2.0	
2				1 1.8	4 2.9	13 6.3	24 18.8	40.0	70.0	85.0	95.0
3		1 12.5	12 21.0	21 36.8	44 31.5	69 33.3	25 19.5	25.0	10.0	10.0	1.0
4		1 12.5	7 12.3	7 12.3	30 21.4	19 9.2	18 14.0	15.0			
5			2 3.5		2 1.4			1.0			
6	1 33.0		14 24.6	13 22.7	21 15.0	62 30.0	26 20.3	7.0	Estimated 10.0	Estimated 1.0	Estimated 2.0
7			7 12.3				8 6.2	5.0	2.0	1.0	
8		1 12.5		1 1.8	2 1.4			1.0	2.0		
9									3.0		1.0
10							6 4.7				
11							2 1.7				
								1.0	1.0	1.0	1.0
TOTALS	3 100	8 100	57 100	57 100	140 100	207 100	128 100	100	100	100	100

CALCULATION OF RESULTS OF PARTICLE COUNTS
WEIGHTED PERCENT OF EACH FRACTION

CONSTITUENTS	OVER 1"	1"-3/4"	3/4"-1/2"	1/2"-3/8"	3/8"-#4	#4-#8	#8-#16	#16-#30	#30-#50	#50-100	MINUS #100 TO PAN	WEIGHTED COMPOSITION
1	3.89	3.75	3.87	2.07	4.12	2.20	1.10	0.34	0.34	0.11		21.78
2				0.15	0.45	0.66	1.39	2.72	11.48	4.76	2.76	24.37
3		0.75	3.09	3.09	4.91	3.46	1.44	1.70	1.64	0.56	0.03	20.67
4		0.75	1.81	1.03	3.34	0.96	1.04	1.02				9.96
5			0.51		0.22			0.07				0.80
6	1.91		3.62	1.91	2.34	3.12	1.50	0.48	1.64	0.06		16.58
7			1.80				0.46	0.34	0.34	0.06	0.06	3.06
8		0.75		0.15	0.22			0.07	0.34			1.50
9							0.35		0.49		0.03	0.87
10							0.12					0.12
11								0.06	0.16	0.05	0.02	0.29
TOTALS	5.80	6.00	14.70	8.40	15.60	10.40	7.40	6.80	16.40	5.60	2.90	100.00

CALCULATION OF RESULTS OF PARTICLE COUNTS
COMPOSITION OF FRACTIONS RETAINED ON SIEVES
DEVIL'S LAKE, SOURCE 326
36+00 10+00W (0'-1')

CONSTITUENTS	OVER 1"	1"-3/4"	3/4"-1/2"	1/2"-3/8"	3/8"-#4	#4-#8	#8-#16	#16-#30	#30-#50	#50-100	MINUS #100 TO PAN
	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %
1			24 53.3	37 28.9	48 25.9	90 35.4	52 31.0				
2					4 2.2	5 2.0	26 15.5	Estimated 25.0			
3			3 6.7	33 25.8	40 21.6	33 13.0	35 20.8	30.0	Estimated 15.0	Estimated 5.0	Estimated 5.0
4			13 28.9	49 38.3	73 39.5	104 40.9	38 22.6	12.0	50.0	83.0	90.0
5								20.0	15.0	5.0	3.0
6						1 0.5	1 0.6		10.0	2.0	
7			3 6.7	6 4.7	10 5.4	9 3.5	3 1.8				
8			2 4.4	3 2.3	10 5.4	10 3.9	11 6.5	3.0	20.0		
9						2 0.8	2 1.2	10.0	70.0	50.0	2.0
10											
11											
TOTALS			45 100	128 100	185 100	254 100	168 100	100	100	100	100

CALCULATION OF RESULTS OF PARTICLE COUNTS
WEIGHTED PERCENT OF EACH FRACTION

CONSTITUENTS	OVER 1"	1"-3/4"	3/4"-1/2"	1/2"-3/8"	3/8"-#4	#4-#8	#8-#16	#16-#30	#30-#50	#50-100	MINUS #100 TO PAN	WEIGHTED COMPOSITION
1			2.56	1.02	4.30	4.57	3.04	1.98	3.16	0.95	0.29	21.87
2					0.37	0.26	1.52	2.37	9.85	15.77	5.22	35.36
3			0.32	0.90	3.59	1.68	2.04	0.95	2.96	0.95	0.17	13.56
4			1.39	1.34	6.56	5.28	2.20	1.58	1.97	0.38		20.70
5						0.06	0.06					0.12
6			0.32	0.16	0.89	0.45	0.18	0.23	0.38			2.61
7			0.21	0.08	0.89	0.50	0.64	0.79	1.38	0.95	0.12	5.56
8						0.10	0.12					0.22
9												
10												
11												
TOTALS			4.80	3.50	16.60	12.90	9.80	7.90	19.70	19.00	5.80	100.00

CALCULATION OF RESULTS OF PARTICLE COUNTS
COMPOSITION OF FRACTIONS RETAINED ON SIEVES
DEVIL'S LAKE, SOURCE 326
46+00, 3+50E (0'-1')

CONSTITUENTS	OVER 1"	1"-3/4"	3/4"- 1/2"	1/2"-3/8"	3/8"-#4	#4-#8	#8-#16	#16-#30	#30-#50	#50-100	MINUS #100 TO PAN
	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %
1			13 39.4	36 31.3	21 23.6	51 32.1	45 39.8	39 26.9	Estimated 20.0	Estimated 10.0	Estimated 95.0
2				2 1.7	2 2.2		9 8.0	32 22.1	50.0	74.0	
3			11 33.3	47 40.9	30 33.7	37 23.3	14 12.4	21 14.5	4.0	5.0	
4			5 15.2	20 17.4	22 24.8	41 25.8	20 17.7	20 13.7	7.0	4.0	4.0
5			3 9.1	2 1.7			2 1.8				
6			1 3.0	4 3.5	12 13.5	19 11.9	12 10.6	21 14.5	12.0	3.0	
7				2 1.7	2 2.2	11 6.9	8 7.1	12 8.3	7.0	4.0	1.0
8				1 0.9			1 0.9				
9							2 1.7				
10				1 0.9							
11											
TOTALS			33 100	115 100	89 100	159 100	113 100	145 100	100	100	100

CALCULATION OF RESULTS OF PARTICLE COUNTS
WEIGHTED PERCENT OF EACH FRACTION

CONSTITUENTS	OVER 1"	1"-3/4"	3/4"- 1/2"	1/2"-3/8"	3/8"-3/8"	#4-#8	#8-#16	#16-#30	#30-#50	#50-100	MINUS #100 TO PAN	WEIGHTED COMPOSITION
1			2.88	2.10	3.49	4.69	5.65	2.69	3.00	1.11		25.61
2				0.11	0.32		1.14	2.21	7.50	8.21	5.99	25.48
3			2.43	2.74	4.99	3.40	1.76	1.45	0.60	0.56		17.93
4			1.11	1.17	3.67	3.77	2.50	1.37	1.05	0.45	0.25	15.34
5			0.66	0.11			0.26					1.03
6			0.22	0.23	2.00	1.74	1.51	1.45	1.80	0.33		9.28
7				0.12	0.33	1.00	1.01	0.83	1.05	0.44	0.06	4.84
8				0.06			0.13					0.19
9							0.24					0.24
10												0.06
11				0.06								
TOTALS			7.30	6.70	14.80	14.60	14.20	10.00	15.00	11.10	6.30	100.00

CALCULATION OF RESULTS OF PARTICLE COUNTS
COMPOSITION OF FRACTIONS RETAINED ON SIEVES
DEVIL'S LAKE, SOURCE 326
66+00, 1+00W (5'-14')

CONSTITUENTS	OVER 1"	1"-3/4"	3/4"-1/2"	1/2"-3/8"	3/8"-#4	#4-#8	#8-#16	#16-#30	#30-#50	#50-100	MINUS #100 TO PAN
	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %
1			2 28.5	8 25.8	30 29.7	30 32.3	40 31.0	24 18.5	10.0	5.0	1.0
2					3 3.0	7 7.5	35 27.0	59 45.4	70.0	89.0	96.0
3			1 14.3	11 35.5	33 32.7	25 26.9	21 16.3	18 13.8	10.0	2.0	1.0
4			3 42.9	9 29.0	28 27.7	17 18.3	20 15.5	16 12.3	5.0	1.0	
5				1 3.2		1 1.1			Estimated	Estimated	Estimated
6					2 2.0	4 4.3	3 2.3	3 2.3	1.0		
7				1 3.3	5 4.9	3 3.2	6 4.7	6 4.6	3.0	2.0	1.0
8						2 2.2					
9							1 0.9	1 0.8	0.5		
10											
11			1 14.3	1 3.2		4 4.3	3 2.3	3 2.3	0.5	1.0	1.0
TOTALS			7 100	31 100	101 100	93 100	129 100	130 100	100	100	100

CALCULATION OF RESULTS OF PARTICLE COUNTS
WEIGHTED PERCENT OF EACH FRACTION

CONSTITUENTS	OVER 1"	1"-3/4"	3/4"-1/2"	1/2"-3/8"	3/8"-#4	#4-#8	#8-#16	#16-#30	#30-#50	#50-100	MINUS #100 TO PAN	WEIGHTED COMPOSITION
1			0.71	0.75	3.98	3.68	3.10	1.66	2.25	1.03	0.08	17.24
2					0.40	0.86	2.70	4.09	15.75	18.33	7.39	49.52
3			0.36	1.03	4.38	3.07	1.63	1.24	2.25	0.41	0.08	14.45
4			1.07	0.84	3.71	2.09	1.55	1.11	1.12	0.21		11.70
5				0.09		0.13						0.22
6					0.27	0.48	0.23	0.21	0.23			1.42
7				0.10	0.66	0.36	0.47	0.41	0.68	0.41	0.08	3.17
8						0.25						0.25
9							0.09	0.07	0.11			0.27
10												
11			0.36	0.09		0.48	0.23	0.21	0.11	0.21	0.07	1.76
TOTALS			2.50	2.90	13.40	11.40	10.00	9.00	22.50	20.60	7.70	100.00

CALCULATION OF RESULTS OF PARTICLE COUNTS
COMPOSITION OF FRACTIONS RETAINED ON SIEVES
LUCAS POINT, SOURCE 303
BASELINE A, COMBINED

CONSTITUENTS	OVER 1"	1"-3/4"	3/4"- 1/2"	1/2"-3/8"	3/8"-#4	#4-#8	#8-#16	#16-#30	#30-#50	#50-100	MINUS #100 TO PAN
	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %
1		1 100	3 42.9	14 31.2	26 29.6	61 35.7	46 25.7	39 24.8			2.0
2						12 7.0	37 20.7	50 31.8	18.0	12.0	95.0
3			1 14.2	8 17.8	24 27.3	29 17.0	40 22.4	27 17.2	60.0	75.0	
4			3 42.9	20 44.4	31 35.2	59 34.5	43 24.0	21 13.5	12.0	8.0	2.0
5									7.0	3.0	
6					1 1.0	2 1.2	1 0.6	3 1.9	Estimated 3.0	Estimated 2.0	Estimated 1.0
7				1 2.2	2 2.3	7 4.1	9 5.0	11 7.0			
8				1 2.2	2 2.3			1 0.6			
9							1 0.6	1 0.6			
10											
11				1 2.2	2 2.3	1 0.5	2 1.0	4 2.6			
TOTALS		1 100	7 100	45 100	88 100	171	179 100	157 100	100	100	100

CALCULATION OF RESULTS OF PARTICLE COUNTS
WEIGHTED PERCENT OF EACH FRACTION

CONSTITUENTS	OVER 1"	1"-3/4"	3/4"- 1/2"	1/2"-3/8"	3/8"-#4	#4-#8	#8-#16	#16-#30	#30-#50	#50-100	MINUS #100 TO PAN	WEIGHTED COMPOSITION
1		9.80	0.77	0.90	4.52	4.92	2.96	2.25	3.78	1.18	0.10	31.18
2						0.97	2.38	2.88	12.60	7.35	4.84	31.02
3			0.26	0.52	4.17	2.34	2.57	1.52	2.52	0.78	0.10	14.78
4			0.77	1.30	5.39	4.77	2.76	1.20	1.47	0.29		17.95
5												
6					0.17	0.16	0.06	0.17				0.56
7				0.06	0.35	0.56	0.58	0.63	0.63	0.20	0.05	3.07
8				0.06	0.35			0.06				0.47
9							0.06	0.05				0.12
10												
11				0.06	0.35	0.08	0.13	0.23				0.85
TOTALS		9.80	1.80	2.90	15.30	13.80	11.50	9.00	21.0	9.80	5.10	100.00

CALCULATION OF RESULTS OF PARTICLE COUNTS
COMPOSITION OF FRACTIONS RETAINED ON SIEVES
LUCAS POINT, SOURCE 303, BASELINE B
4+00, 1+00S (0'-1')

CONSTITUENTS	OVER 1"	1"-3/4"	3/4"-1/2"	1/2"-3/8"	3/8"-#4	#4-#8	#8-#16	#16-#30	#30-#50	#50-100	MINUS #100 TO PAN
	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %
1		9 56.3	18 28.2	46 41.1	36 29.5	36 30.8	24 22.4		25		
2					3 2.5	11 9.4	27 25.3	Estimated	35	15	
3		2 12.5	17 26.5	28 25.0	41 33.6	35 29.9	25 23.4	Estimated	25	60	90
4		5 31.2	14 21.8	23 20.5	21 17.2	18 15.4	10 9.3		10	15	7
5			1 1.6				1 0.9			5	
6			7 10.9	4 3.6	10 8.2	6 5.1	8 7.5	Estimated			
7			6 9.4	9 8.0	9 7.4	10 8.5	7 6.5		5		
8			1 1.6	2 1.8	2 1.6	1 0.9				5	3
9							2 1.9				
10							3 2.8				
11											
TOTALS		16 100	64 100	112 100	122 100	117 100	107 100	100	100	100	100

CALCULATION OF RESULTS OF PARTICLE COUNTS
WEIGHTED PERCENT OF EACH FRACTION

CONSTITUENTS	OVER 1"	1"-3/4"	3/4"-1/2"	1/2"-3/8"	3/8"-#4	#4-#8	#8-#16	#16-#30	#30-#50	#50-100	MINUS #100 TO PAN	WEIGHTED COMPOSITION
1		1.97	0.71	0.86	8.88	13.58	2.60	0.33	0.18	0.02		29.13
2					0.75	4.15	2.93	0.46	0.72	0.40	2.80	12.21
3		0.44	0.66	0.53	10.11	13.19	2.73	0.33	0.18	0.05	0.20	28.42
4		1.09	0.55	0.43	5.18	6.79	1.08	0.12	0.06	0.01		15.31
5			0.04				0.10					0.14
6			0.26	0.08	2.47	2.25	0.87					5.93
7			0.24	0.16	2.23	3.74	0.75	0.06	0.06	0.02	0.10	7.36
8			0.04	0.04	0.48	0.40						0.96
9							0.22					0.22
10							0.32					0.32
11												
TOTALS		3.50	2.50	2.10	30.10	44.10	11.60	1.30	1.20	0.50	3.10	100.00

CALCULATION OF RESULTS OF PARTICLE COUNTS
COMPOSITION OF FRACTIONS RETAINED ON SIEVES
LUCAS POINT, SOURCE 303
BASELINE C, COMBINED

CONSTITUENTS	OVER 1"	1"-3/4"	3/4"- 1/2"	1/2"-3/8"	3/8"-#4	#4-#8	#8-#16	#16-#30	#30-#50	#50-100	MINUS #100 TO PAN
	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %
1			12 23.5	22 25.0	37 20.2	82 40.0	35 27.3	20.0	5.0	2.0	2.0
2				1 1.1	2 1.1	12 5.6	32 25.0	50.0	75.0	90.0	95.0
3			7 13.7	11 12.5	51 27.9	26 12.7	20 15.6	10.0	10.0	3.0	1.0
4	2 100		25 49.0	45 51.1	78 42.6	73 35.6	33 25.8	15.0	6.0	4.0	
5				2 2.3				Estimated	Estimated	Estimated	Estimated
6			2 3.9	1 1.1	4 2.2	3 1.5	3 2.3	2.0			
7			4 7.8	2 2.3	7 3.8	6 2.9	4 3.2	3.0	3.0		1.0
8			1 2.1	2 2.3	2 1.1	2 1.1					
9							1 0.8				
10				2 2.3	2 1.1	1 0.6			1.0	1.0	1.0
11											
TOTALS	2 100		51 100	88 100	183 100	205 100	128 100	100	100	100	100

CALCULATION OF RESULTS OF PARTICLE COUNTS
WEIGHTED PERCENT OF EACH FRACTION

CONSTITUENTS	OVER 1"	1"-3/4"	3/4"- 1/2"	1/2"-3/8"	3/8"-#4	#4-#8	#8-#16	#16-#30	#30-#50	#50-100	MINUS #100 TO PAN	WEIGHTED COMPOSITION
1			0.66	0.80	4.32	7.92	3.66	2.08	0.60	0.06	0.14	20.24
2				0.04	0.24	1.11	3.35	5.20	8.92	2.60	6.56	28.02
3			0.38	0.40	5.97	2.51	2.09	1.04	1.19	0.09	0.07	13.74
4	7.30		1.37	1.64	9.12	7.05	3.46	1.56	0.71	0.12		32.33
5				0.07								0.07
6			0.11	0.04	0.47	0.30	0.31	0.21				1.44
7			0.22	0.07	0.81	0.57	0.43	0.31	0.36		0.07	2.84
8			0.06	0.07	0.23	0.22						0.58
9												0.10
10							0.10					
11				0.07	0.24	0.12			0.12	0.03	0.06	0.64
TOTALS	7.30		2.80	3.20	21.40	19.80	13.40	10.40	11.90	2.90	6.90	100.00

CALCULATION OF RESULTS OF PARTICLE COUNTS
COMPOSITION OF FRACTIONS RETAINED ON SIEVES
SWIMMING POINT, SOURCE 222
SOUTH, COMBINED

CONSTITUENTS	OVER 1"	1"-3/4"	3/4"-1/2"	1/2"-3/8"	3/8"-#4	#4-#8	#8-#16	#16-#30	#30-#50	#50-100	MINUS #100 TO PAN
	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %
1			14 33.3	22 27.8	49 38.0	62 33.3	22 22.0	26 18.8	10.0	2.0	1.0
2						14 7.5	29 29.0	53 38.4	66.0	90.0	95.0
3			11 26.2	23 29.1	21 16.3	36 19.4	17 17.0	17 12.3	10.0	3.0	2.0
4			11 26.2	29 36.7	53 41.0	63 33.9	20 20.0	20 14.5	6.0	1.0	
5			2 4.7	1 1.3					Estimated	Estimated	Estimated
6			1 2.4		1 0.8	3 1.6		6 4.3			
7			1 2.4	2 2.5	3 2.3	7 3.8	1 1.0	2 1.4			
8			1 2.4	1 1.3	1 0.8		5 5.0	4 2.9			
9							2 2.0	5 3.7	4.0	3.0	1.0
10											
11			1 2.4	1 1.3	1 0.8	1 0.5	4 4.0	5 3.7	1.0	1.0	1.0
TOTALS			42 100	79 100	129 100	186 100	100 100	138 100	100	100	100

CALCULATION OF RESULTS OF PARTICLE COUNTS
WEIGHTED PERCENT OF EACH FRACTION

CONSTITUENTS	OVER 1"	1"-3/4"	3/4"-1/2"	1/2"-3/8"	3/8"-#4	#4-#8	#8-#16	#16-#30	#30-#50	#50-100	MINUS #100 TO PAN	WEIGHTED COMPOSITION
1			2.10	1.89	8.89	5.13	2.35	1.82	1.50	0.11	0.07	23.86
2						1.16	3.10	3.72	9.90	4.77	7.03	29.68
3			1.65	1.98	3.81	2.98	1.82	1.19	1.50	0.16	0.15	15.24
4			1.65	2.50	9.59	5.22	2.14	1.41	0.90	0.05		23.46
5			0.30	0.09								0.39
6			0.15		0.19	0.25		0.42				1.01
7			0.15	0.17	0.54	0.59	0.11	0.14	0.30			2.00
8			0.15	0.09	0.19		0.54	0.28	0.15			1.40
9							0.21	0.36	0.60	0.16	0.07	1.40
10												
11			0.15	0.08	0.19	0.07	0.43	0.36	0.15	0.05	0.08	1.56
TOTALS			6.30	6.80	23.40	15.40	10.70	9.70	15.00	5.30	7.40	100.00

CALCULATION OF RESULTS OF PARTICLE COUNTS
COMPOSITION OF FRACTIONS RETAINED ON SIEVES
SWIMMING POINT, SOURCE 222
EAST, COMBINED

CONSTITUENTS	OVER 1"	1"-3/4"	3/4"-1/2"	1/2"-3/8"	3/8"-#4	#4-#8	#8-#16	#16-#30	#30-#50	#50-100	MINUS #100 TO PAN
	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %
1		1 25.0	5 22.7	12 25.6	33 30.6	34 41.5	42 35.9	30.0	20.0	10.0	1.0
2						11 13.4	31 26.5	40.0	60.0	80.0	95.0
3			3 13.6	18 38.3	30 27.8	12 14.6	15 12.8	12.0	10.0	5.0	2.0
4		3 75.0	13 59.1	14 29.8	38 35.3	20 24.4	20 17.1	Estimated 10.0	Estimated 5.0	Estimated 2.0	Estimated
5				1 2.1							
6					1 0.9						
7			1 4.6	1 2.1	4 3.6	4 4.9	6 5.1	7.0	5.0	3.0	2.0
8					2 1.8						
9											
10											
11				1 2.1		1 1.2	3 2.6	1.0			
TOTALS		4 100	22 100	47 100	108 100	82 100	117 100	100	100	100	100

CALCULATION OF RESULTS OF PARTICLE COUNTS
WEIGHTED PERCENT OF EACH FRACTION

CONSTITUENTS	OVER 1"	1"-3/4"	3/4"-1/2"	1/2"-3/8"	3/8"-#4	#4-#8	#8-#16	#16-#30	#30-#50	#50-100	MINUS #100 TO PAN	WEIGHTED COMPOSITION
1		3.05	1.61	1.87	6.40	5.52	3.16	2.49	1.76	0.42	0.09	26.37
2						1.78	2.33	3.32	5.28	3.36	8.64	24.71
3			0.97	2.80	5.81	1.94	1.13	1.00	0.88	0.21	0.18	14.92
4		9.15	4.20	2.18	7.38	3.25	1.50	0.83	0.44	0.08		29.01
5				0.15								0.15
6					0.19							0.19
7			0.32	0.15	0.74	0.65	0.45	0.58	0.44	0.13	0.19	3.65
8					0.38							0.38
9												
10												
11				0.15		0.16	0.23	0.08				0.62
TOTALS		12.20	7.10	7.30	20.90	13.30	8.80	8.30	8.80	4.20	9.10	100.00

CALCULATION OF RESULTS OF PARTICLE COUNTS
COMPOSITION OF FRACTIONS RETAINED ON SIEVES
SWIMMING POINT, SOURCE 222
WEST, COMBINED

CONSTITUENTS	OVER 1"	1"-3/4"	3/4"- 1/2"	1/2"-3/8"	3/8"-#4	#4-#8	#8-#16	#16-#30	#30-#50	#50-100	MINUS #100 TO PAN
	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %
1			1 11.1	5 12.3	32 24.6	24 16.7	25 23.1	20 20.0	20.0	5.0	
2						2 1.4	14 13.0	35 35.0	50.0	80.0	90.0
3			1 11.1	8 19.5	28 21.5	27 18.8	15 13.9	10 10.0	10.0	5.0	5.0
4			4 44.5	18 43.9	54 41.5	70 48.6	30 27.8	18 18.0	10.0	5.0	1.0
5				1 2.4					Estimated 3.0	Estimated 1.0	Estimated 2.0
6				1 2.4		5 3.5	7 6.5	5 5.0			
7				6 14.6	6 4.6	9 6.2	14 13.0	10 10.0			
8			1 11.1	1 2.4	4 3.2	3 2.1	1 0.9				
9											
10											
11			2 22.2	1 2.4	6 4.6	4 2.7	2 1.8	2 2.0	2.0	1.0	2.0
TOTALS			9 100	41 100	130 100	144 100	108 100	100 100	100	100	100

CALCULATION OF RESULTS OF PARTICLE COUNTS
WEIGHTED PERCENT OF EACH FRACTION

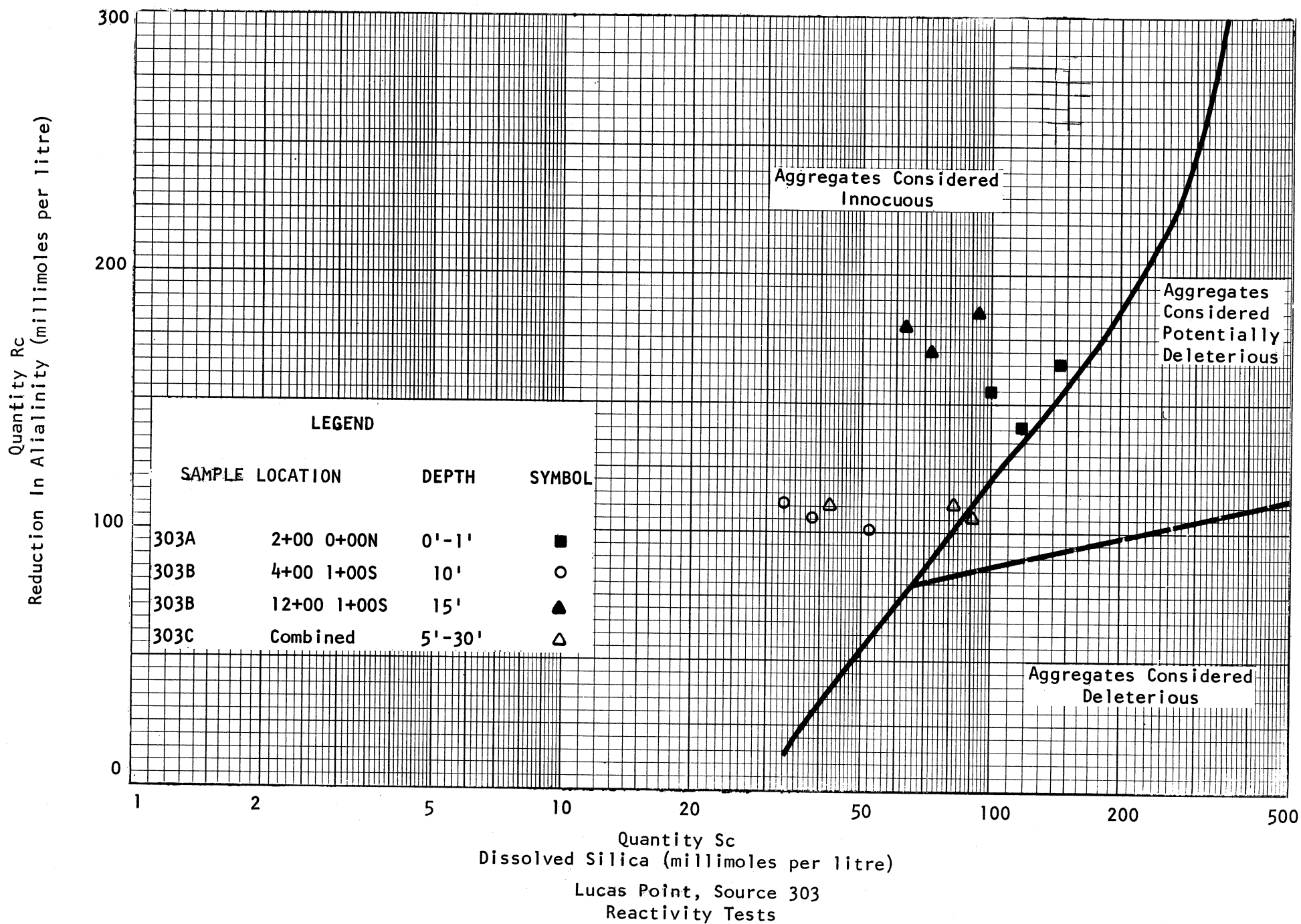
CONSTITUENTS	OVER 1"	1"-3/4"	3/4"- 1/2"	1/2"-3/8"	3/8"-#4	#4-#8	#8-#16	#16-#30	#30-#50	#50-100	MINUS #100 TO PAN	WEIGHTED COMPOSITION
1			1.58	0.44	4.48	2.14	2.10	1.36	2.94	0.42		15.46
2						0.18	1.18	2.38	7.35	6.64		28.80
3			1.58	0.70	3.91	2.41	1.26	0.68	1.47	0.42	0.62	13.05
4			6.32	1.58	7.55	6.22	2.54	1.22	1.47	0.42	0.12	27.44
5				0.09								0.09
6				0.09		0.45	0.53	0.34	0.44	0.08		1.99
7				0.52	0.84	0.79	1.18	0.68	0.74	0.25	0.25	5.25
8			1.58	0.09	0.58	0.27	0.09					2.61
9												
10												
11			3.14	0.09	0.84	0.34	0.16	0.14	0.29	0.07	0.24	5.31
TOTALS			14.20	3.60	18.20	12.80	9.10	6.80	14.70	8.30	12.30	100.00

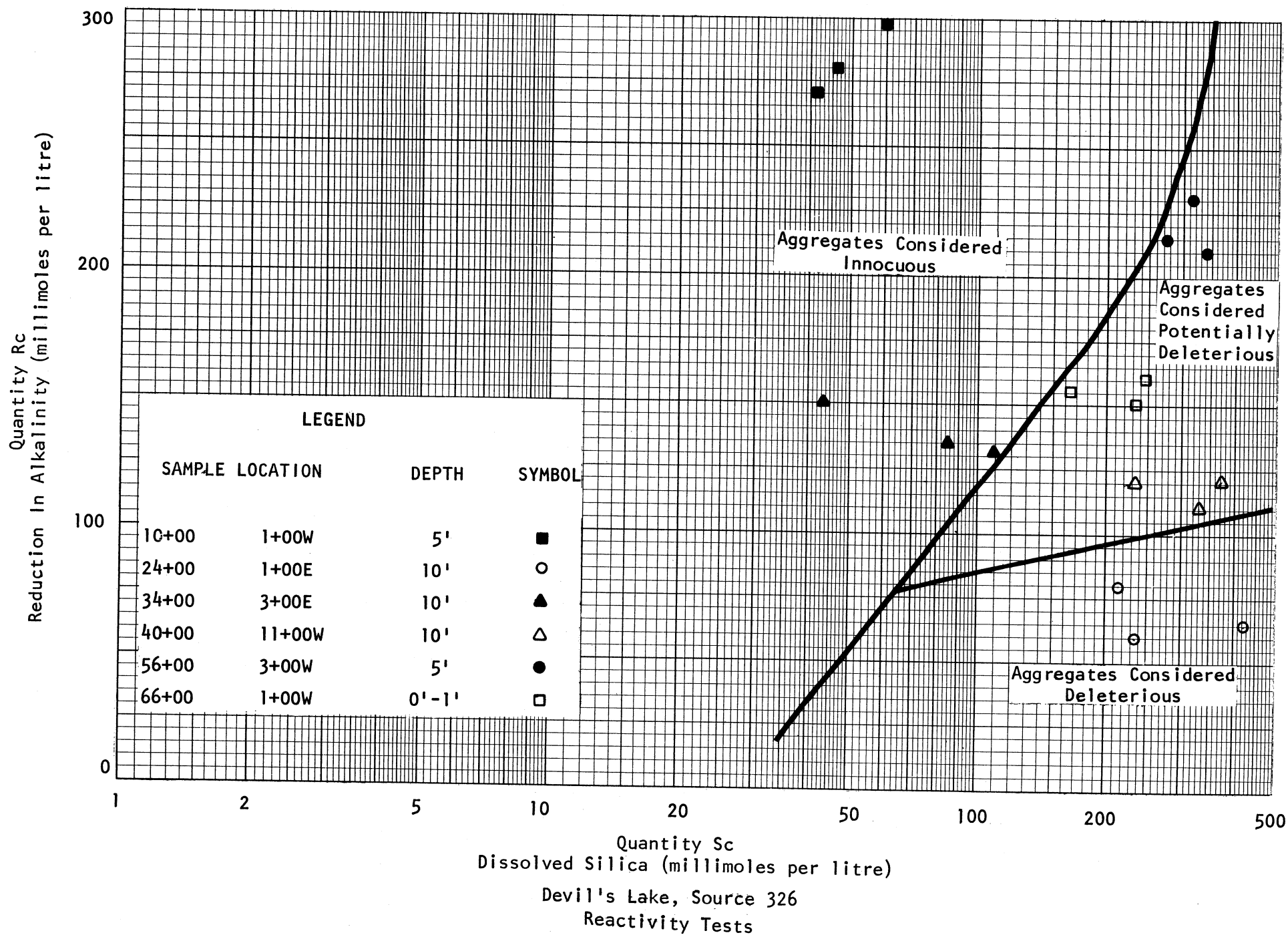
CALCULATION OF RESULTS OF PARTICLE COUNTS
COMPOSITION OF FRACTIONS RETAINED ON SIEVES
SWIMMING POINT, SOURCE 222
CENTRAL, COMBINED

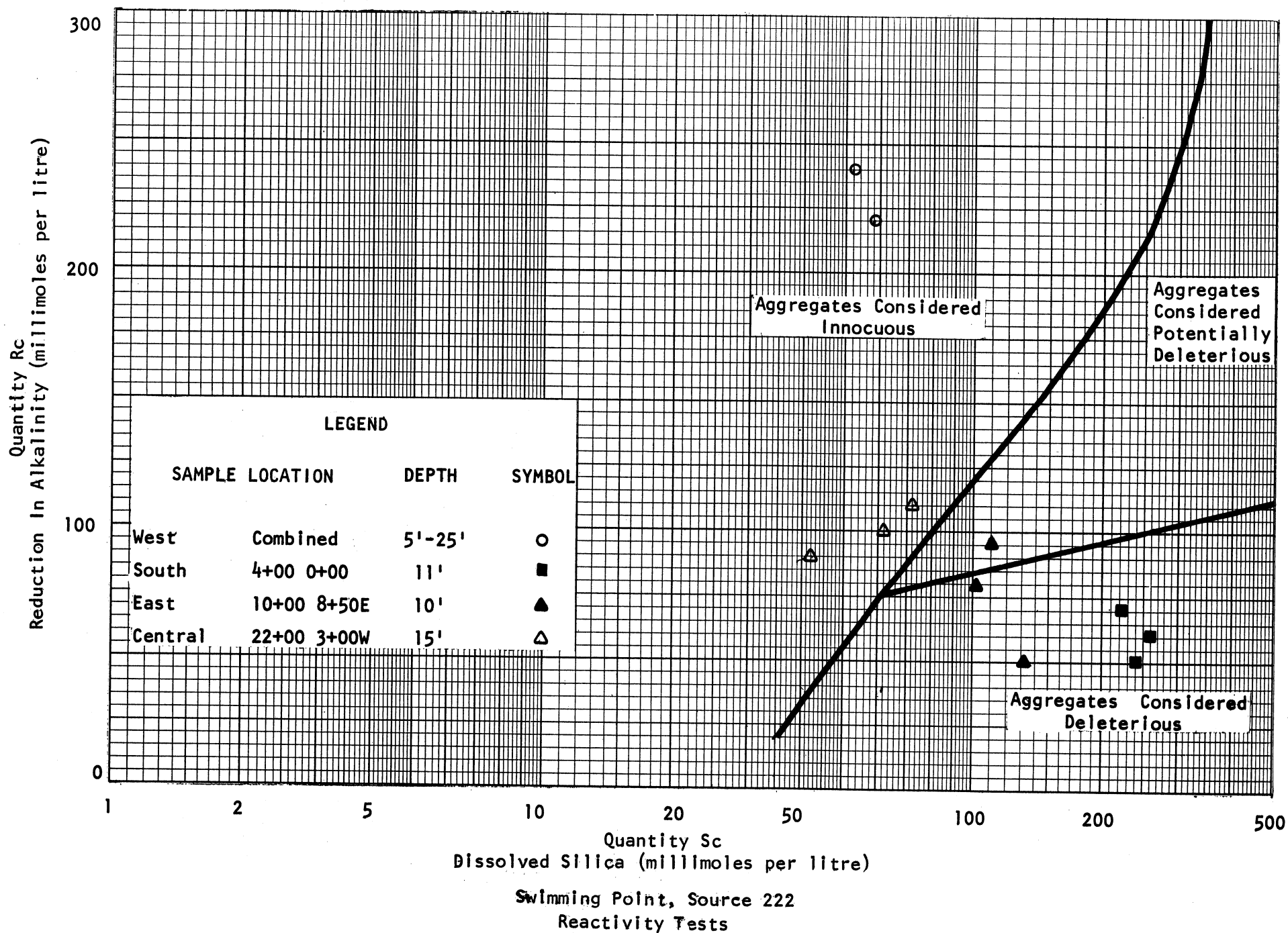
CONSTITUENTS	OVER 1"	1"-3/4"	3/4"- 1/2"	1/2"-3/8"	3/8"-#4	#4-#8	#8-#16	#16-#30	#30-#50	#50-100	MINUS #100 TO PAN
	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %	No. Grains %
1				4 44.5	14 33.3	67 48.6	40 35.4	23 21.9			
2						13 9.4	25 22.1	43 41.0			
3				2 22.2	7 16.7	19 13.8	12 10.6	15 14.3			
4				2 22.2	16 38.1	30 21.7	20 17.7	12 11.4			
5					1 2.4	1 0.7			Estimated 15.0	Estimated 5.0	Estimated 2.0
6					1 2.4	1 0.7			60.0	85.0	95.0
7						6 4.4	7 6.2	8 7.6	10.0	3.0	2.0
8					2 4.7					2.0	
9						1 0.7	5 4.4	1 1.0			
10											
11				1 11.1	1 2.4		4 3.6	3 2.8			
TOTALS				9 100	42 100	138 100	113 100	105 100	100	100	100

CALCULATION OF RESULTS OF PARTICLE COUNTS
WEIGHTED PERCENT OF EACH FRACTION

CONSTITUENTS	OVER 1"	1"-3/4"	3/4"- 1/2"	1/2"-3/8"	3/8"-#4	#4-#8	#8-#16	#16-#30	#30-#50	#50-100	MINUS #100 TO PAN	WEIGHTED COMPOSITION
1				5.78	9.79	8.89	4.28	1.88	1.22	0.21	0.13	32.18
2						1.72	2.67	3.53	4.86	3.48	6.08	22.34
3				2.89	4.91	2.53	1.28	1.23	0.81	0.12	0.13	13.90
4				2.89	11.20	3.97	2.14	0.98	0.40	0.08		21.66
5					0.71	0.13						0.84
6					0.71	0.13						0.84
7						0.80	0.75	0.65	0.81	0.21	0.06	3.28
8					1.37							1.37
9						0.13	0.54	0.09				0.76
10												
11				1.44	0.71		0.44	0.24				2.83
TOTALS				13.00	29.40	18.30	12.10	8.60	8.10	4.10	6.40	100.00





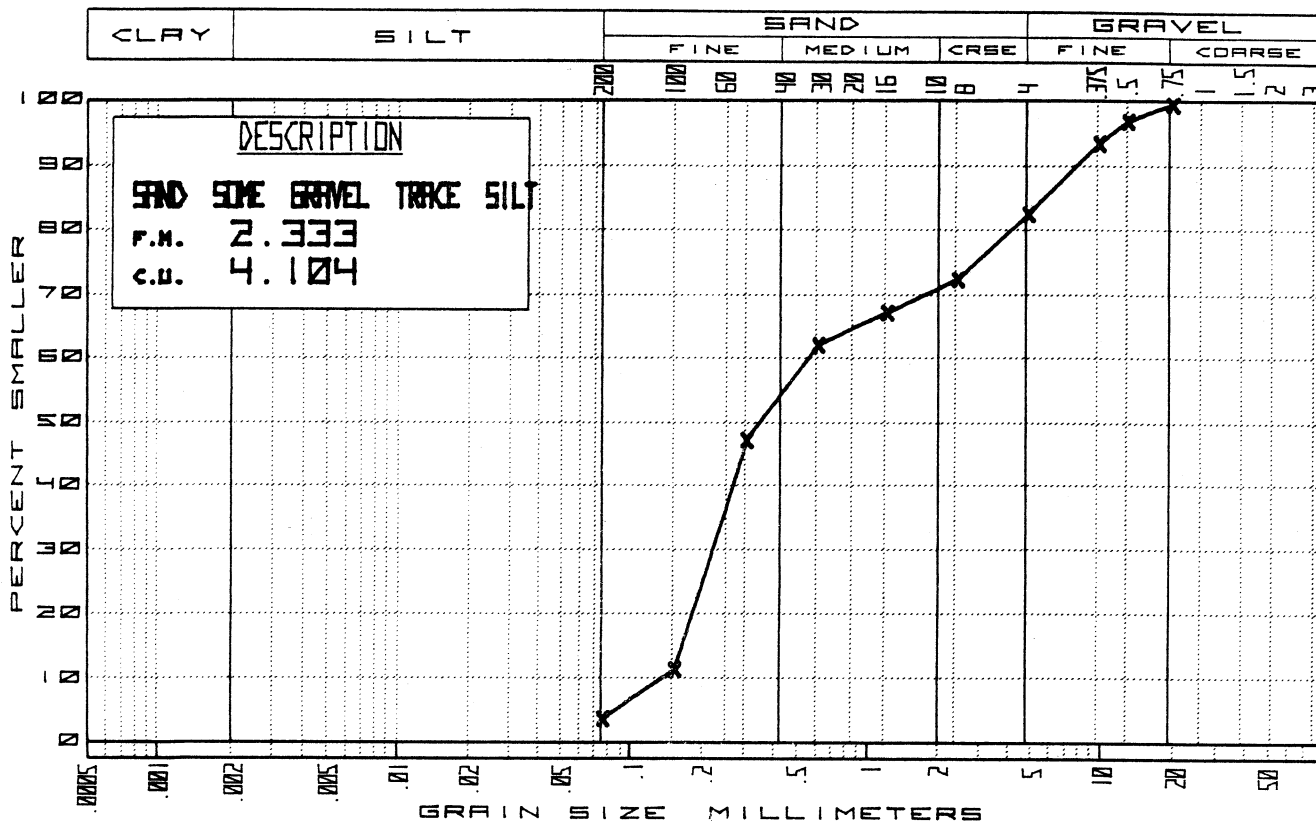


Devil's Lake, Source 326

Grain Size Curves

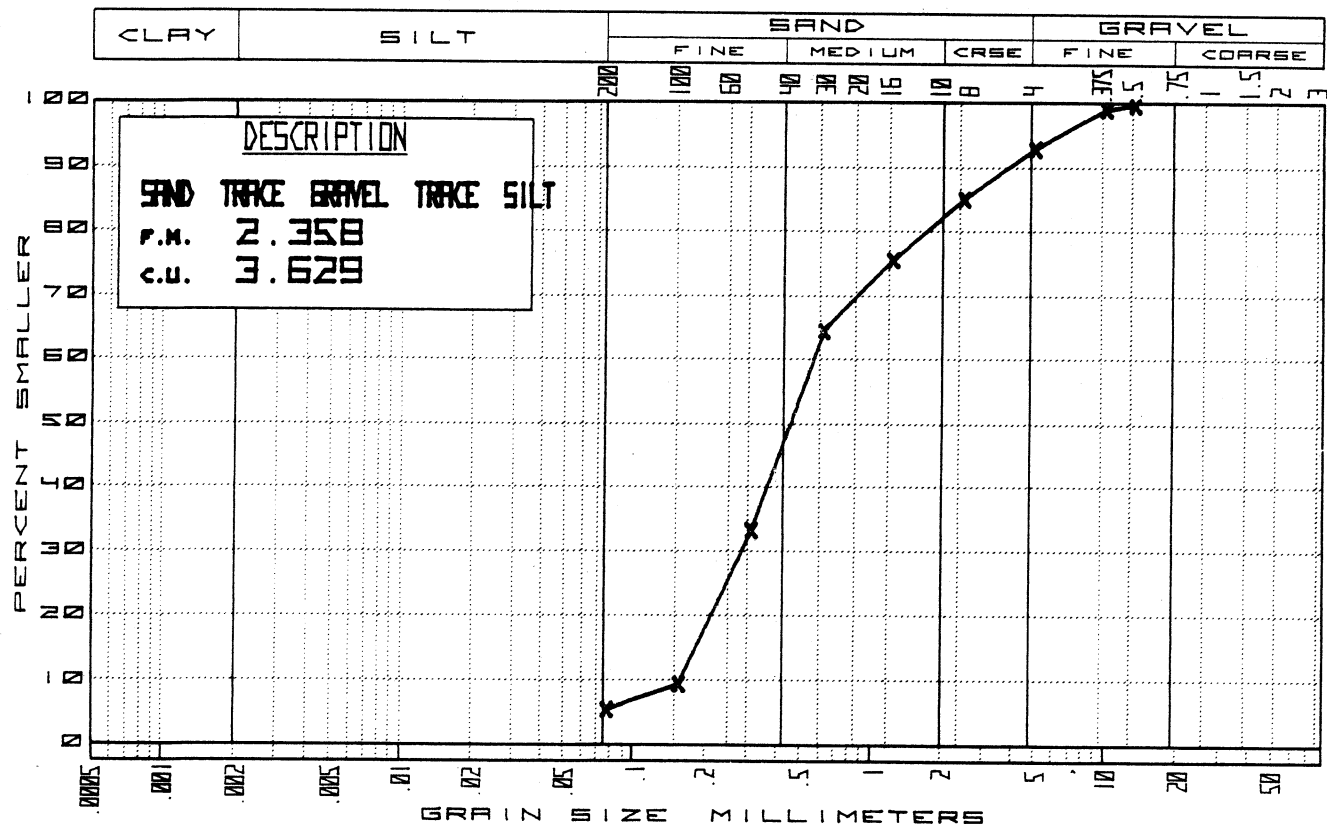
JOB NO. **1-1318** SITE **DEVILS LAKE SOURCE 326**

DATE **2-10-76** BASELINE **A** STATION **2+00N** OFFSET **0+00** DEPTH **25.0**



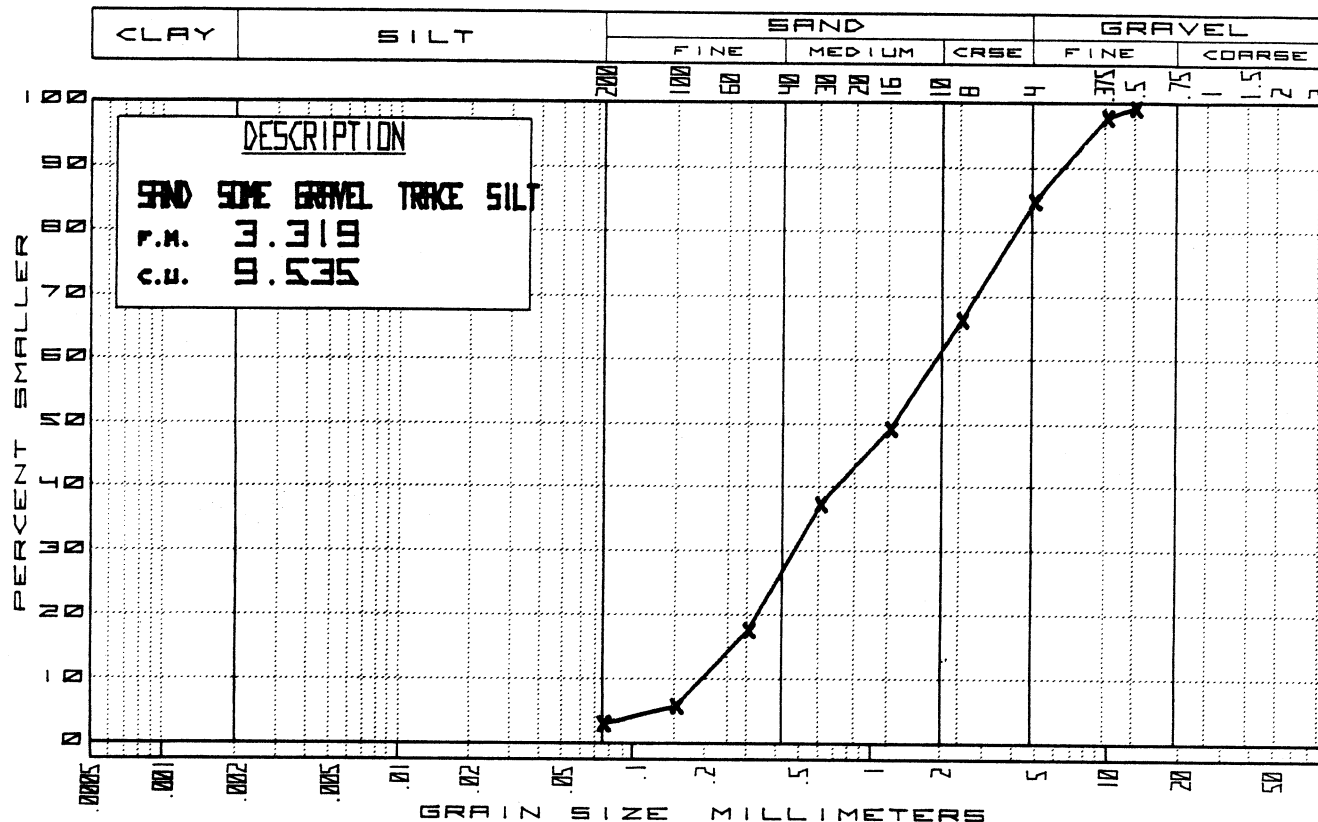
JOB NO. **1-1318** SITE **DEVILS LAKE SOURCE 326**

DATE **2-10-76** BASELINE **A** STATION **2+00N** OFFSET **1+00E** DEPTH **4.0-6.0**



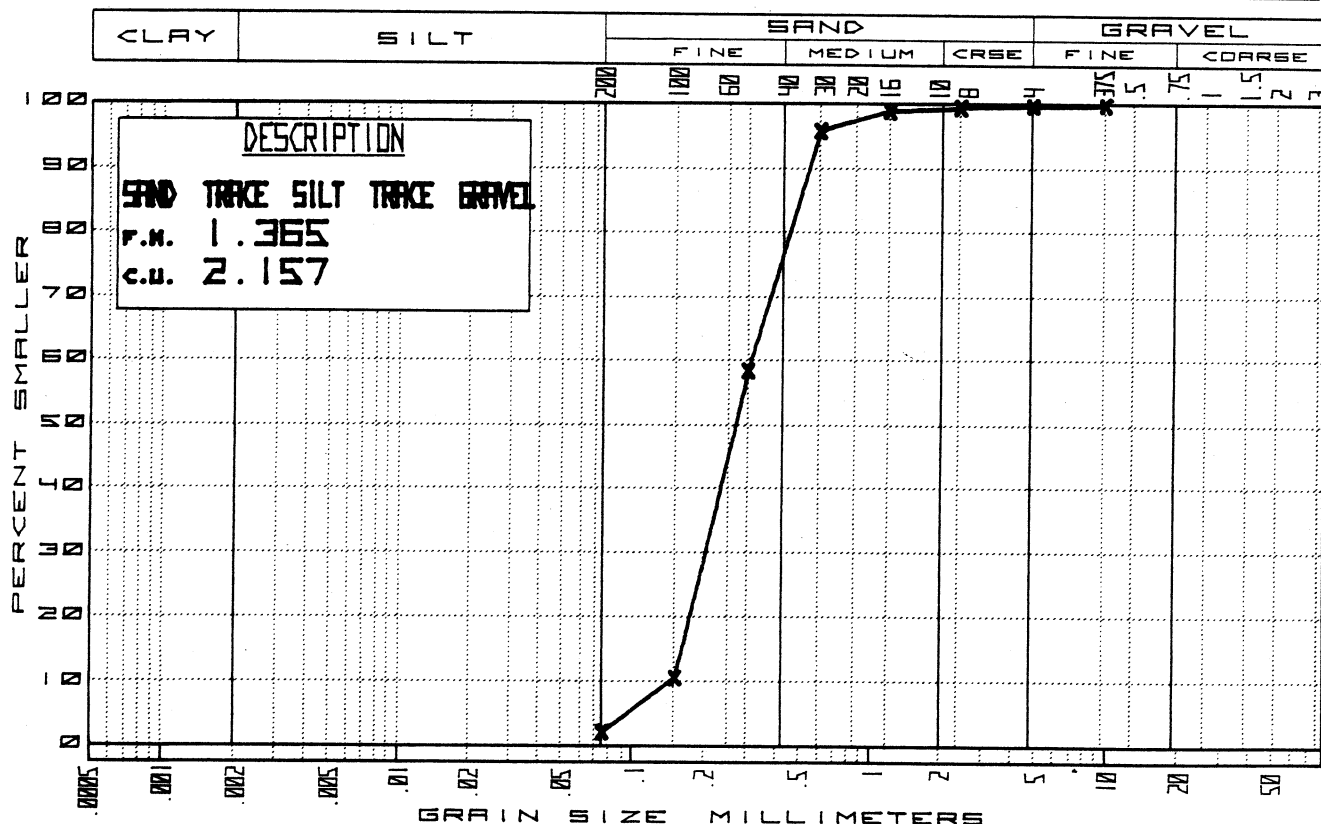
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-10-76 BASELINE A STATION 4+00N OFFSET 2+00W DEPTH 15.0



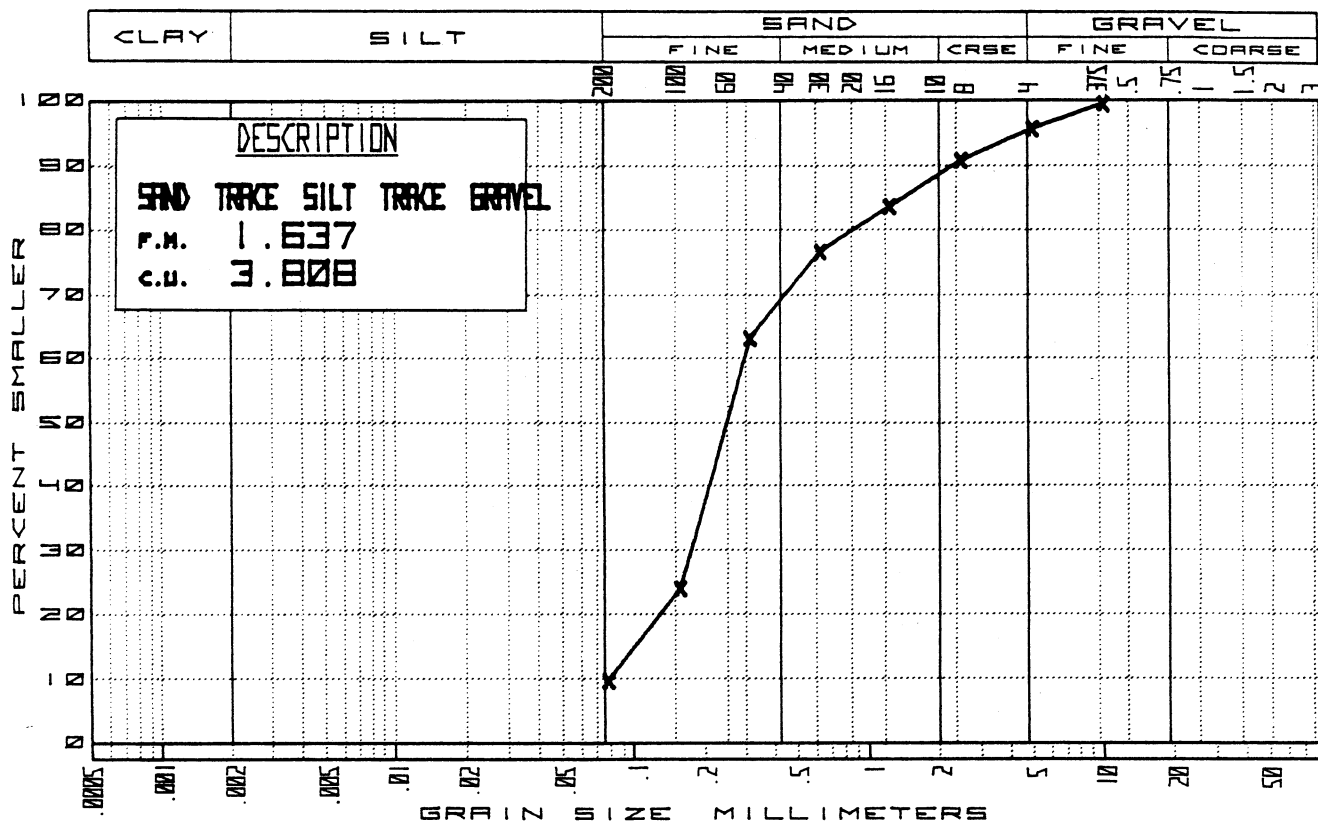
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-18-76 BASELINE A STATION 4+00 OFFSET 0+00 DEPTH 4.0-5.0



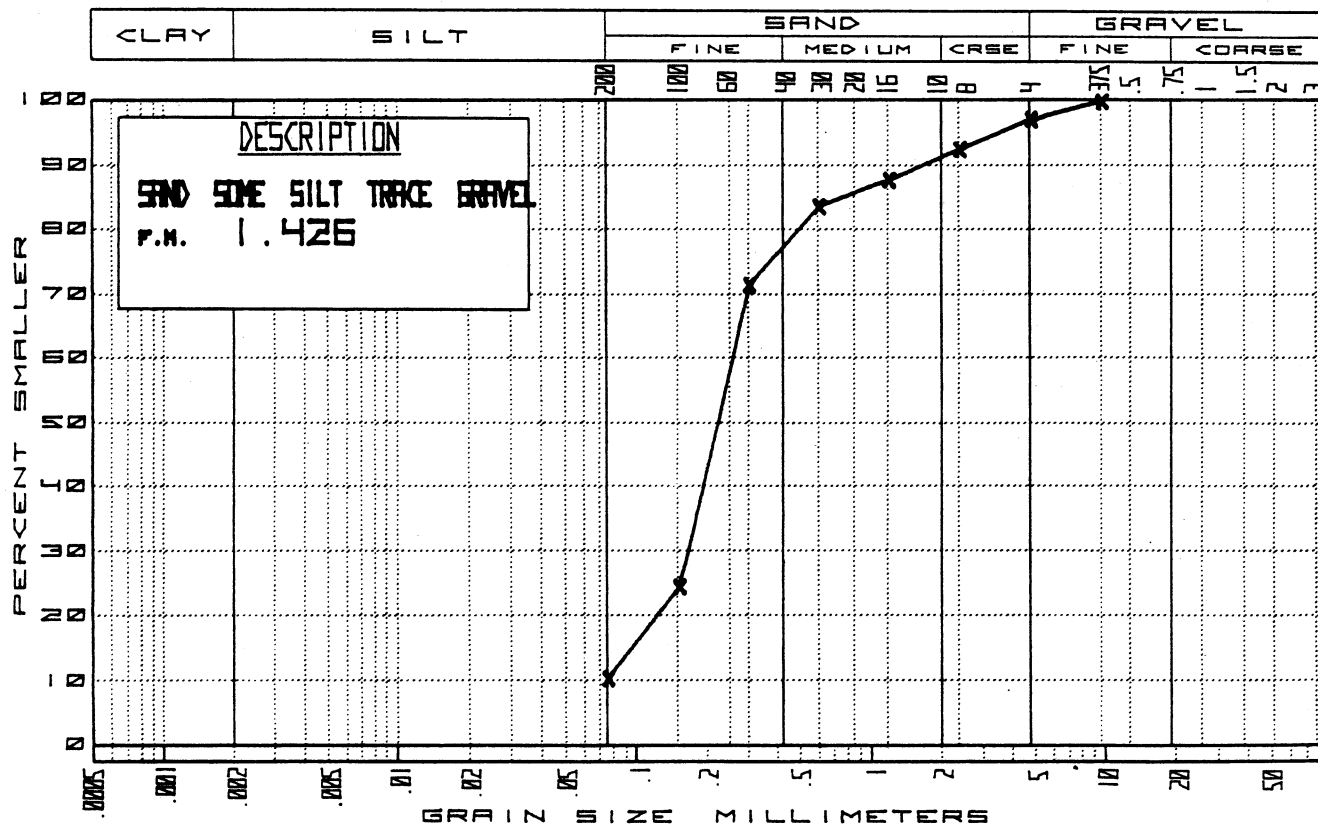
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-10-76 BASELINE A STATION 2+00N OFFSET 1+00E DEPTH 18.0

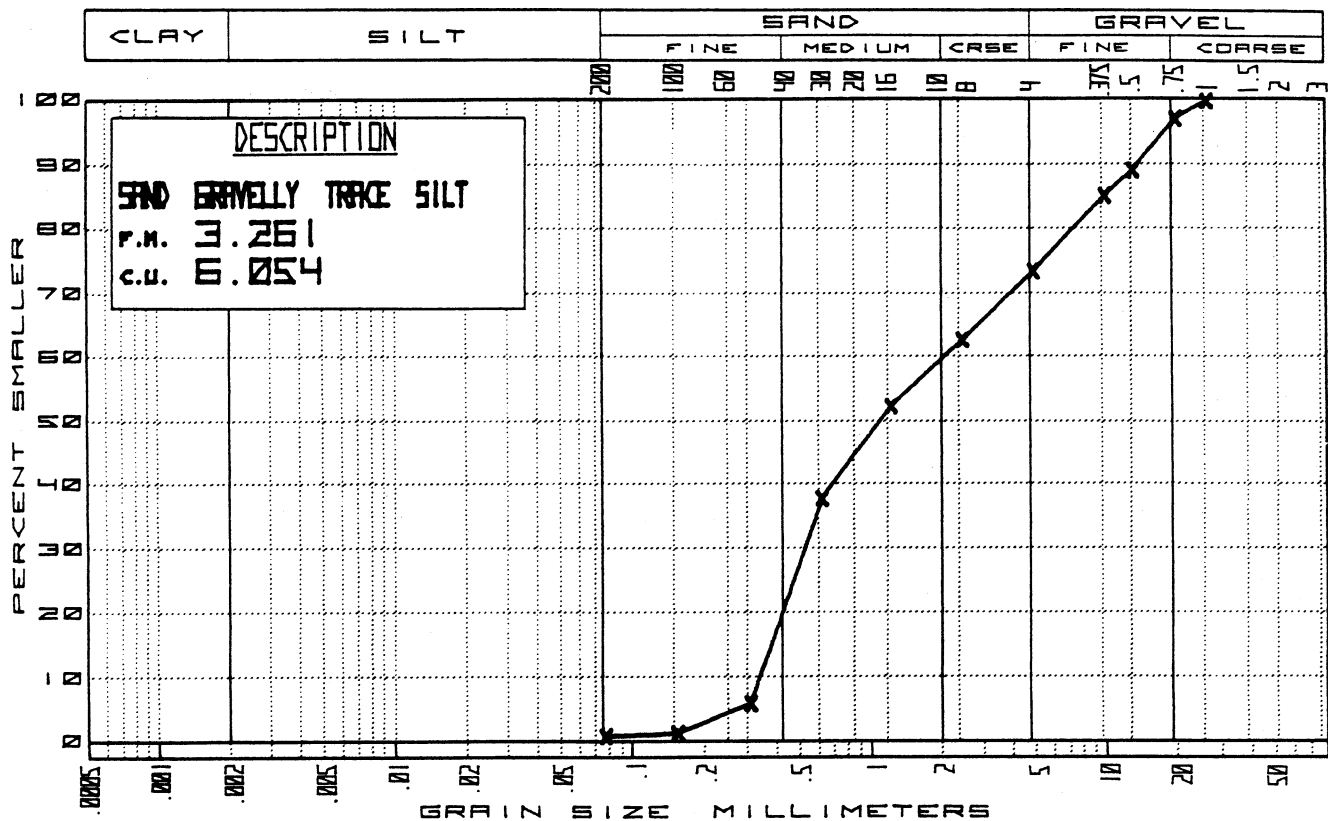


JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

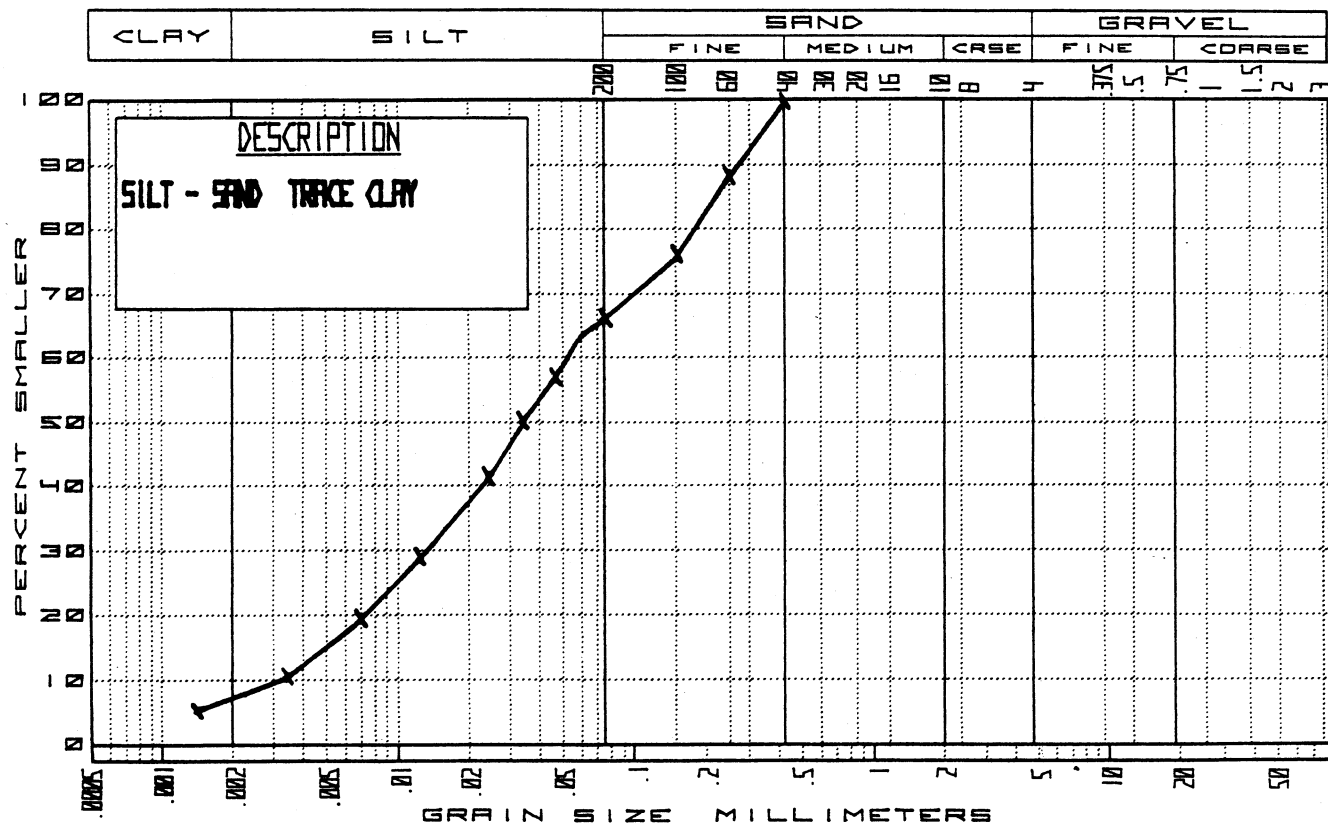
DATE 2-10-76 BASELINE A STATION 4+00N OFFSET 2+00W DEPTH 5.0



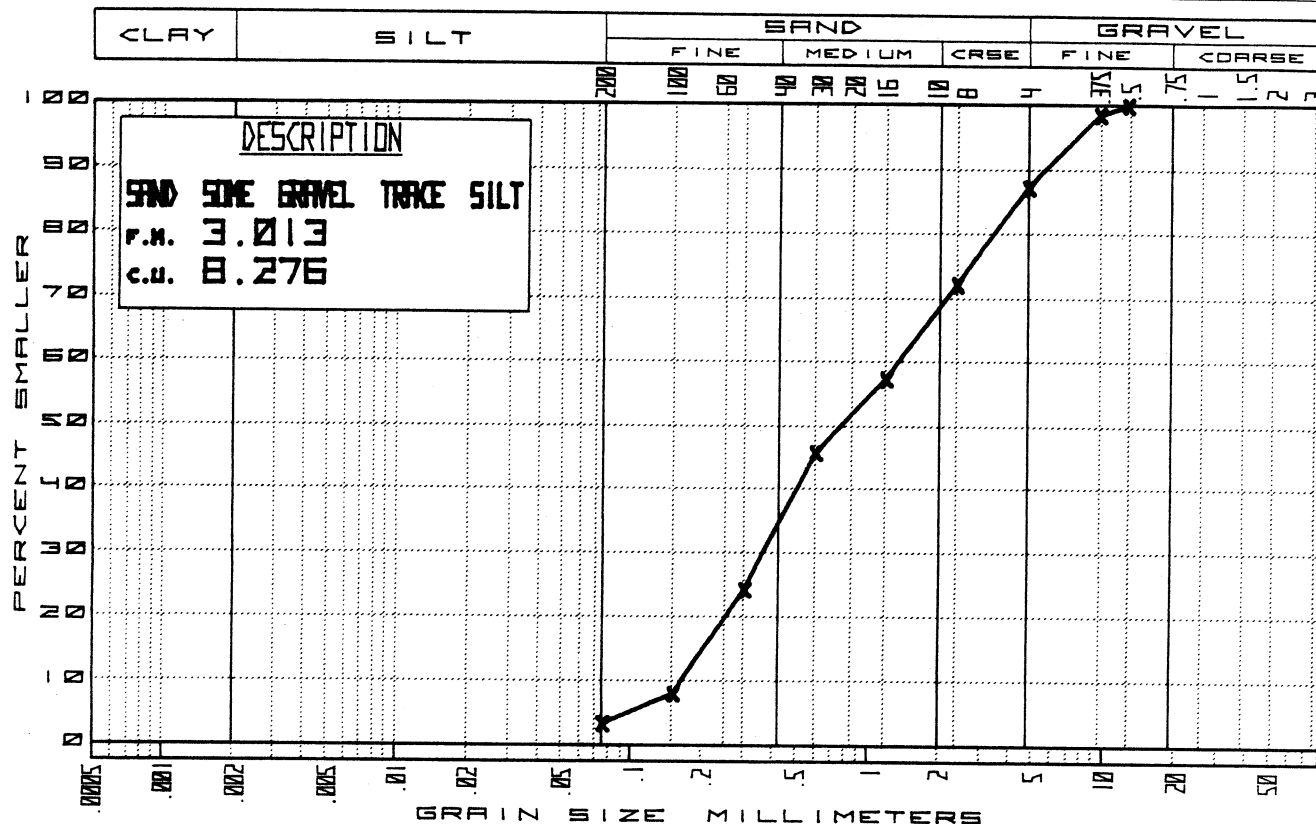
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-11-76 BASELINE A STATION 4+00 OFFSET 0+00 DEPTH 15.0-20.0



JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-12-76 BASELINE A STATION 4+00 OFFSET 1+00E DEPTH 4.0-5.0

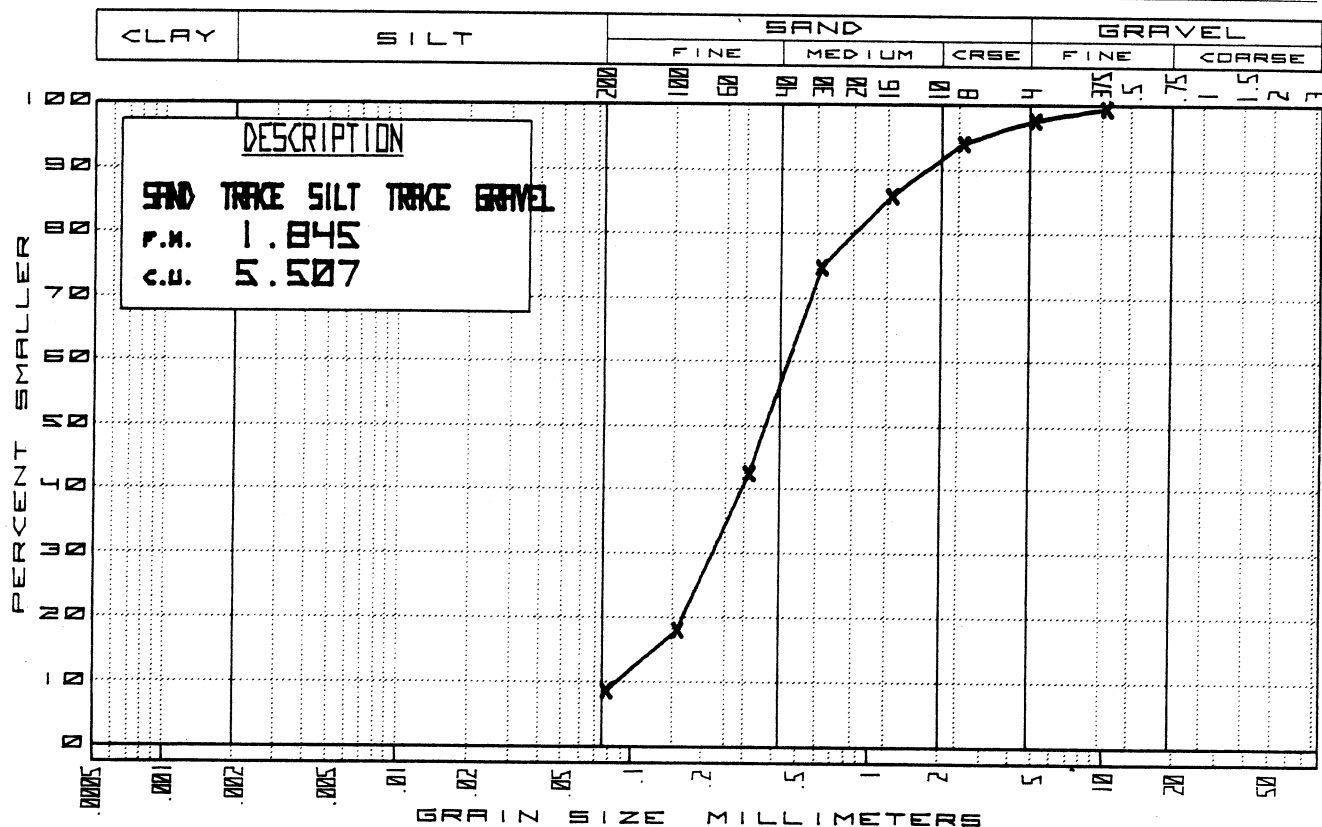


DATE 2-12-76 BASELINE A STATION 4+00 OFFSET 1+00E DEPTH 13.5-15.0



JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

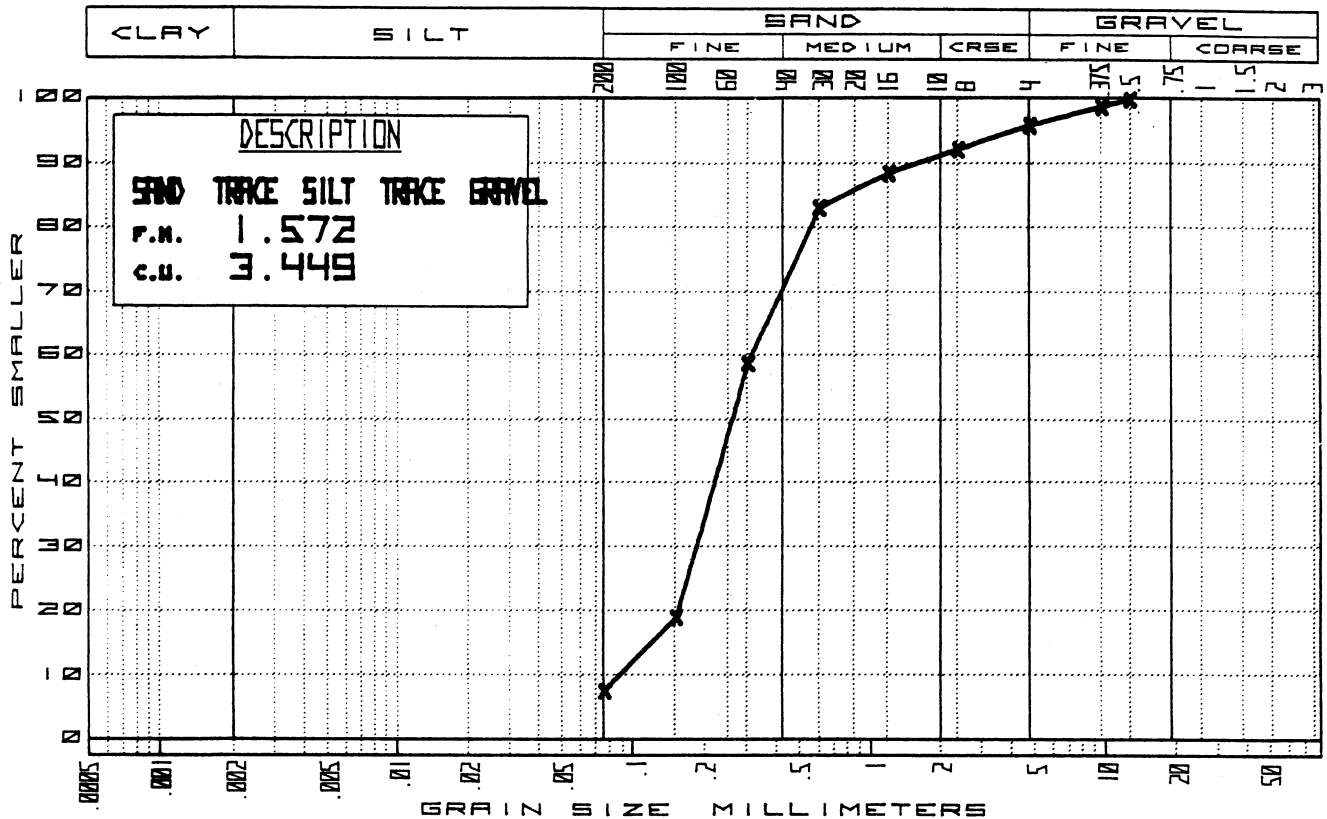
DATE 2-10-76 BASELINE A STATION 4400N OFFSET 2400E DEPTH 13.0



All tests performed in accordance with ASTM & CSA standards.

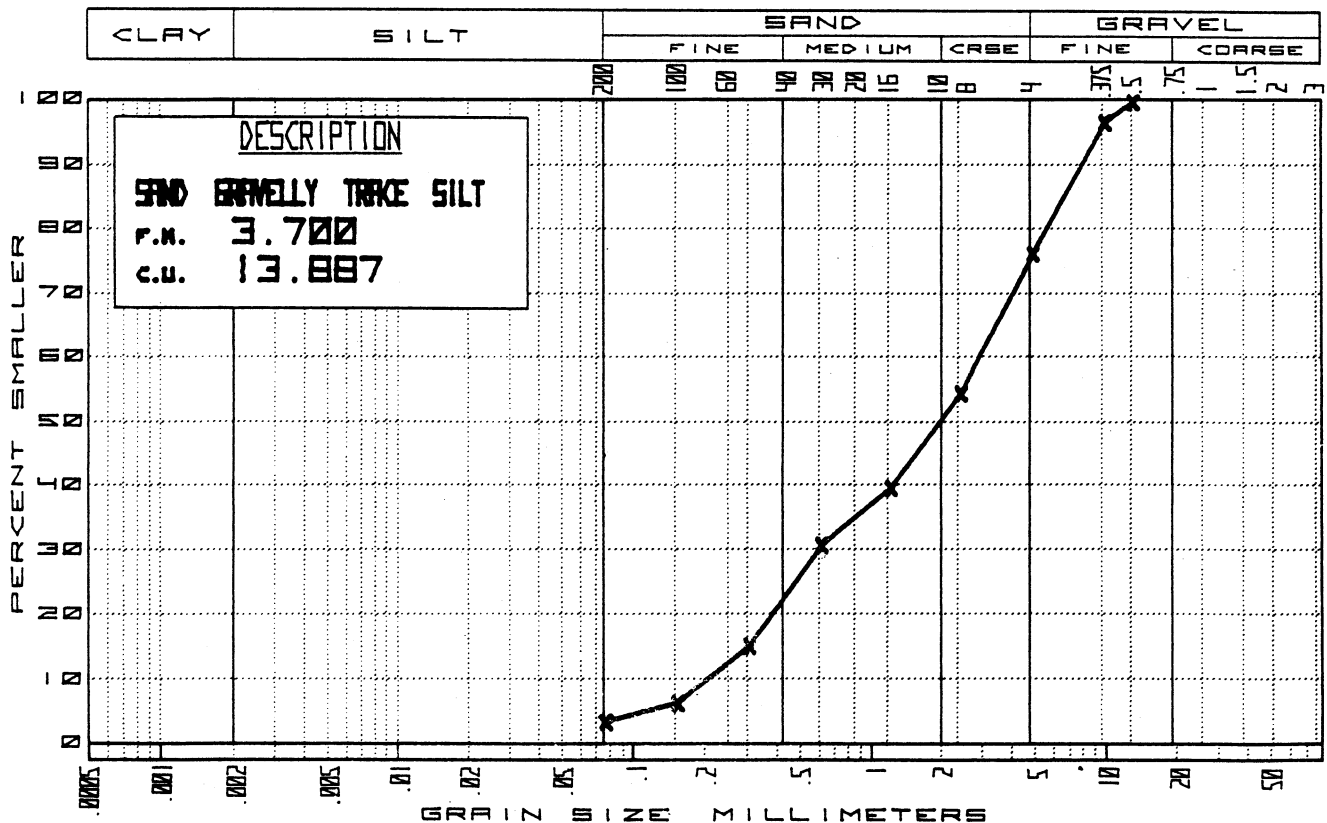
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-10-76 BASELINE A STATION 6+00 OFFSET 0+00 DEPTH 5.0

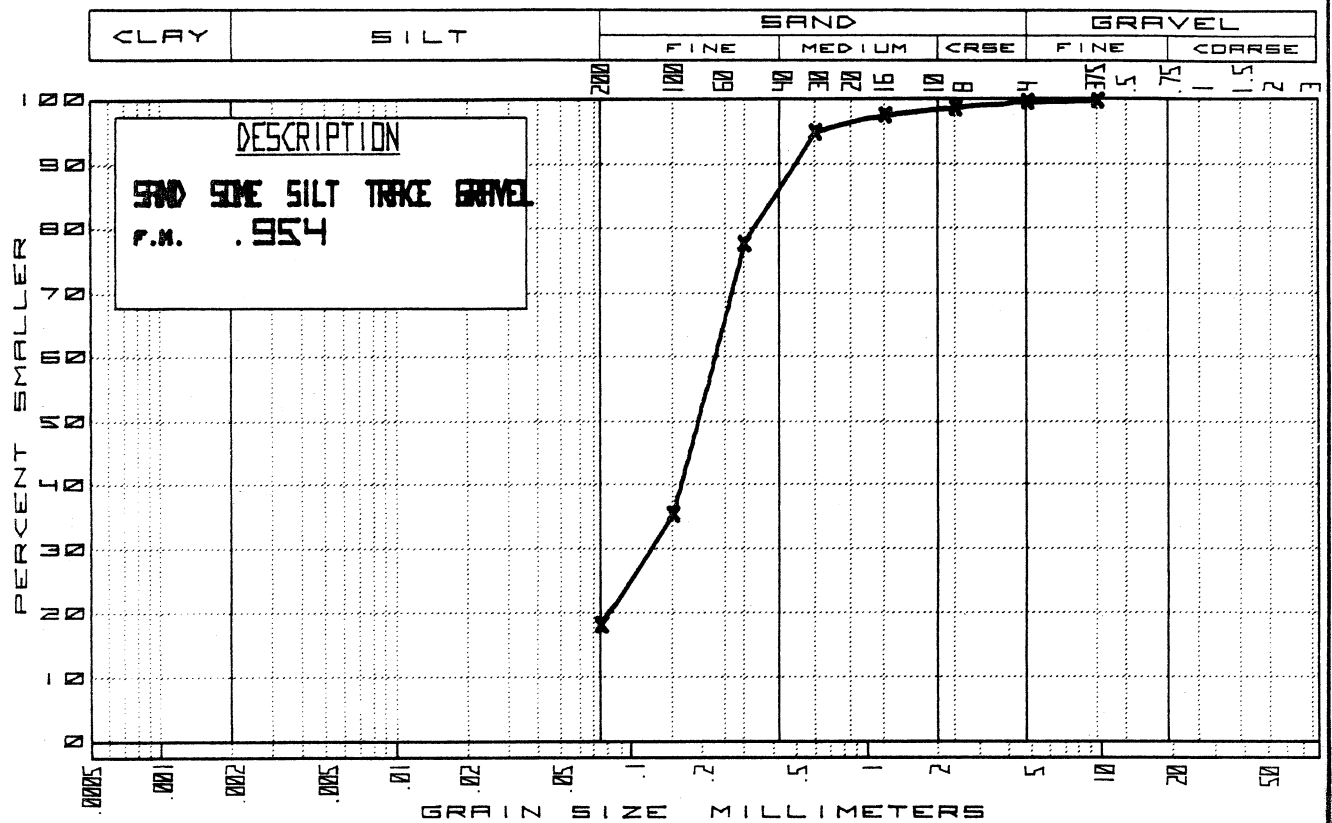


JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

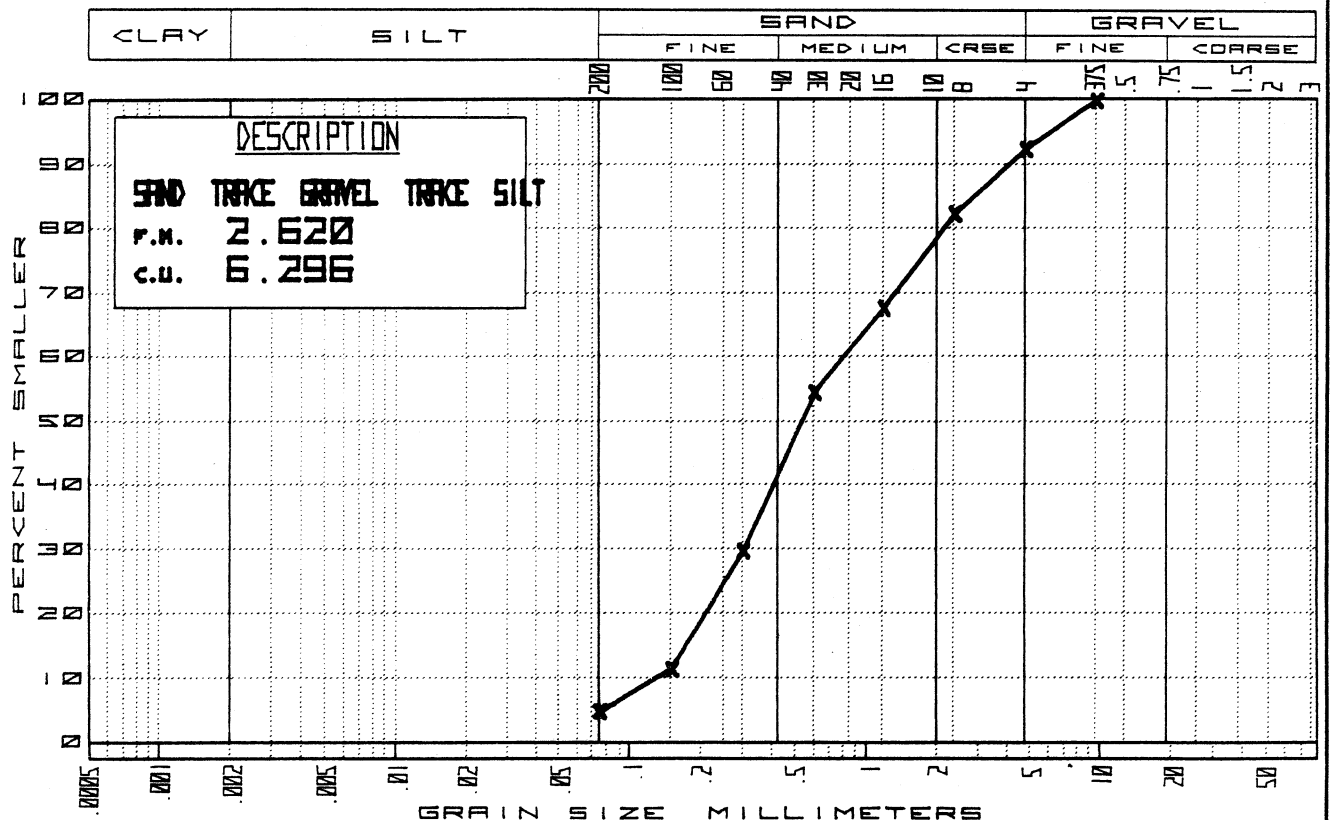
DATE 2-10-76 BASELINE A STATION 6+00 OFFSET 0+00 DEPTH 15.0



JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-10-76 BASELINE A STATION 6+00 OFFSET 1+00E DEPTH 5.0

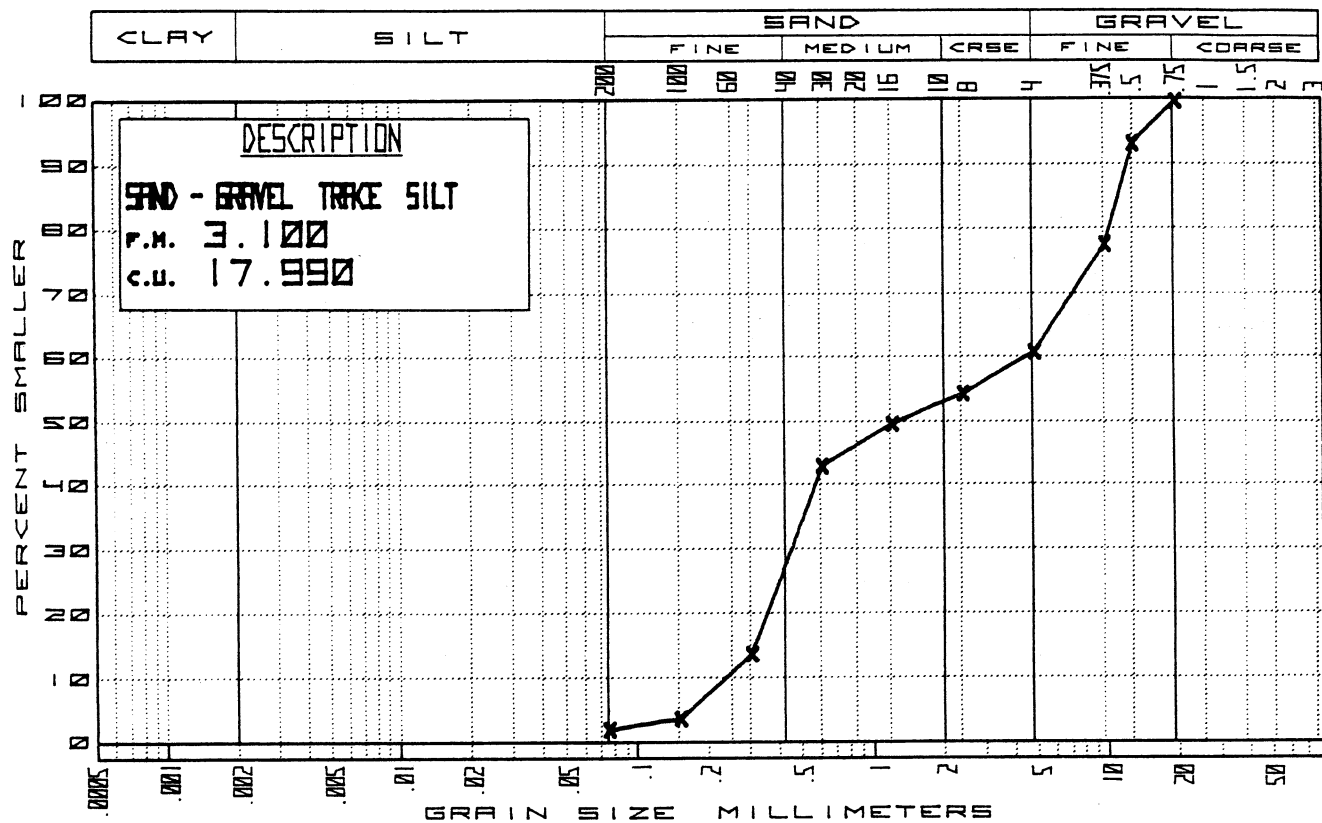


JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-10-76 BASELINE A STATION 6+00 OFFSET 2+00E DEPTH 10.0

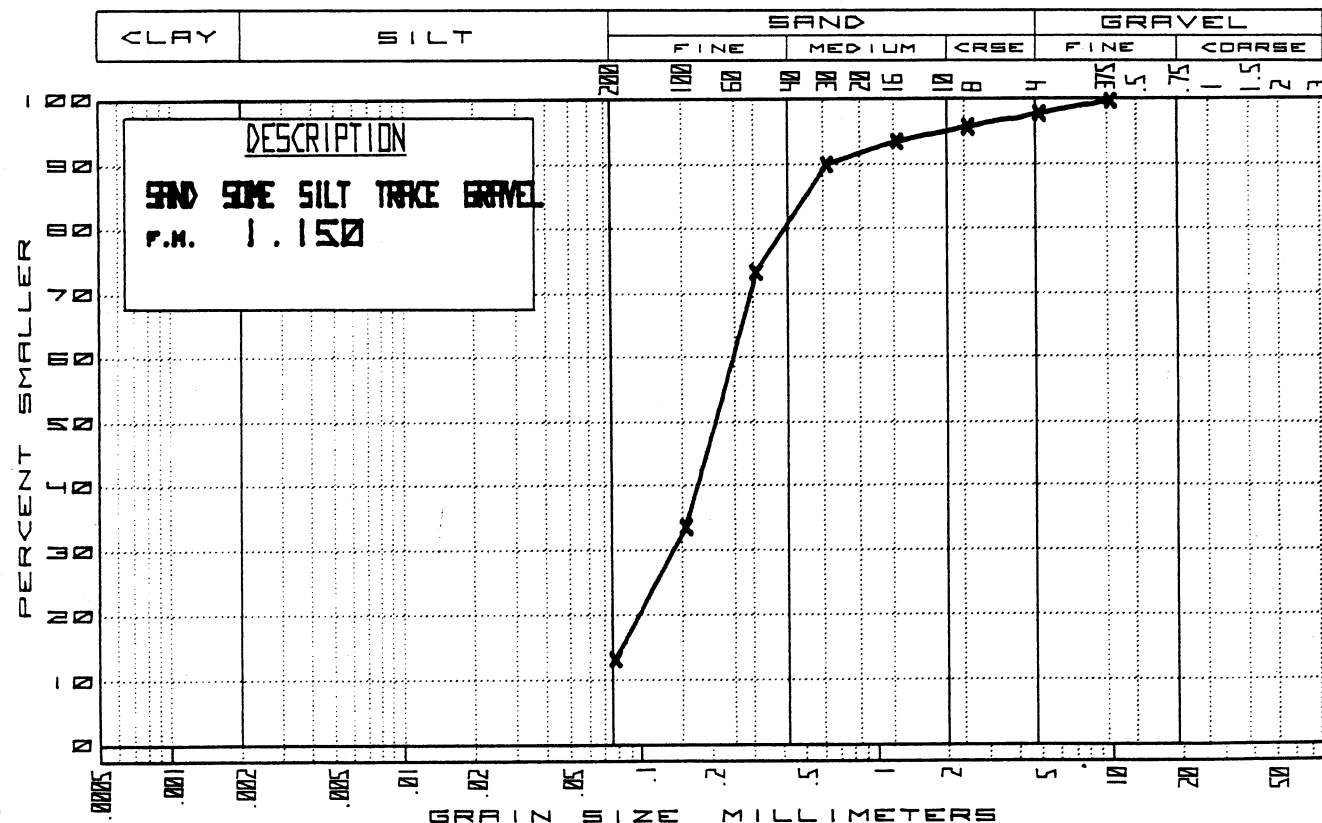




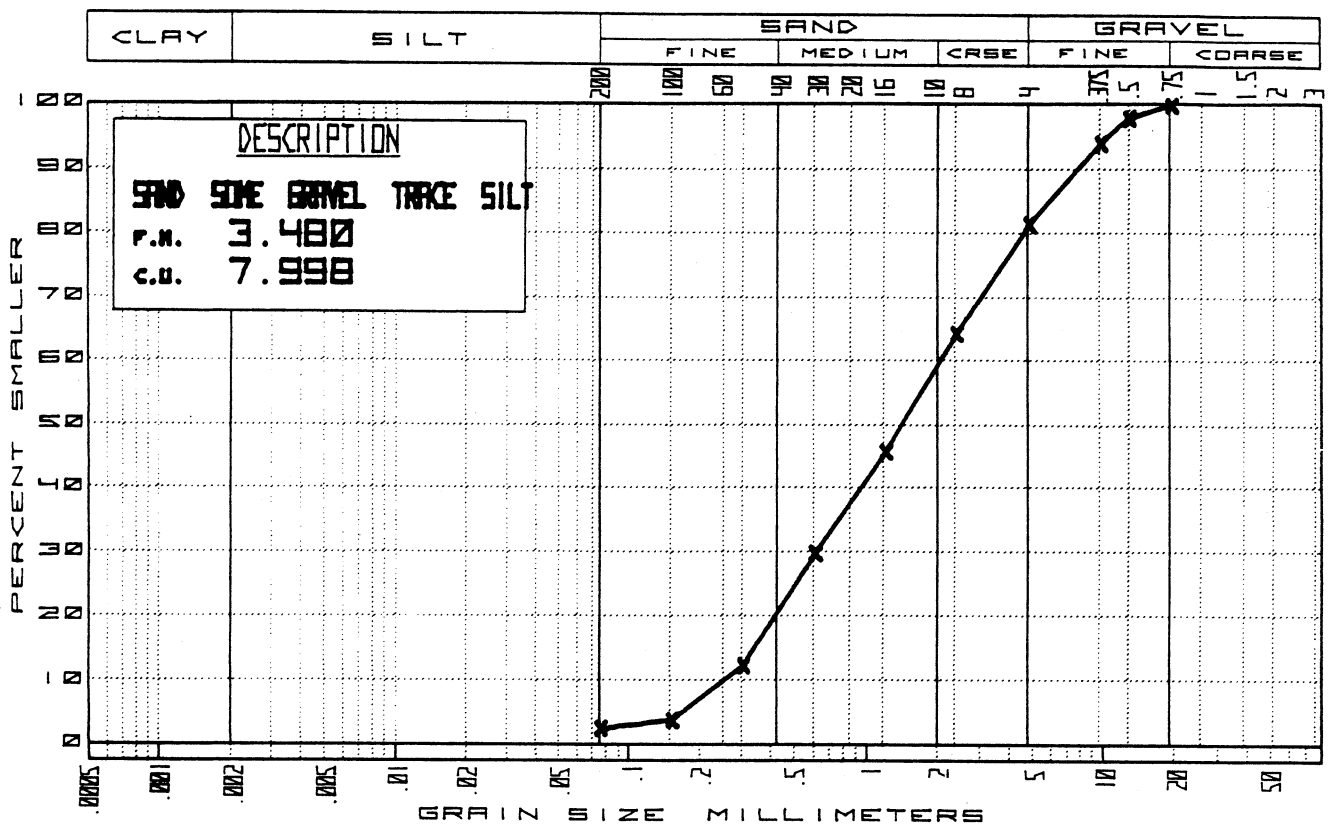
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
DATE 2-11-76 BASELINE A STATION 6+00 OFFSET 2+00E DEPTH 18.0-20.0



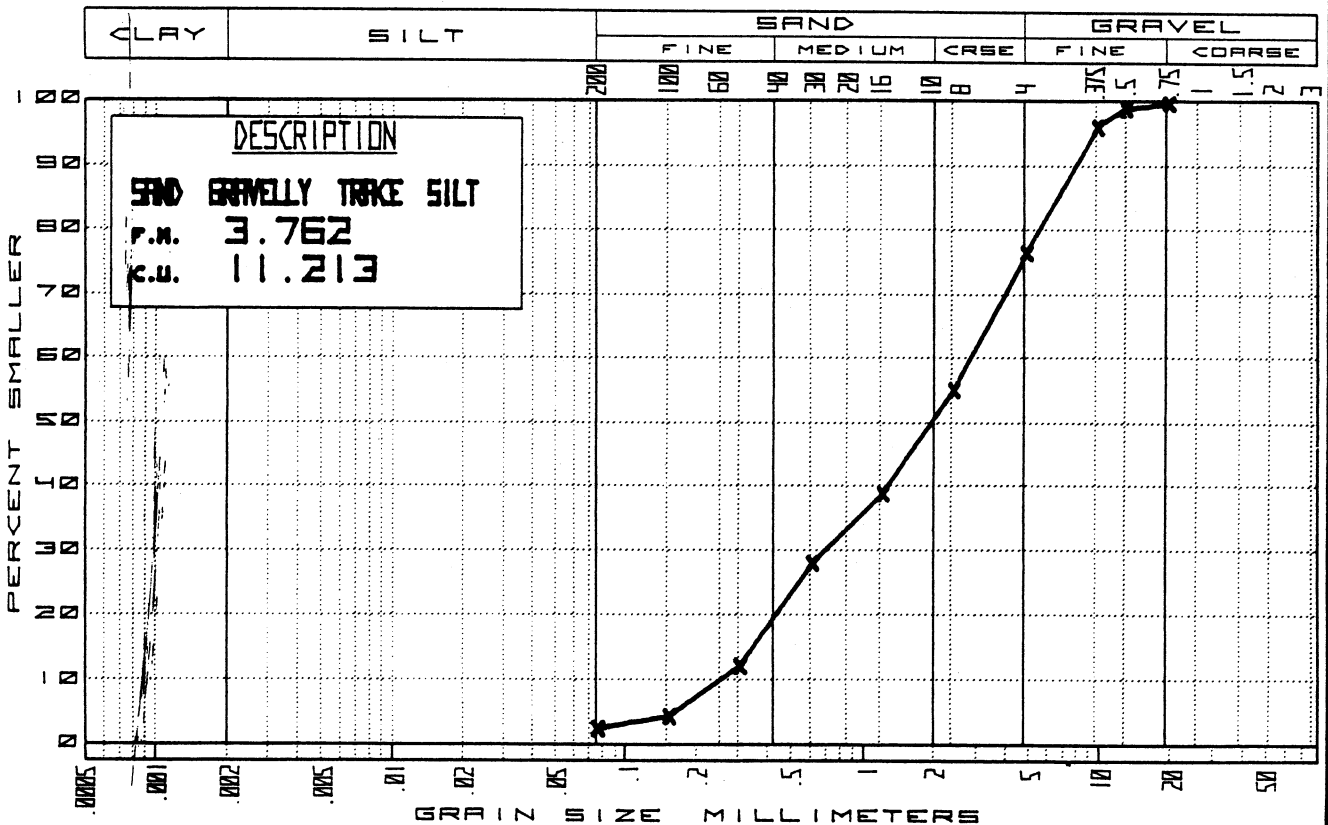
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
DATE 2-10-76 BASELINE A STATION 7+00 OFFSET 0+00 DEPTH 10.0



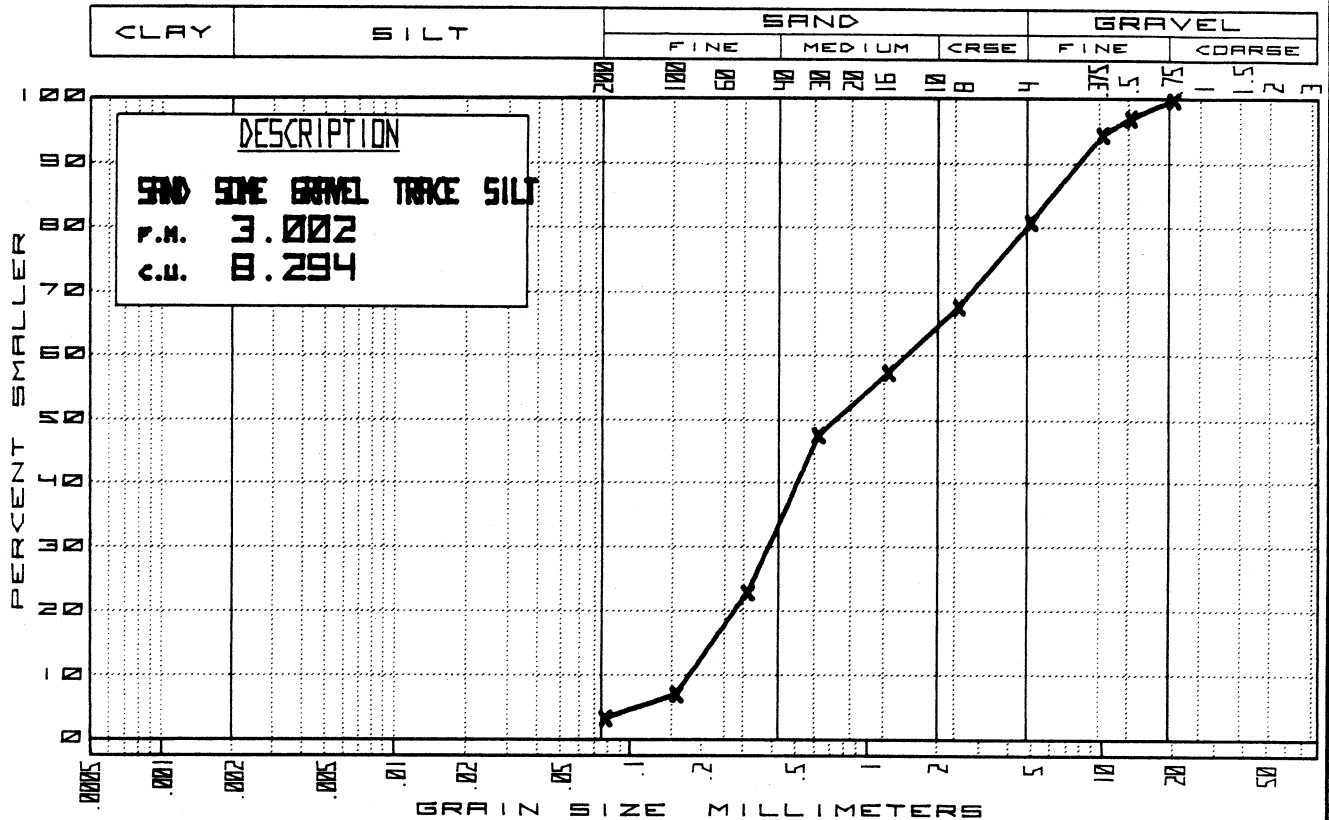
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-10-76 BASELINE A STATION 8+00 OFFSET 0+00 DEPTH 13.0-19.0



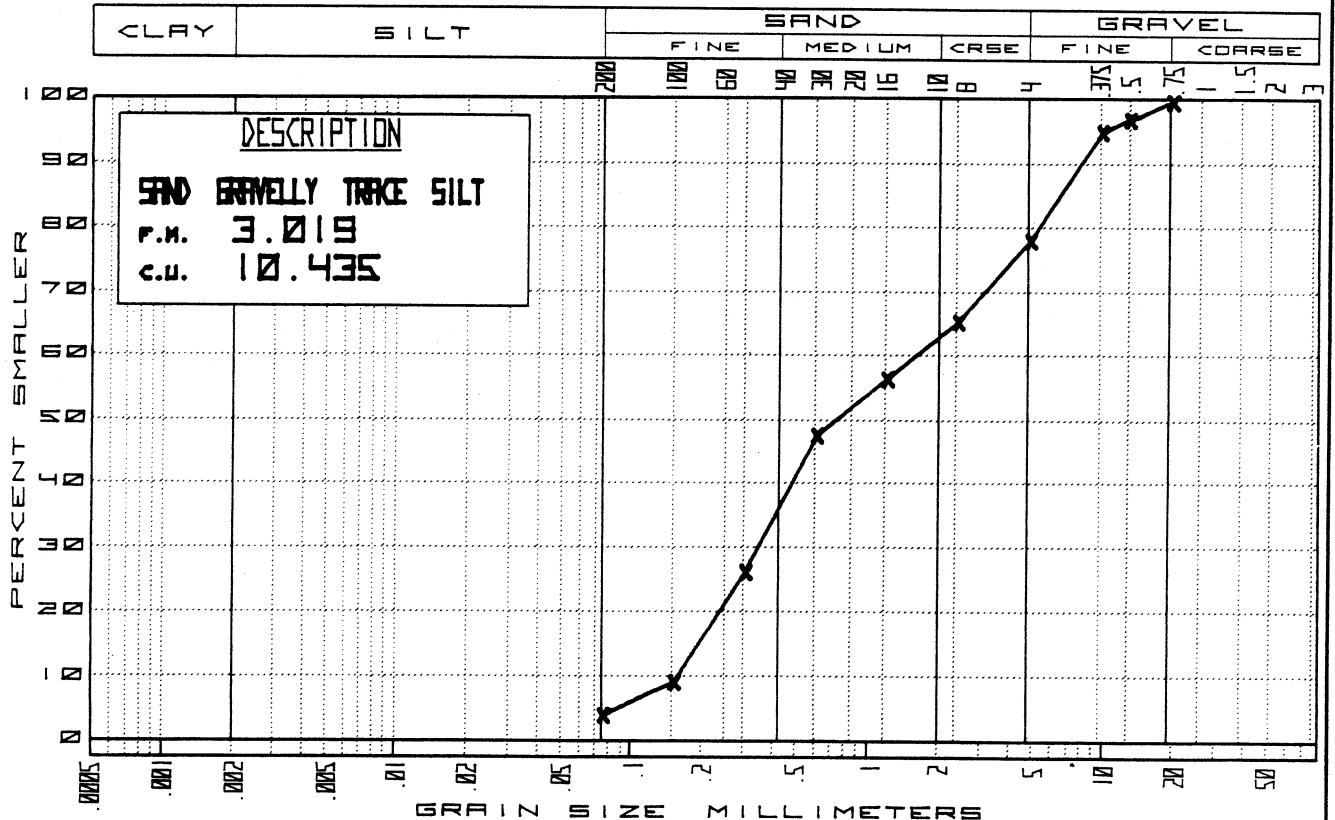
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-10-76 BASELINE A STATION 8+00 OFFSET 1+00E DEPTH 15.0



JOB NO. **1-1318** SITE **DEVILS LAKE SOURCE 326**
 DATE **2-10-76** BASELINE **A** STATION **9+00** OFFSET **0+00** DEPTH **8.0-10.0**

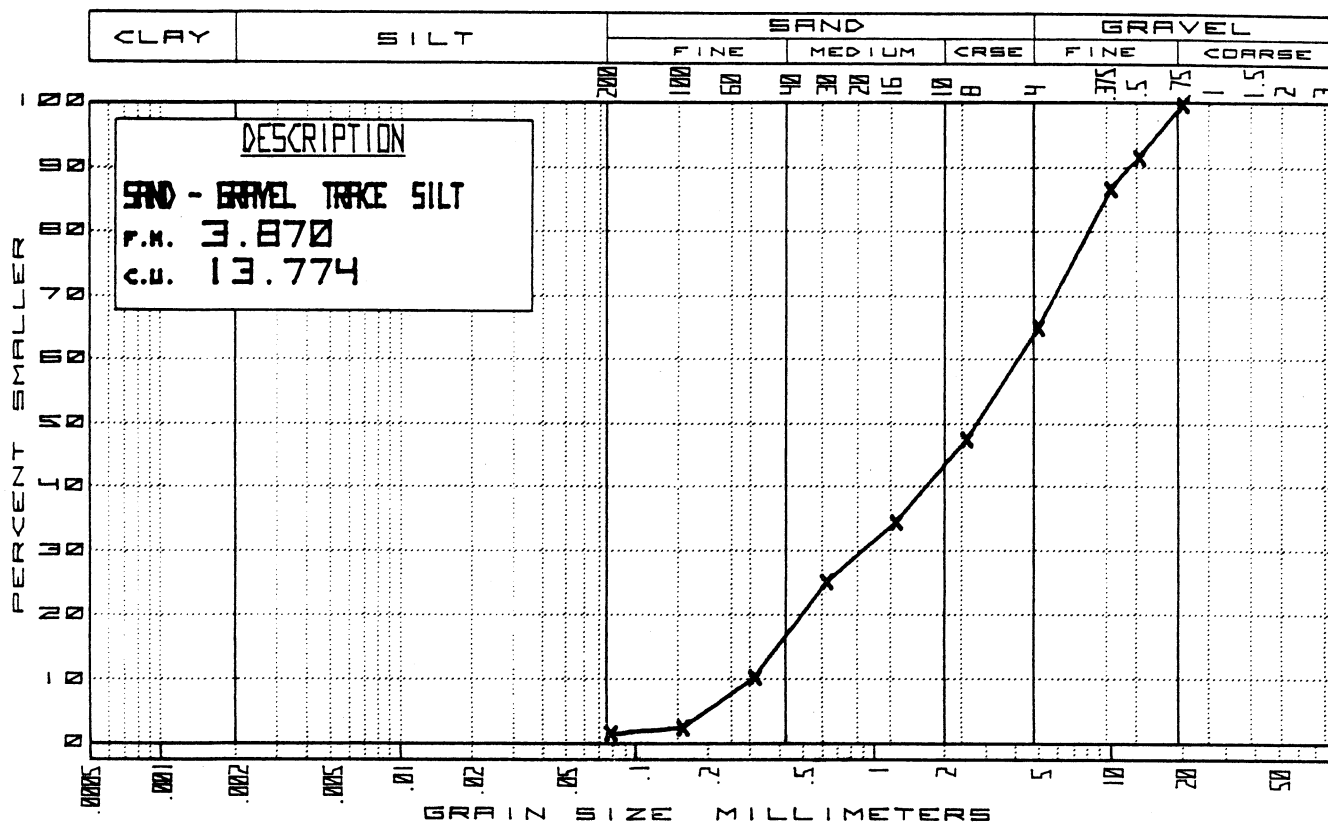


JOB NO. **1-1318** SITE **DEVILS LAKE SOURCE 326**
 DATE **2-10-76** BASELINE **A** STATION **10+00N** OFFSET **3+00W** DEPTH **5.0**



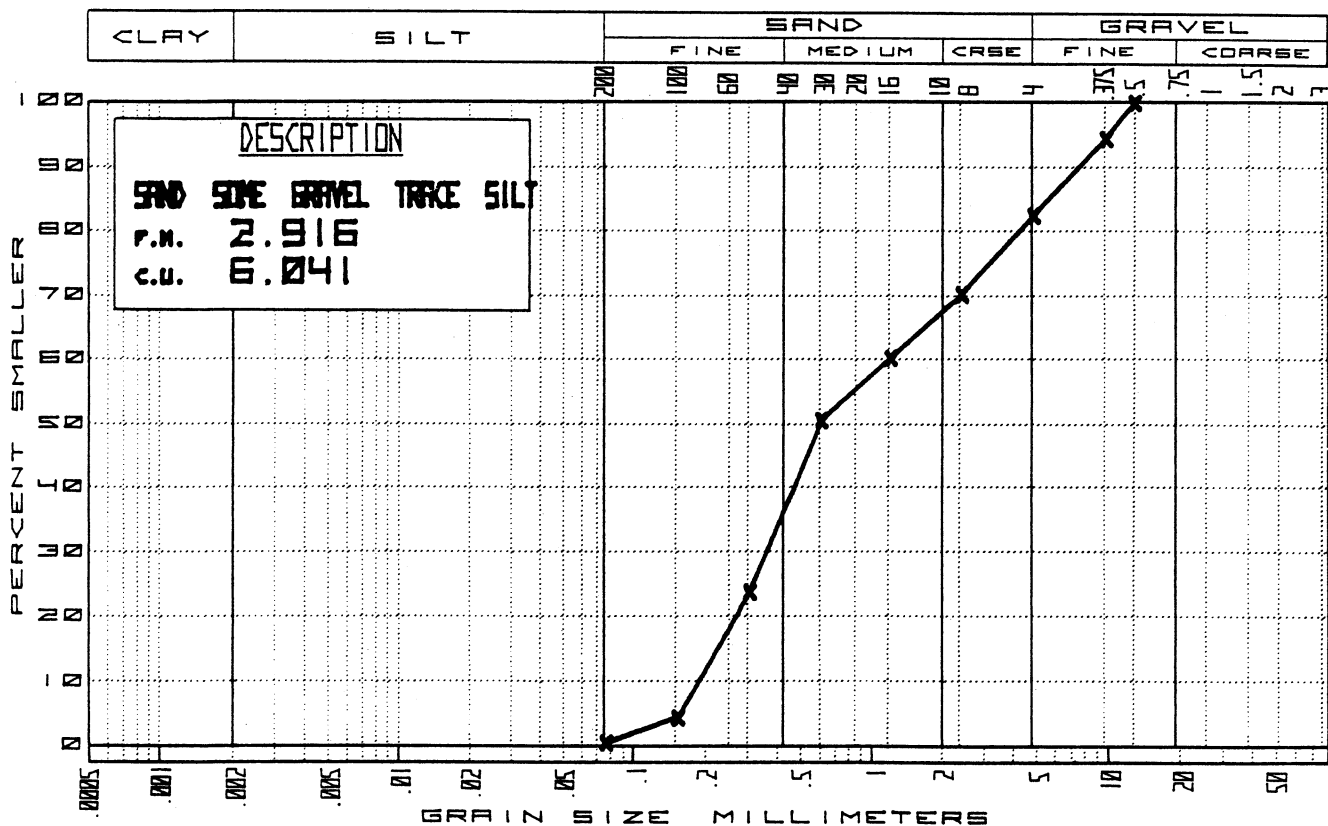
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-11-76 BASELINE A STATION 10+00 OFFSET 2+00W DEPTH 5.5-6.0

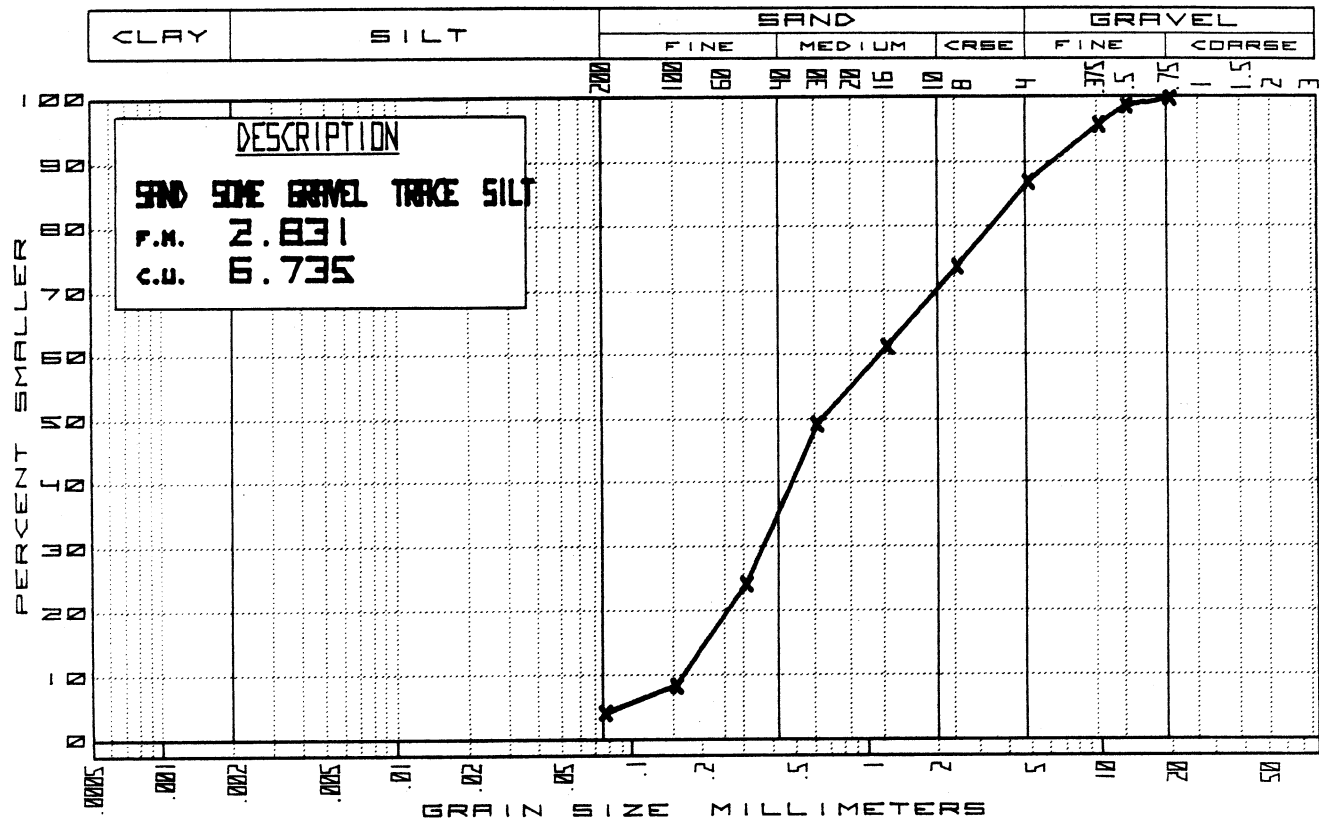


JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

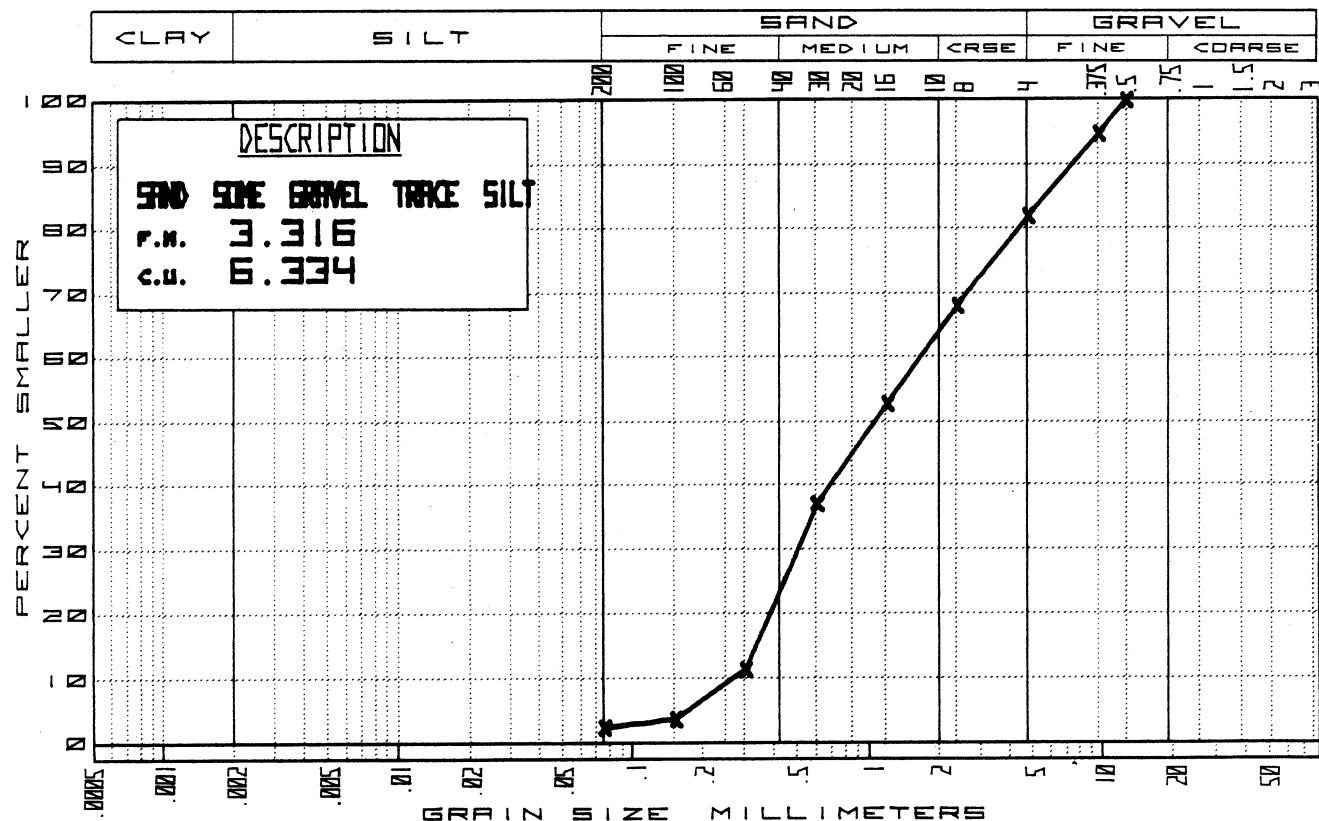
DATE 2-10-76 BASELINE A STATION 10+00 OFFSET 2+00W DEPTH 11.5-12.0



JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-10-76 BASELINE A STATION 10+00 OFFSET 1+00W DEPTH 15.0

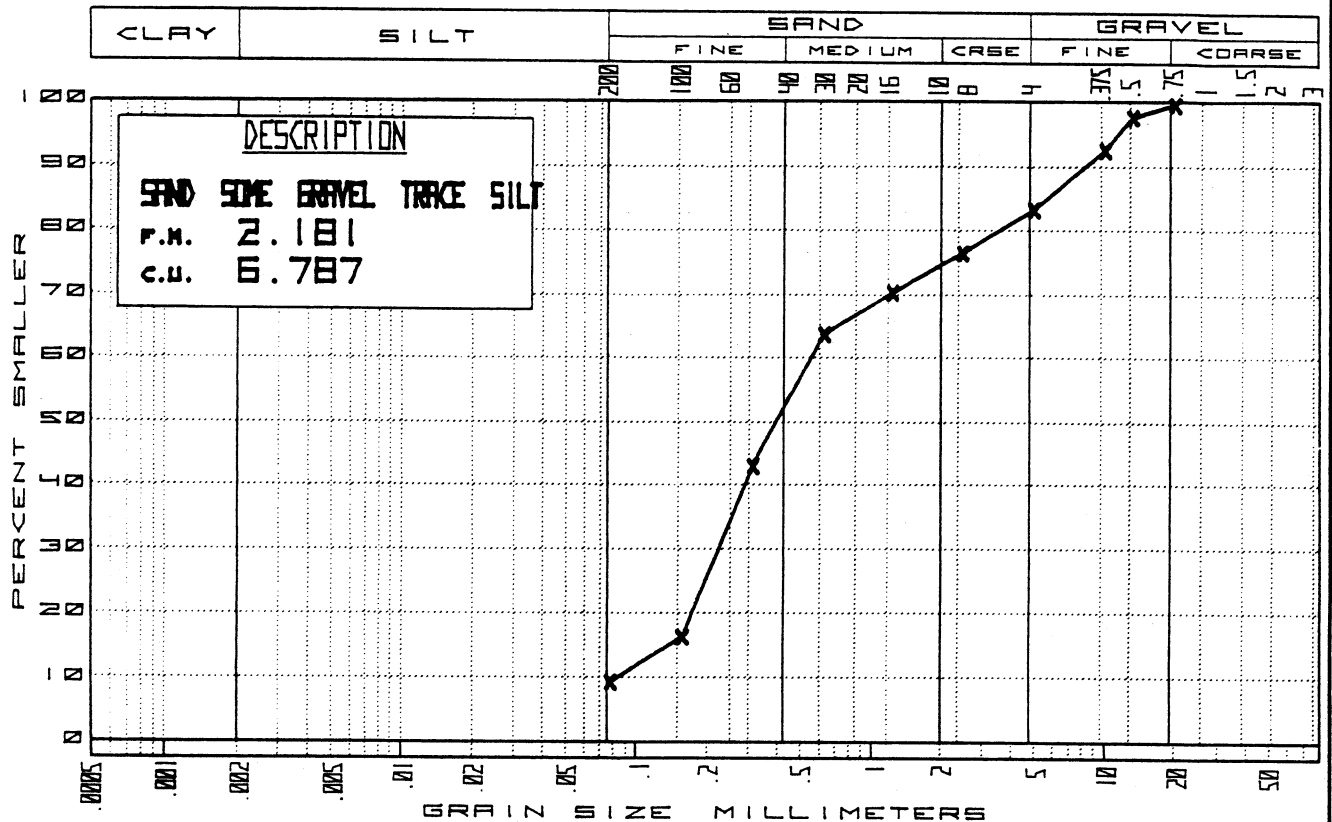


JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-10-76 BASELINE A STATION 10+00 OFFSET 1+00E DEPTH 14.0-15.0



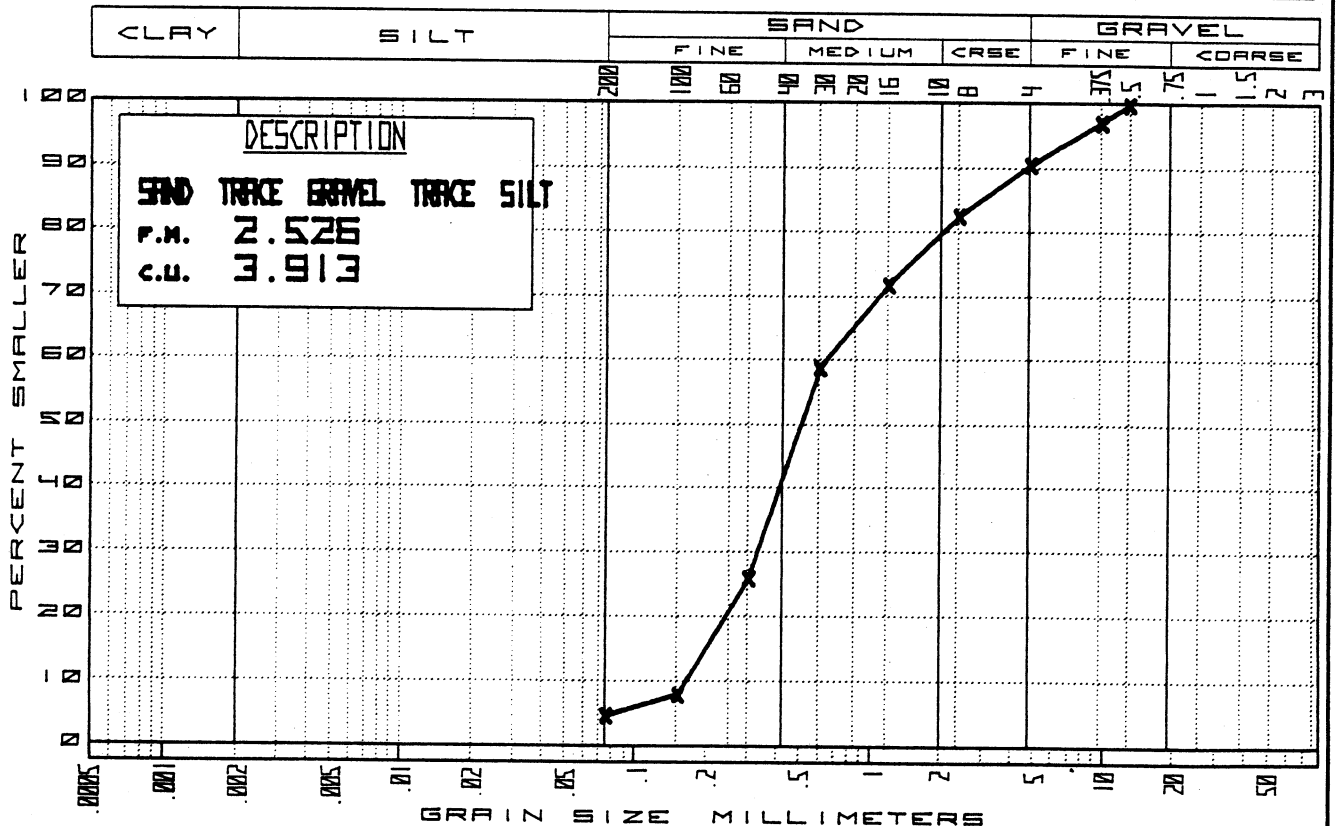
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-10-76 BASELINE A STATION 11+00N OFFSET 0+00 DEPTH 5.0-7.0



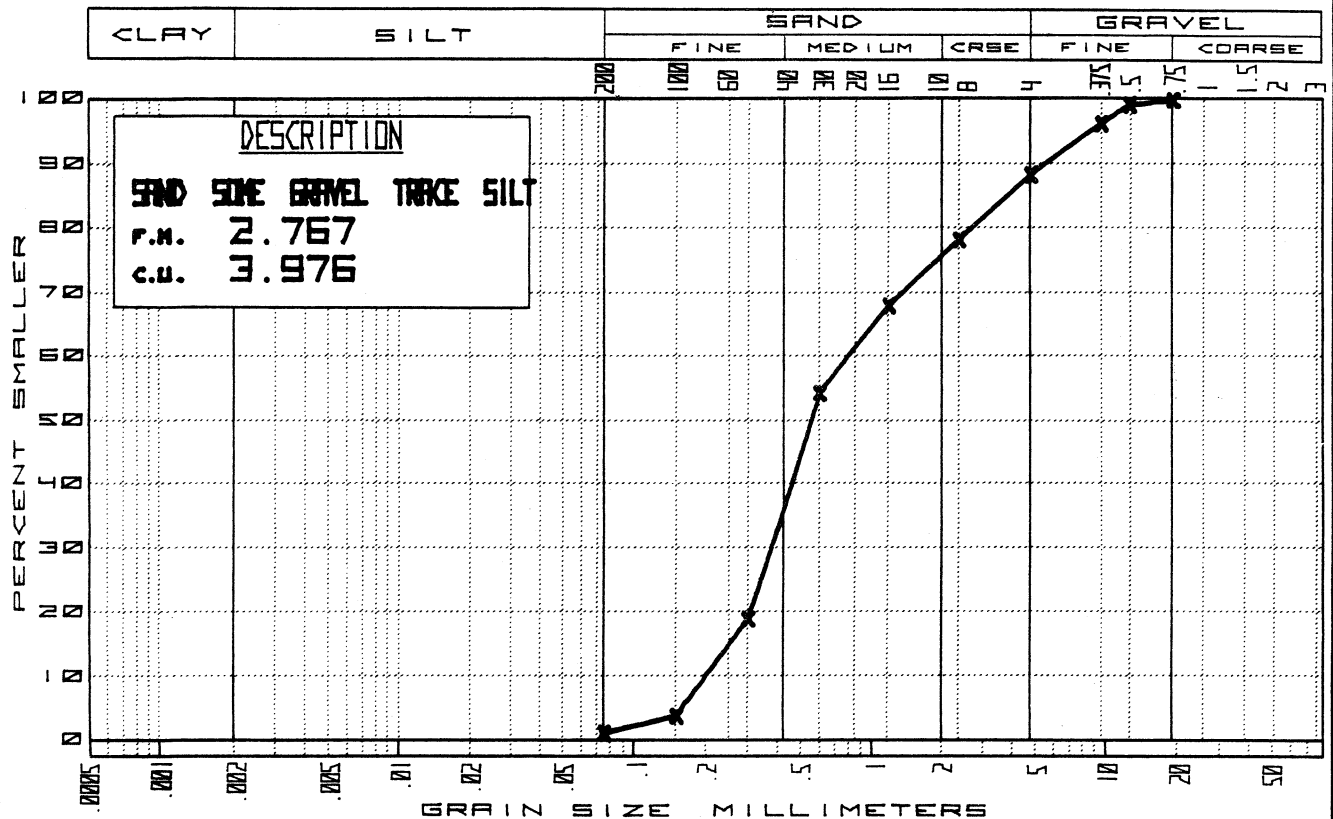
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-10-76 BASELINE A STATION 12+00 OFFSET 1+00W DEPTH 20.0



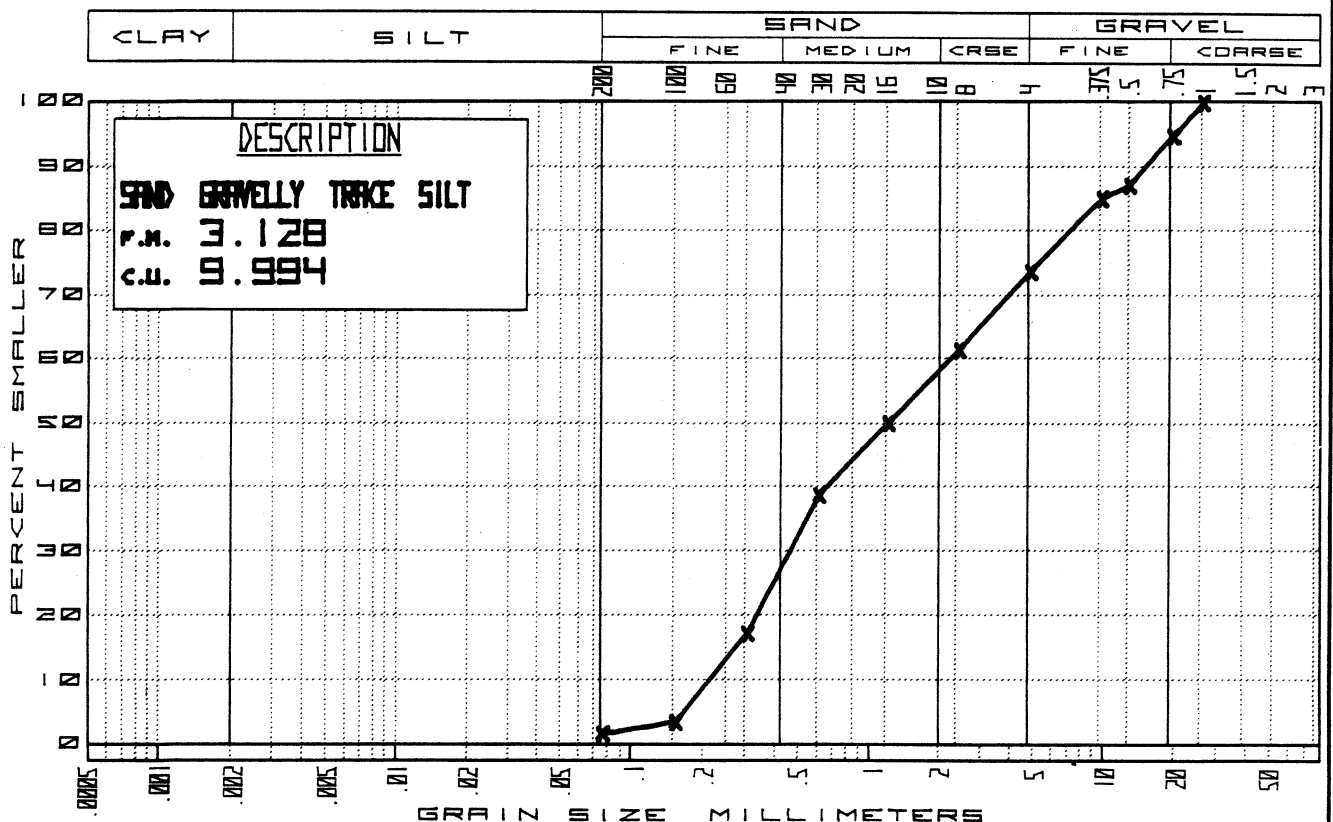
JOB NO. **1-1318** SITE **DEVILS LAKE SOURCE 326**

DATE **2-10-76** BASELINE **A** STATION **12+00** OFFSET **0+00** DEPTH **7.0-8.0**

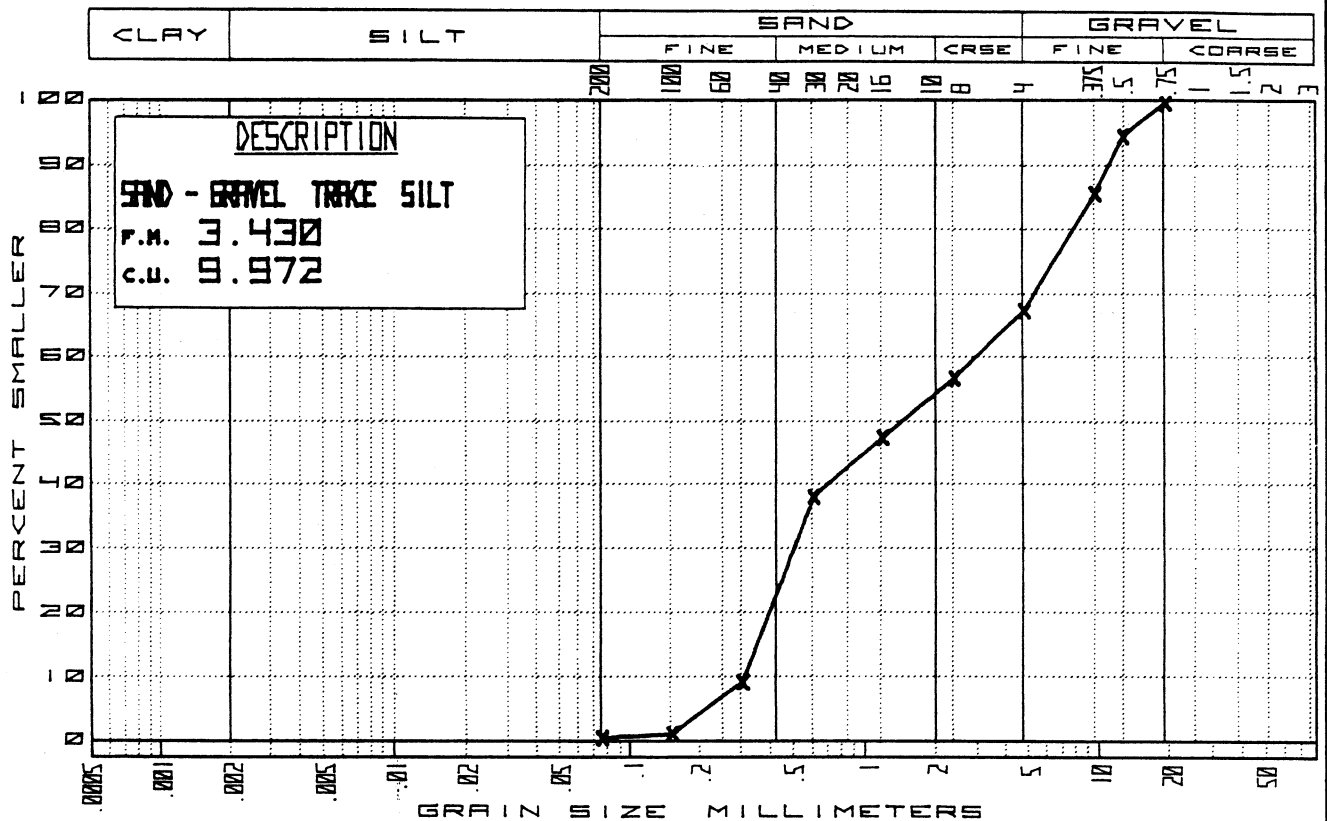


JOB NO. **1-1318** SITE **DEVILS LAKE SOURCE 326**

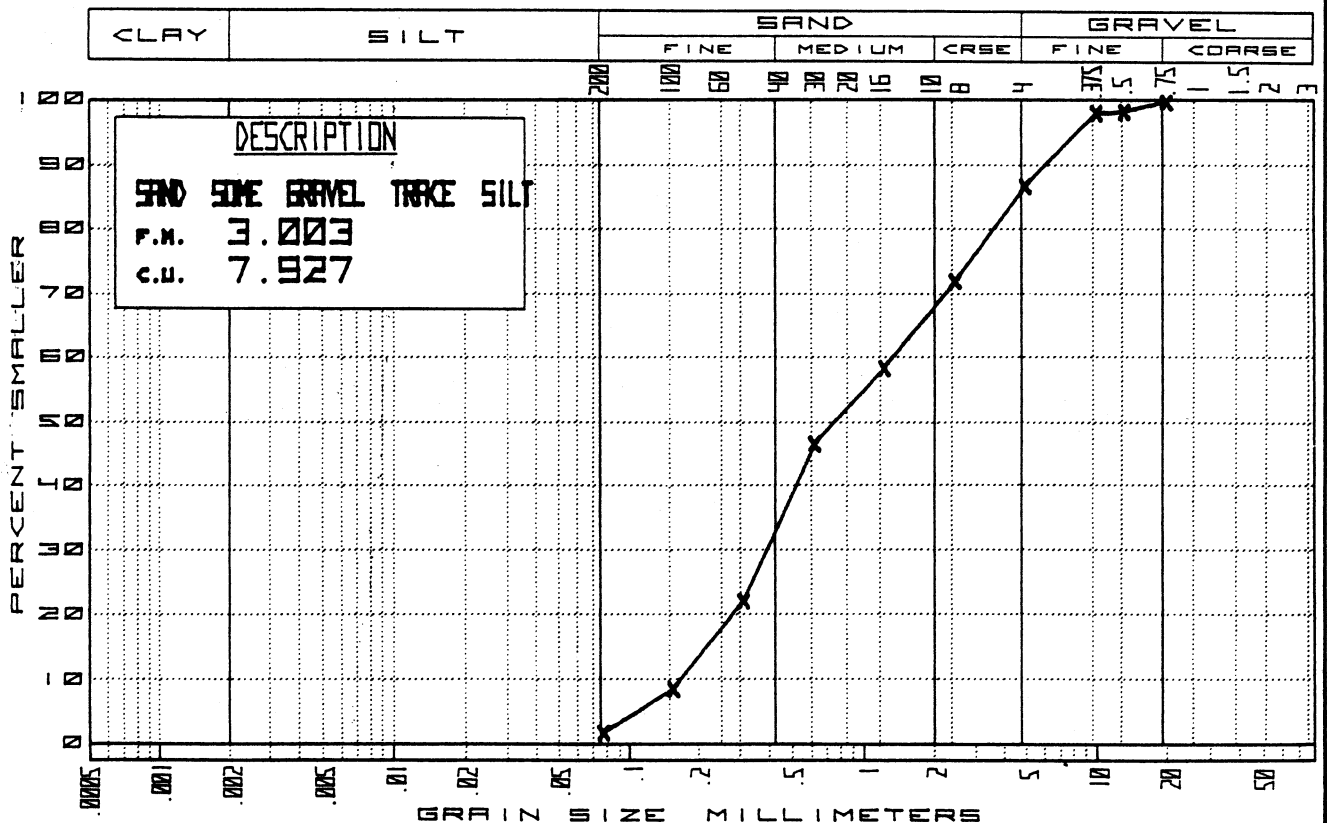
DATE **2-13-76** BASELINE **A** STATION **12+00** OFFSET **0+00** DEPTH **13.5-15.0**



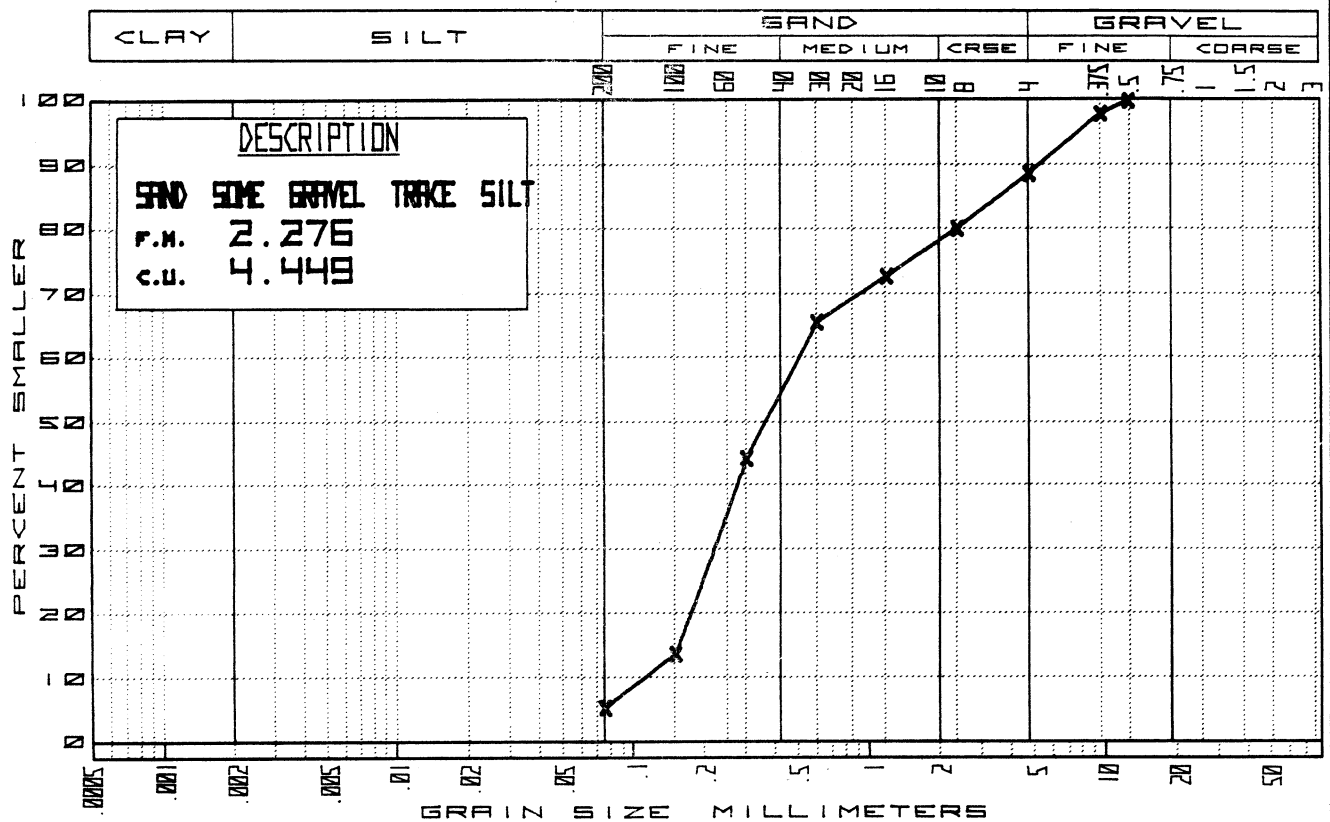
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-11-76 BASELINE A STATION 12+00 OFFSET 0+00 DEPTH 17.0-19.0



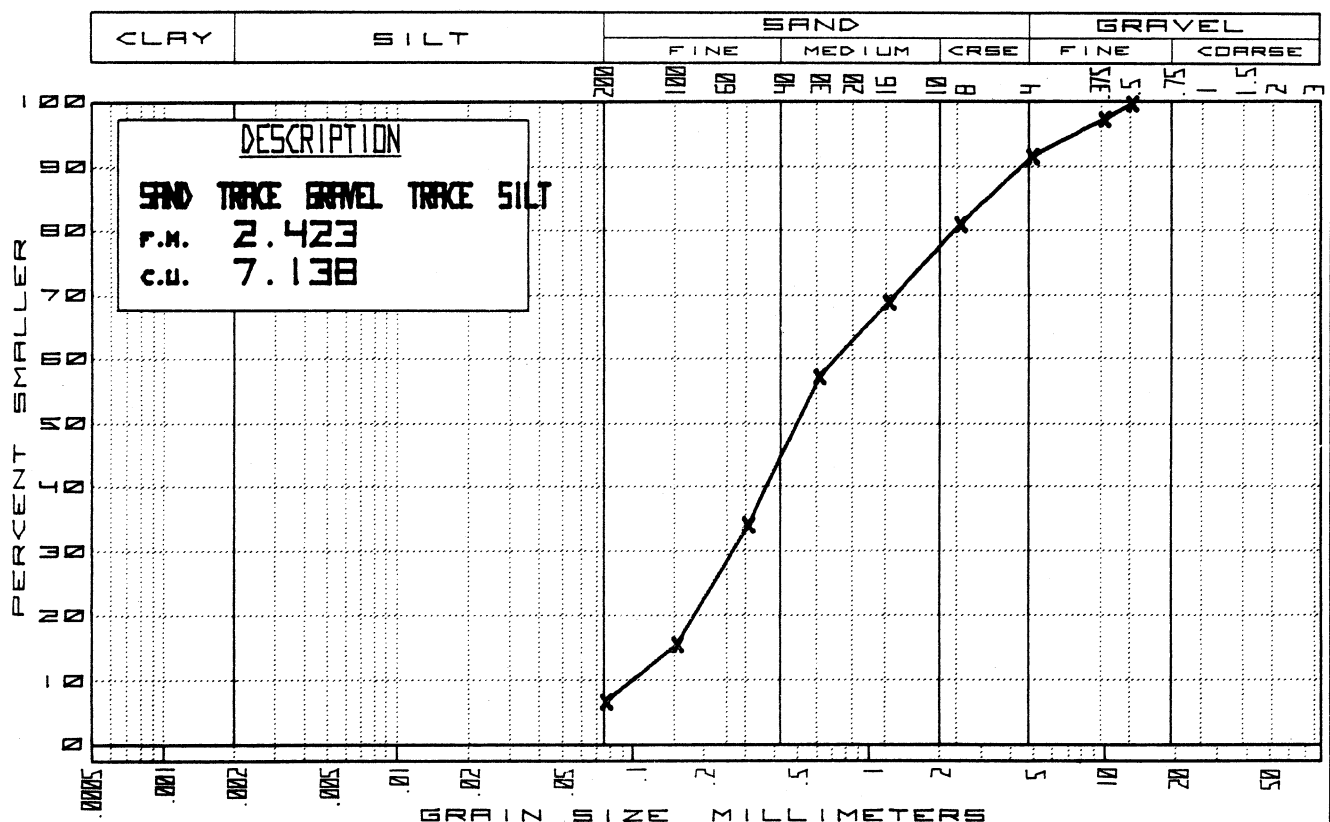
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-10-76 BASELINE A STATION 12+00N OFFSET 2+00E DEPTH 10.0



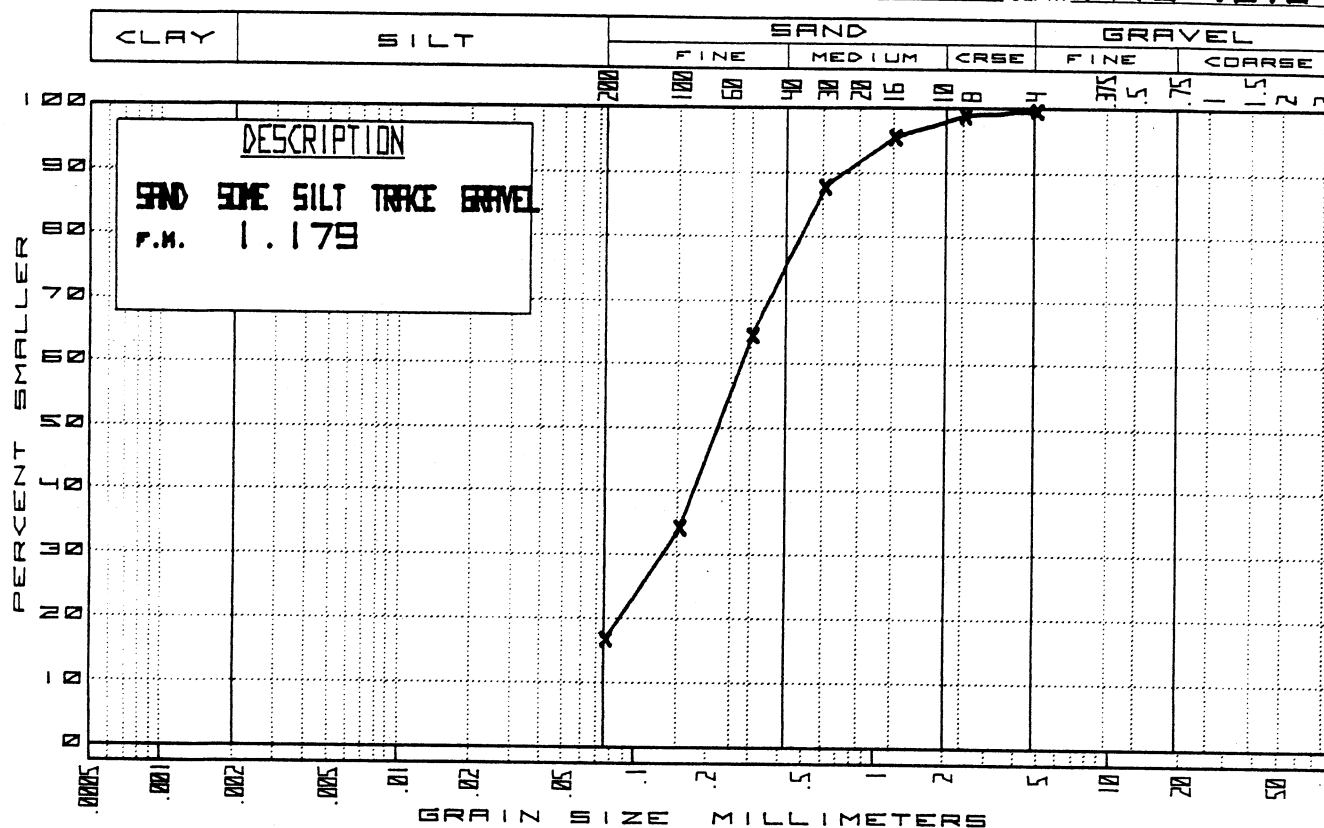
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-10-76 BASELINE A STATION 13+00N OFFSET 0+00 DEPTH 15.0



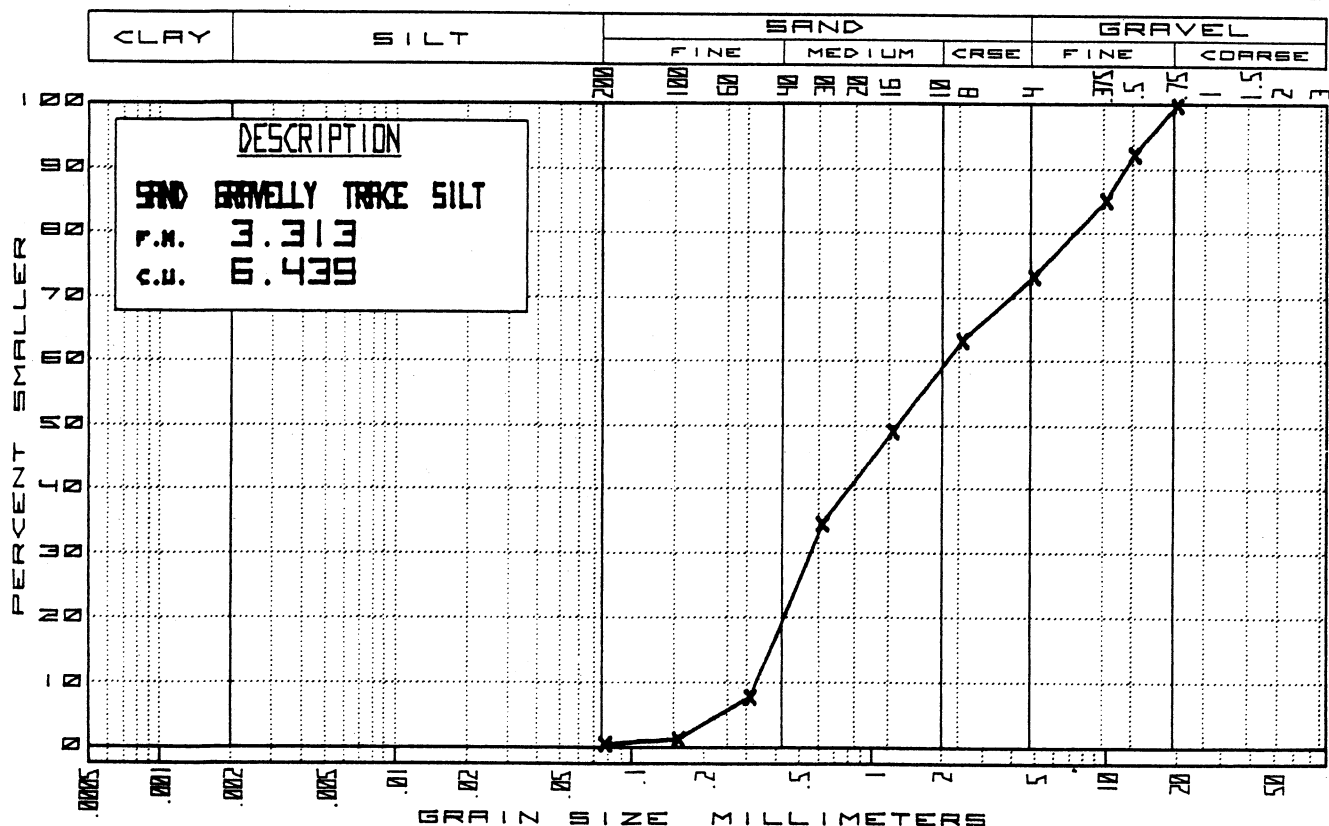
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-10-76 BASELINE A STATION 14+00N OFFSET 0+00 DEPTH 15.0



JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-10-76 BASELINE A STATION 14+00N OFFSET 1+00E DEPTH 11.5-12.0

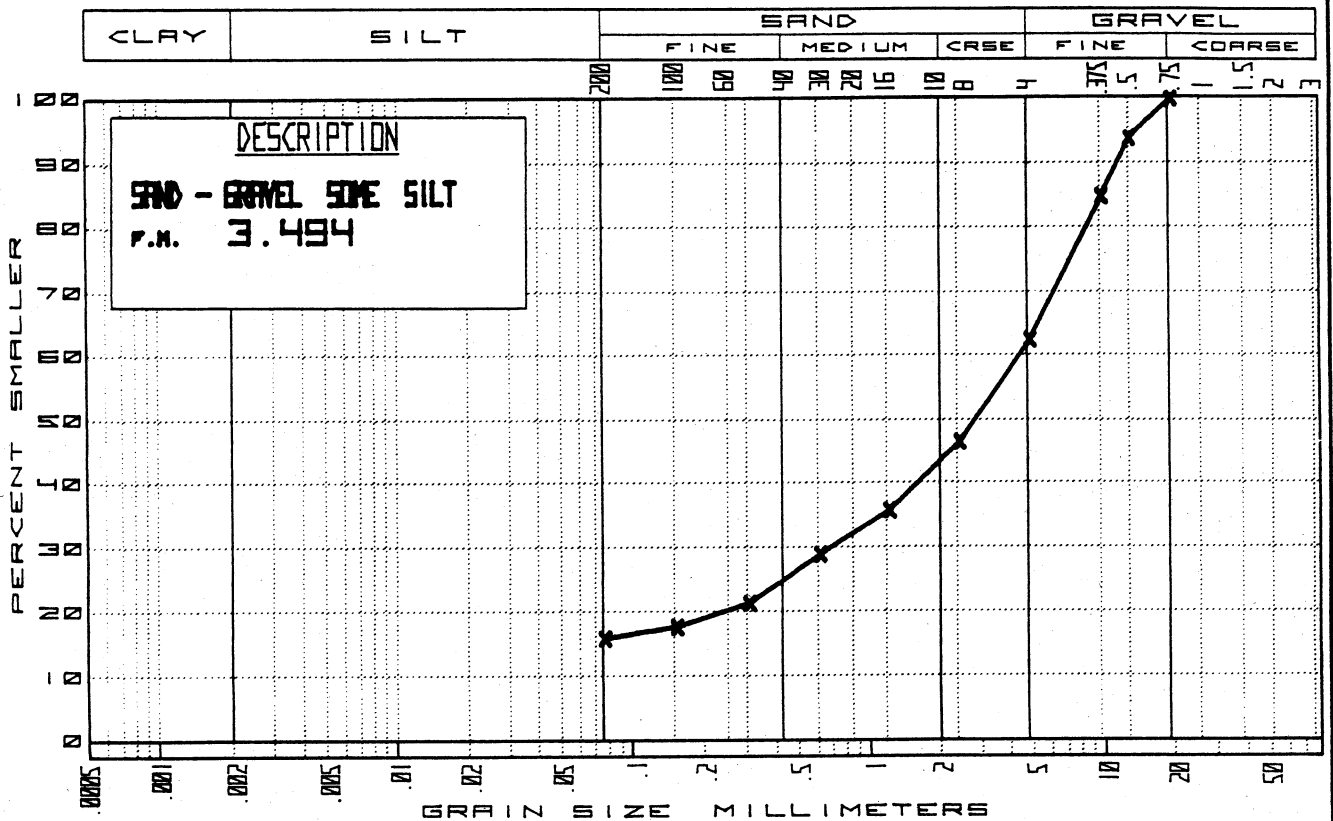


JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-10-76 BASELINE A STATION 14+00N OFFSET 1+00E DEPTH 15.0-17.0



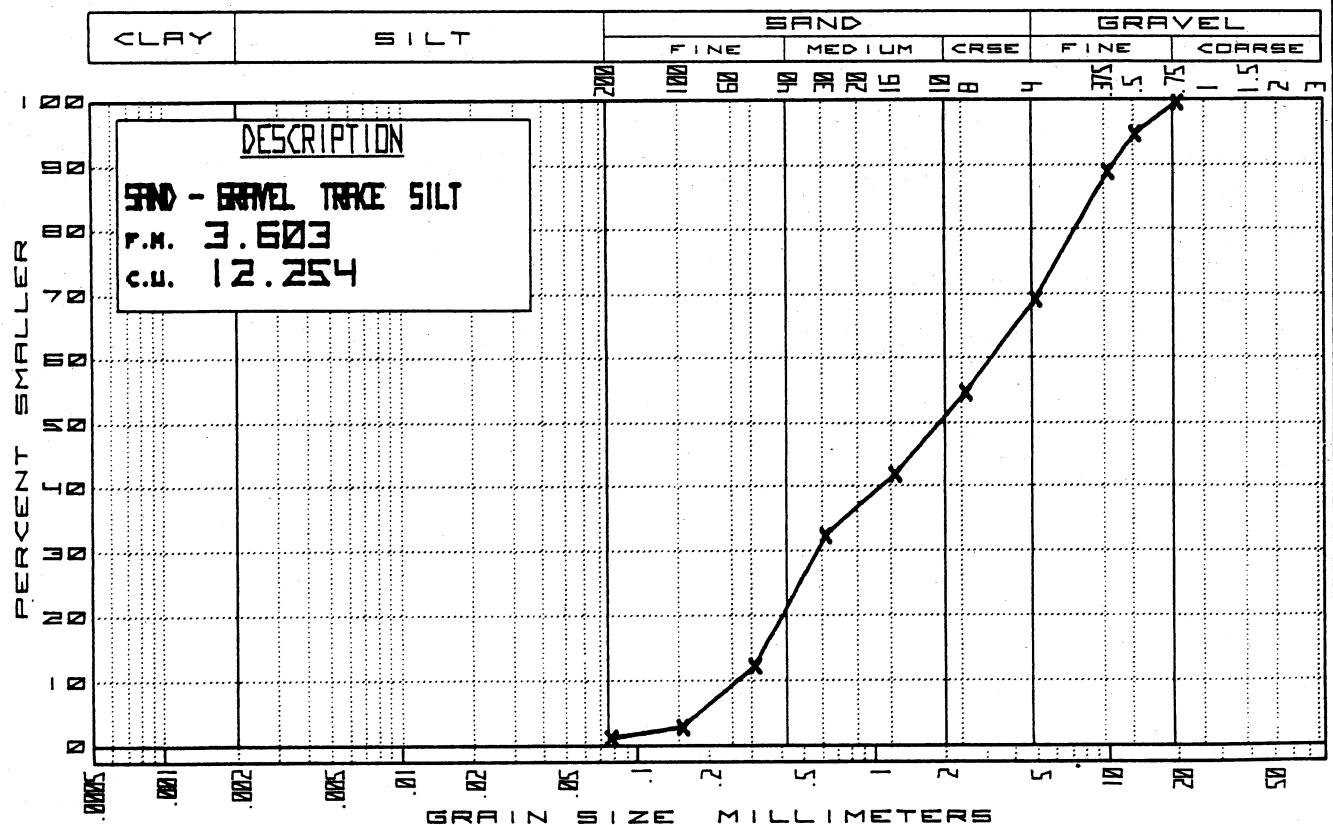
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-10-76 BASELINE A STATION 20+00 OFFSET 4+00W DEPTH 10.0



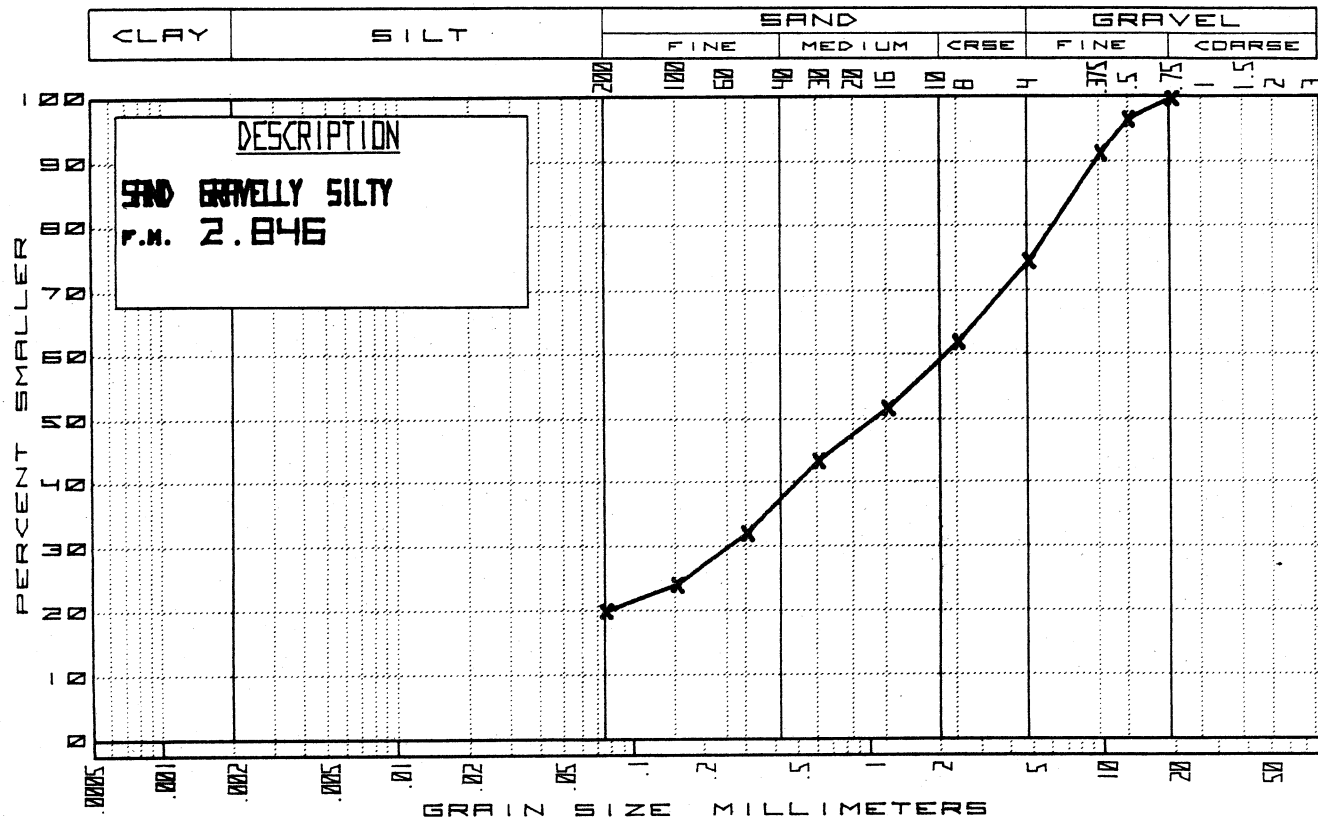
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-11-76 BASELINE A STATION 20+00 OFFSET 1+00E DEPTH 7.5-11.0



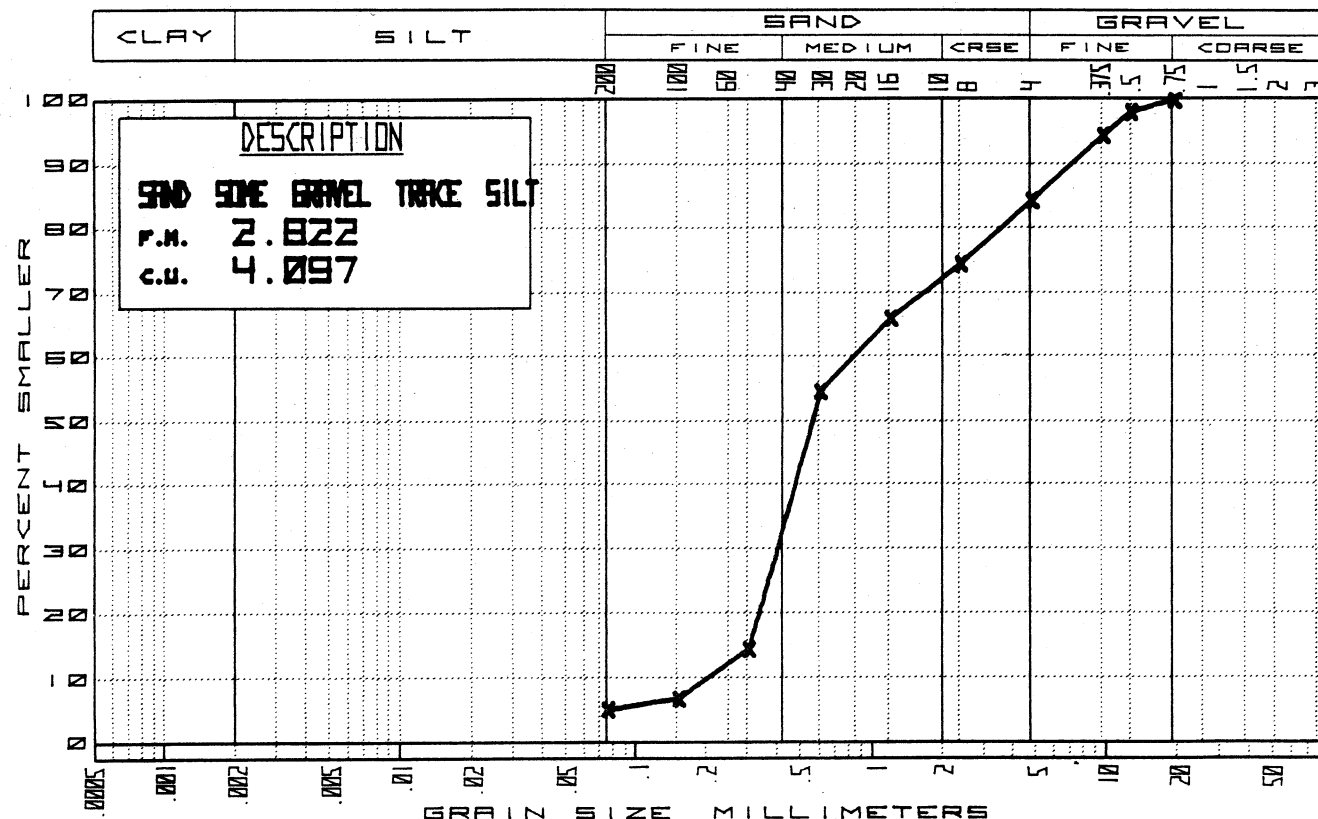
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-18-76 BASELINE A STATION 22+00 OFFSET 10+00W DEPTH 5.0



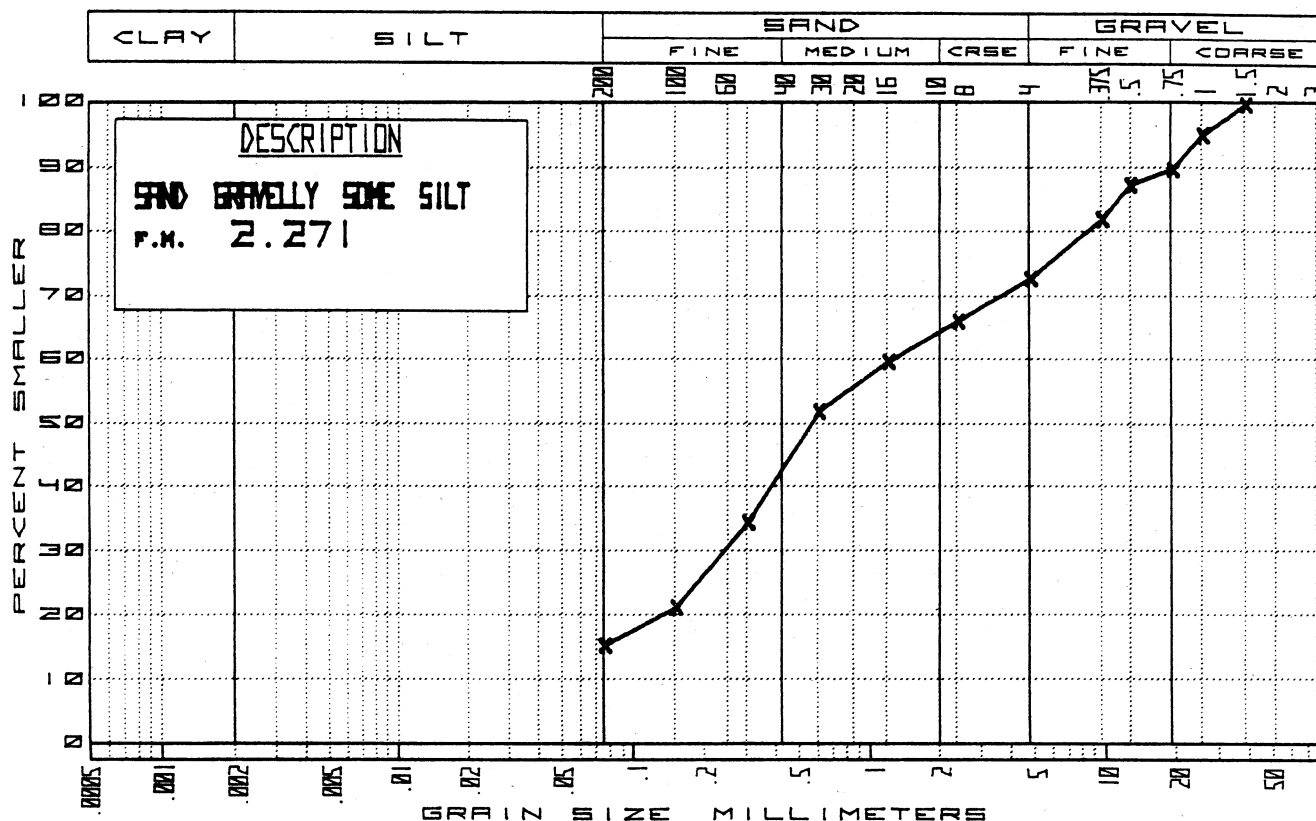
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-10-76 BASELINE A STATION 22+00 OFFSET 3+00W DEPTH 10.0



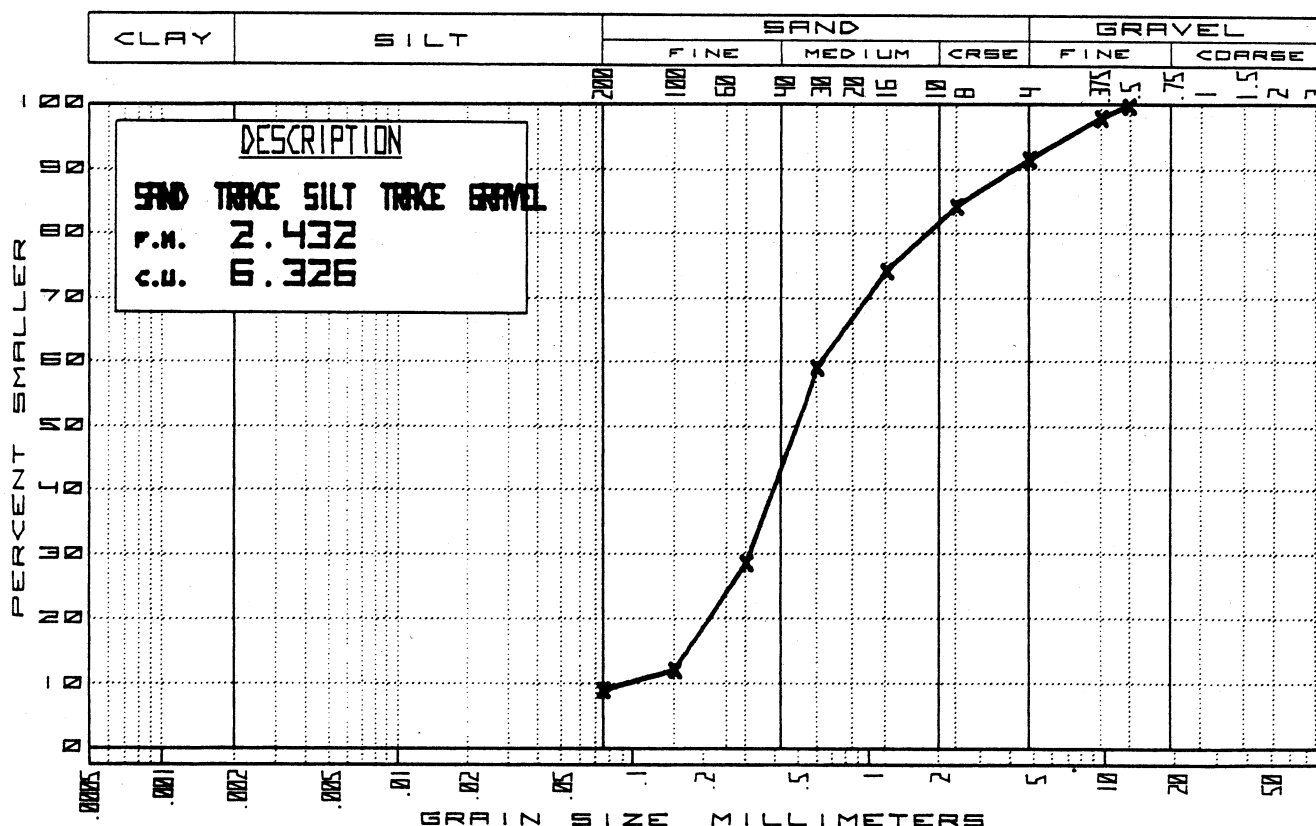
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-10-76 BASELINE A STATION 24+00 OFFSET 7+00W DEPTH 5.0-10.0

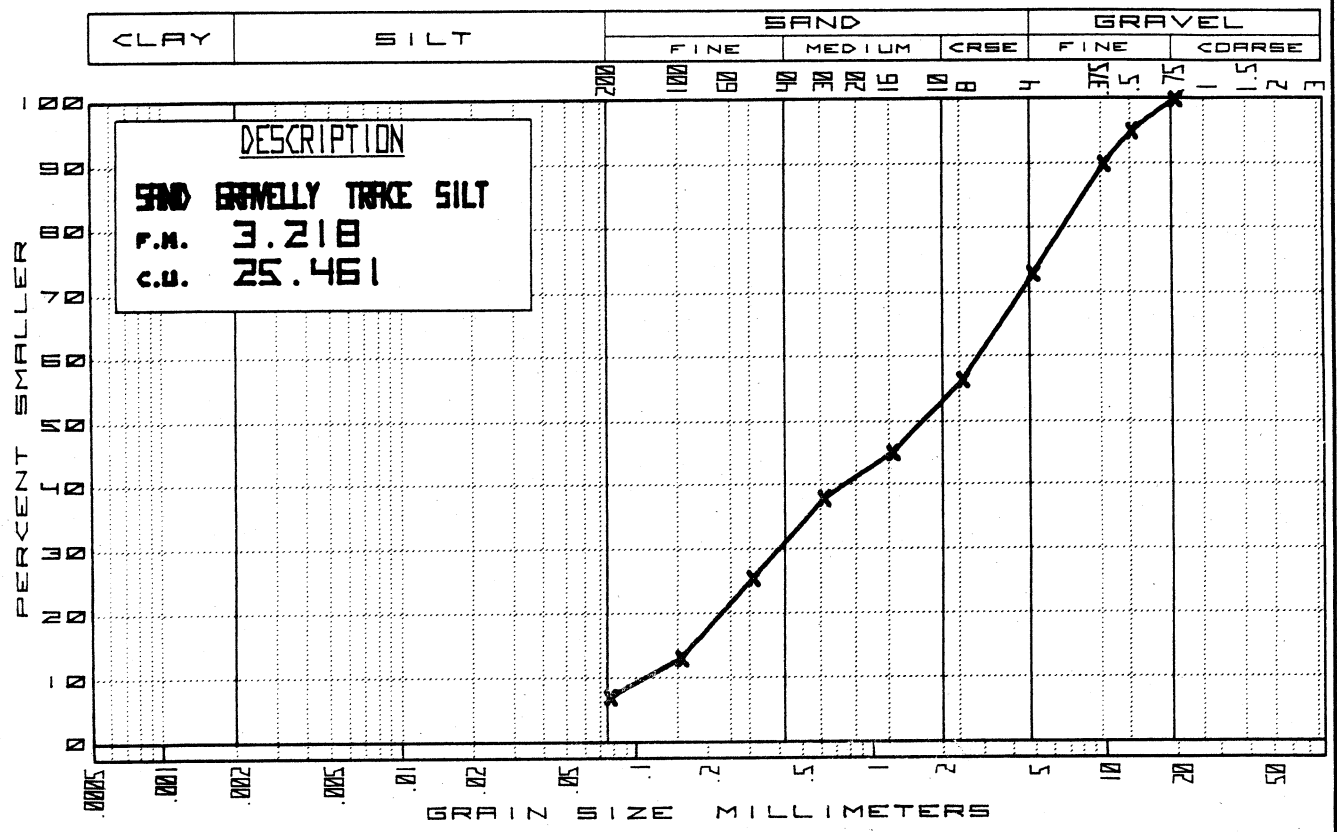


JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

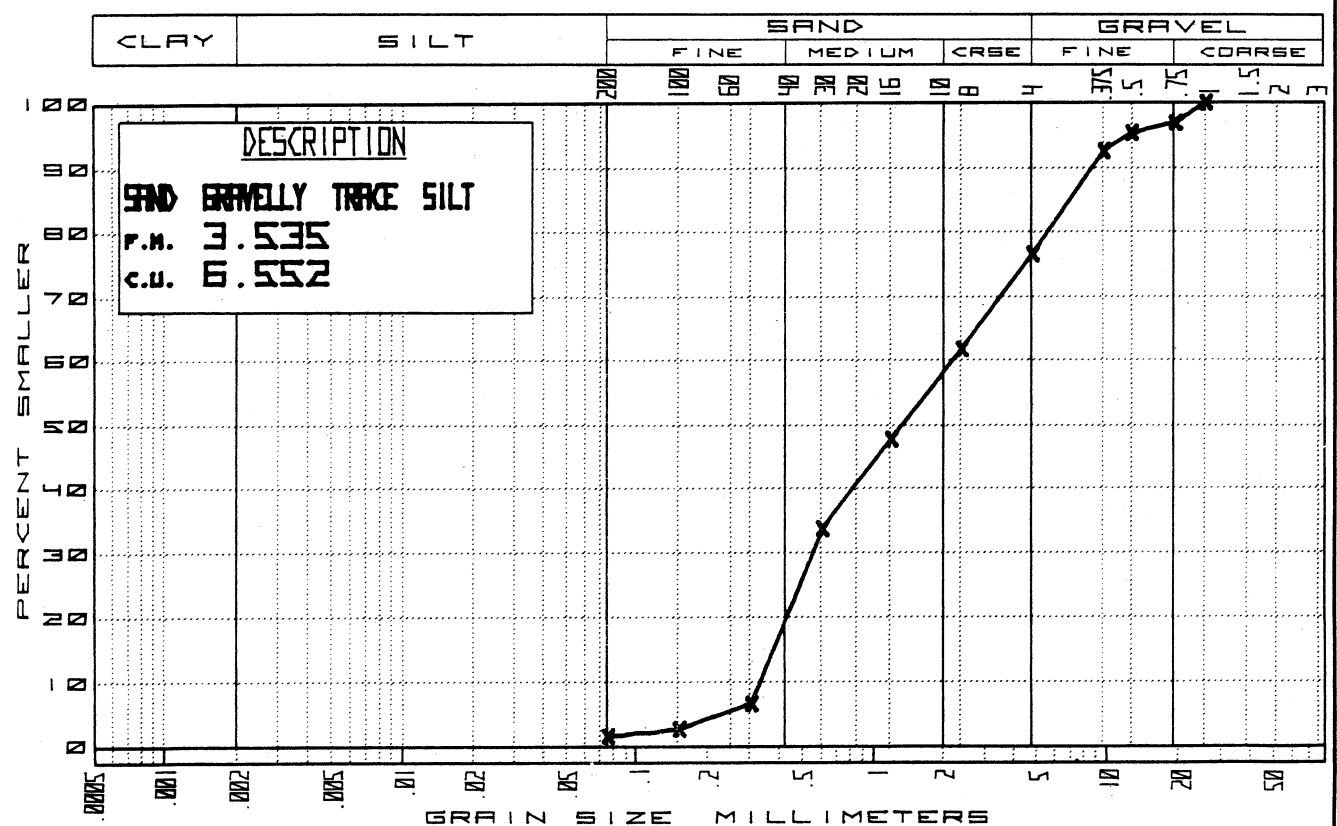
DATE 2-10-76 BASELINE A STATION 24+00 OFFSET 2+00W DEPTH 10.0



JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-10-76 BASELINE A STATION 24+00 OFFSET 1+00W DEPTH 10.0

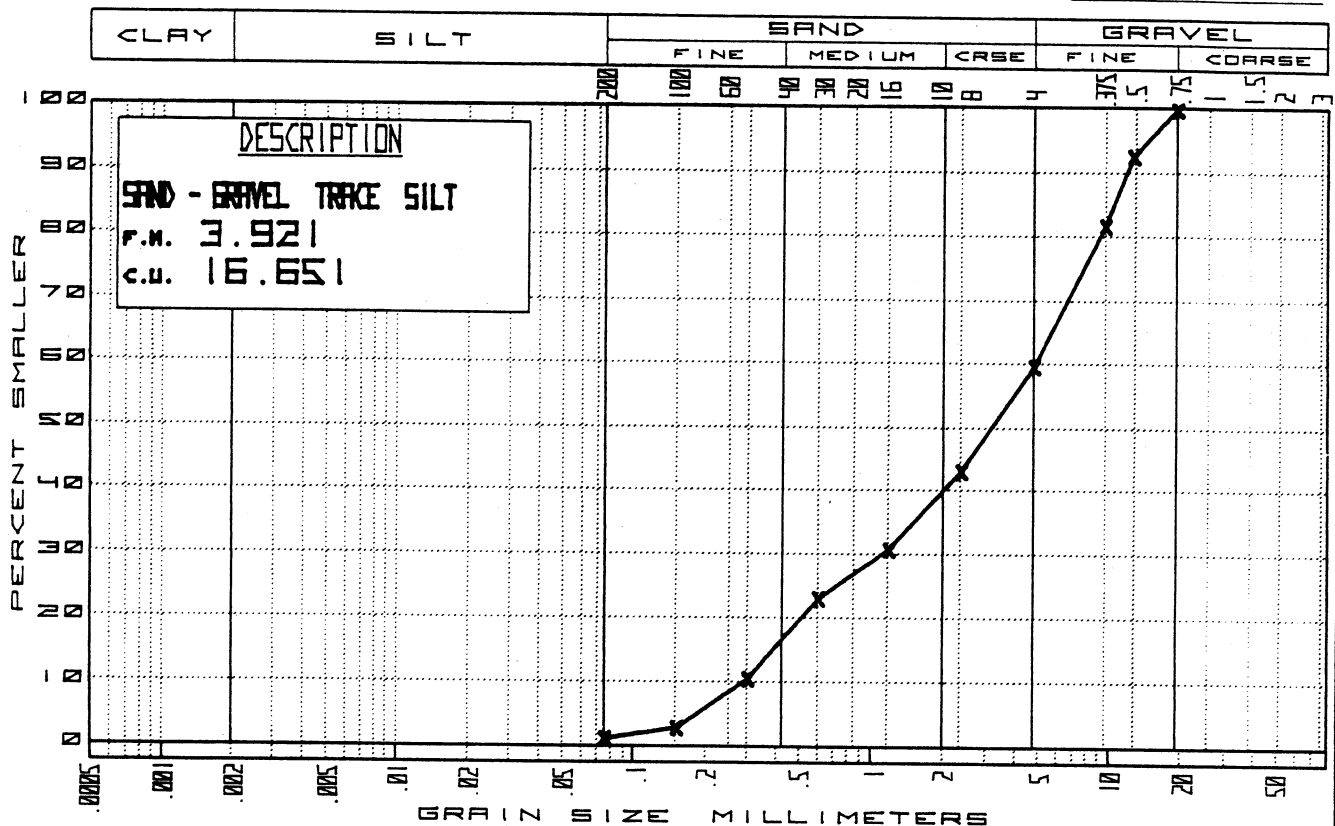


JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-18-76 BASELINE A STATION 24+00 OFFSET 0+00 DEPTH 17.0-18.0



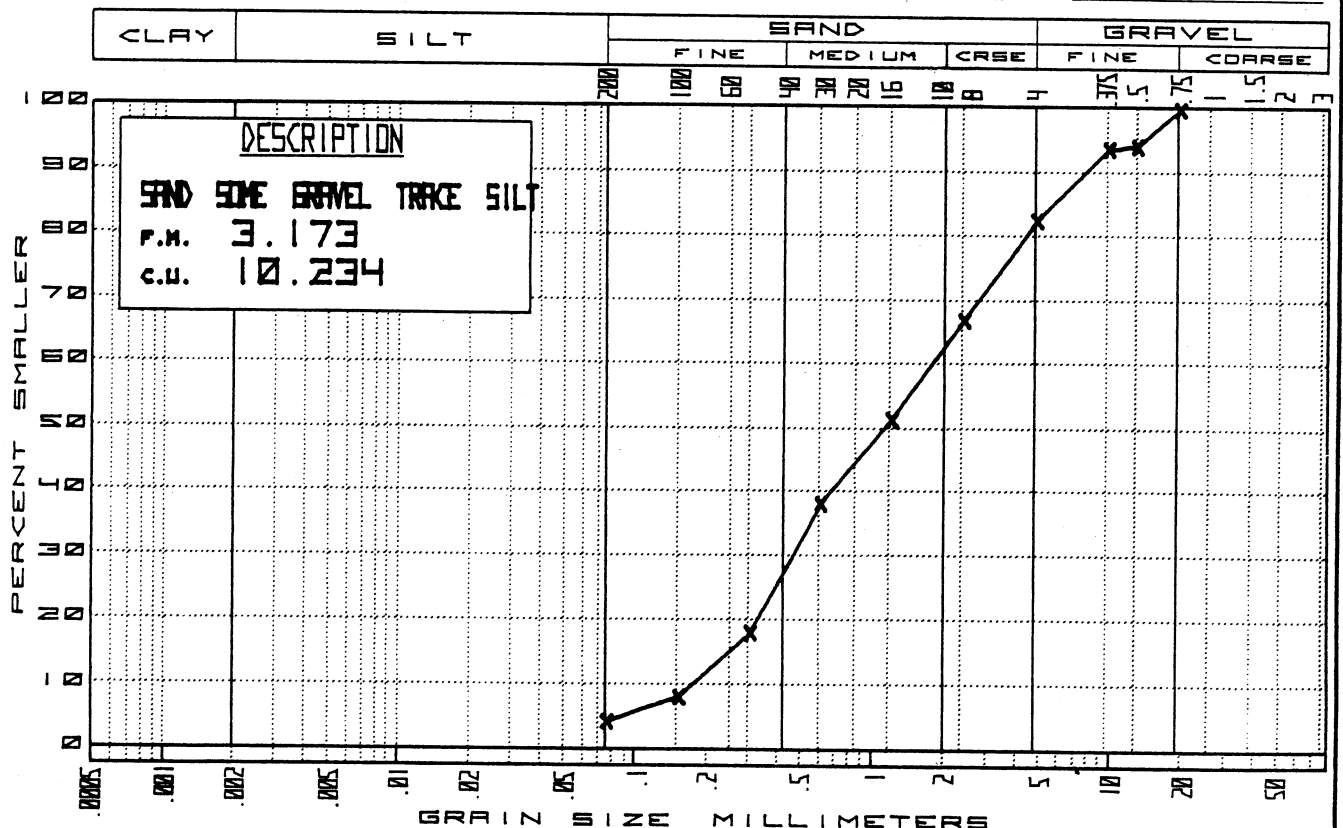
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-11-76 BASELINE A STATION 24+00 OFFSET 1+00E DEPTH 7.0

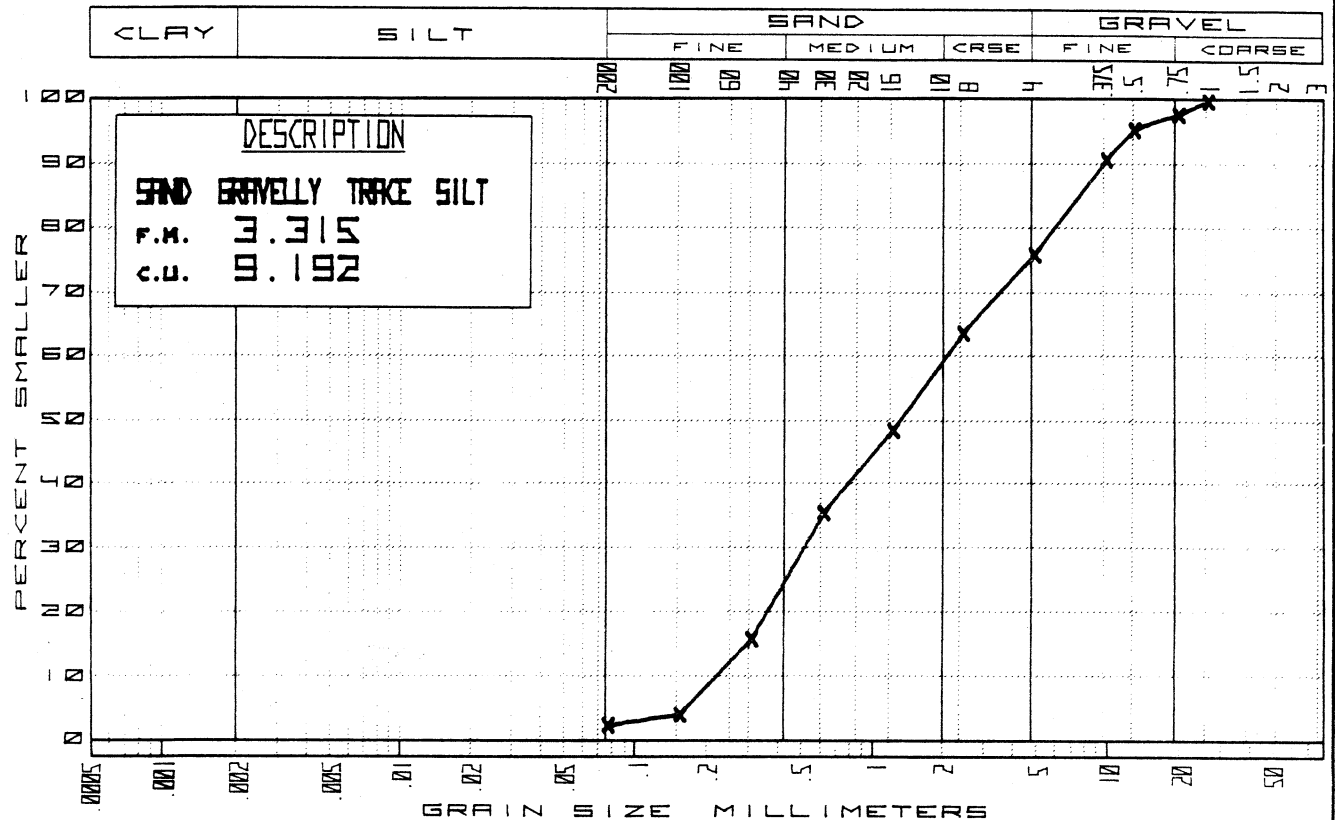


JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

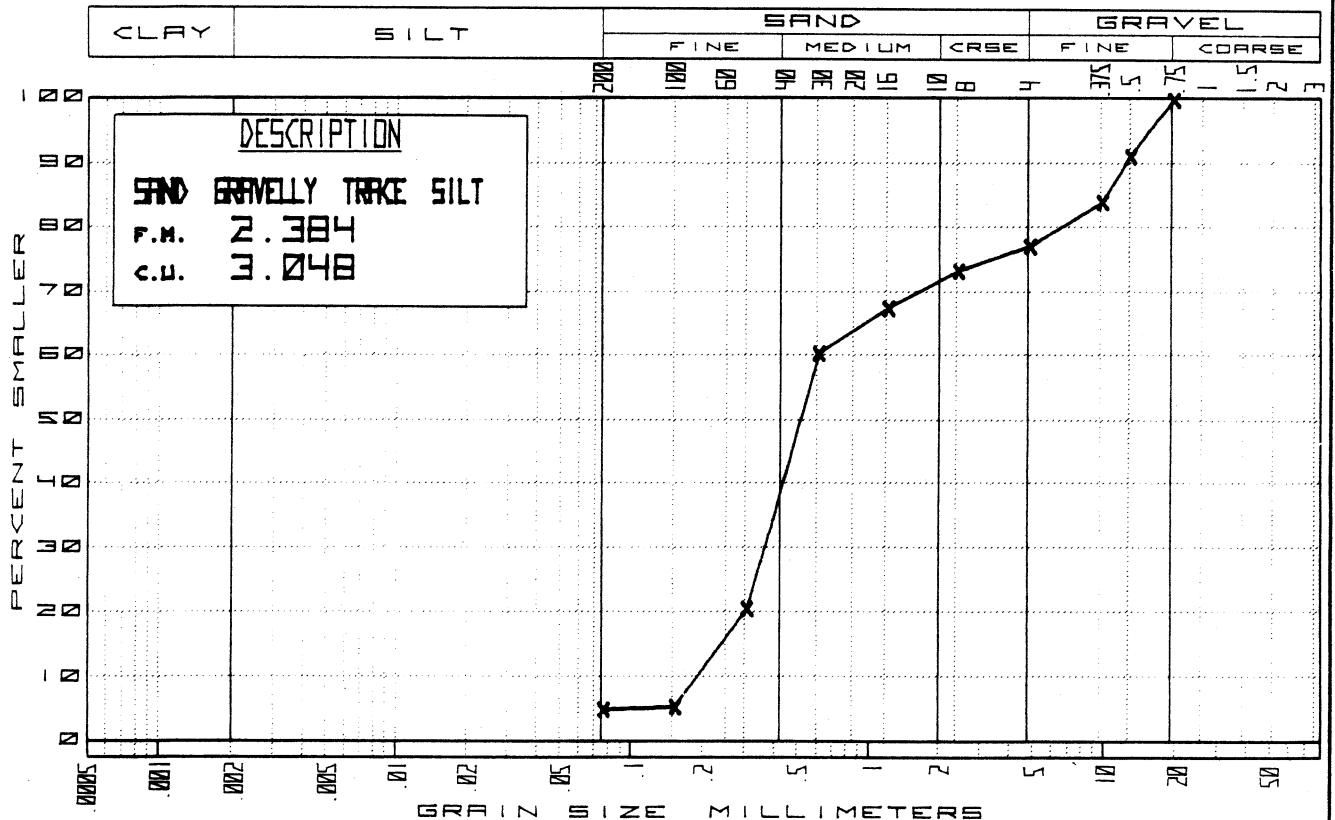
DATE 2-10-76 BASELINE A STATION 26+00 OFFSET 7+00W DEPTH 5.0



JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-10-76 BASELINE A STATION 30+00 OFFSET 1+00E DEPTH 9.0-11.0



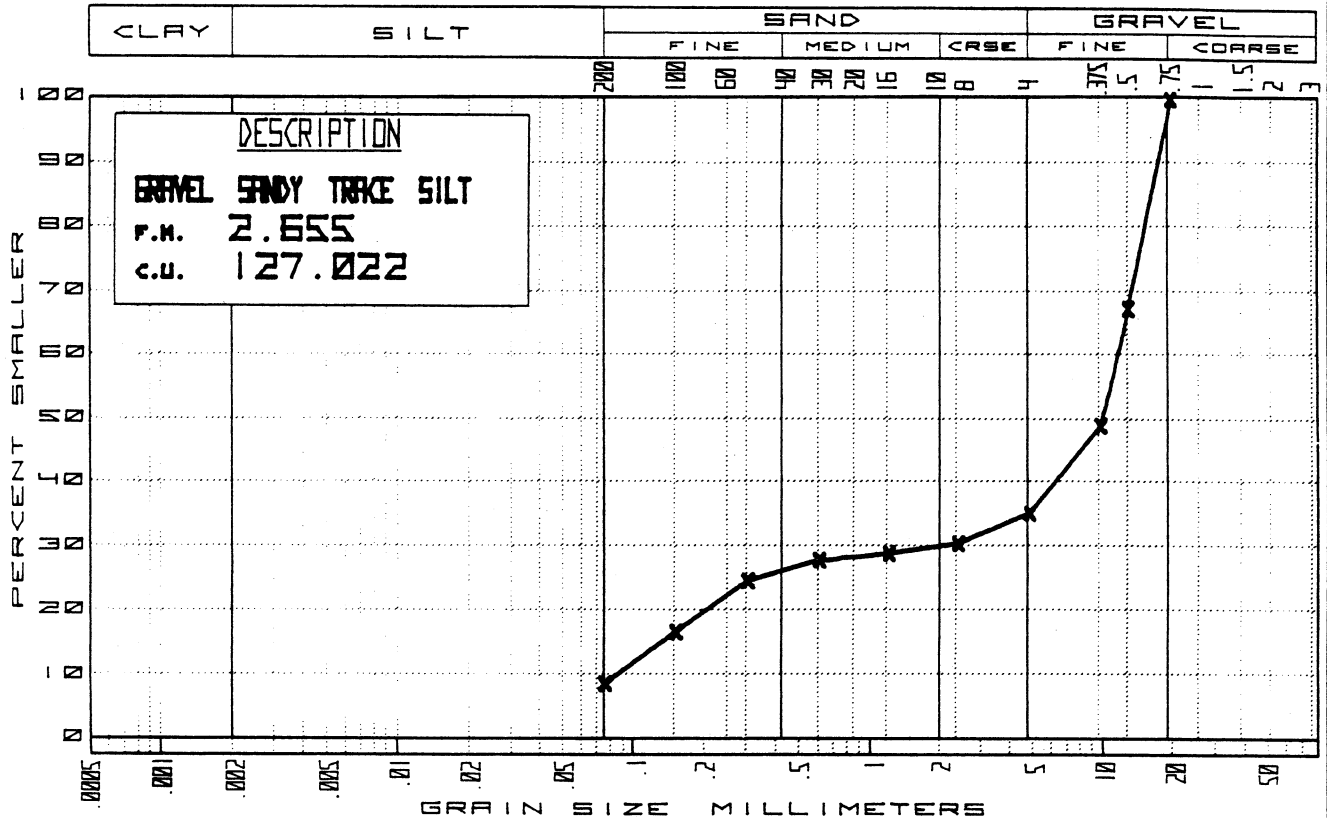
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-10-76 BASELINE A STATION 32+00 OFFSET 2+00W DEPTH 25.0



All tests performed in accordance with ASTM & CSA standards.

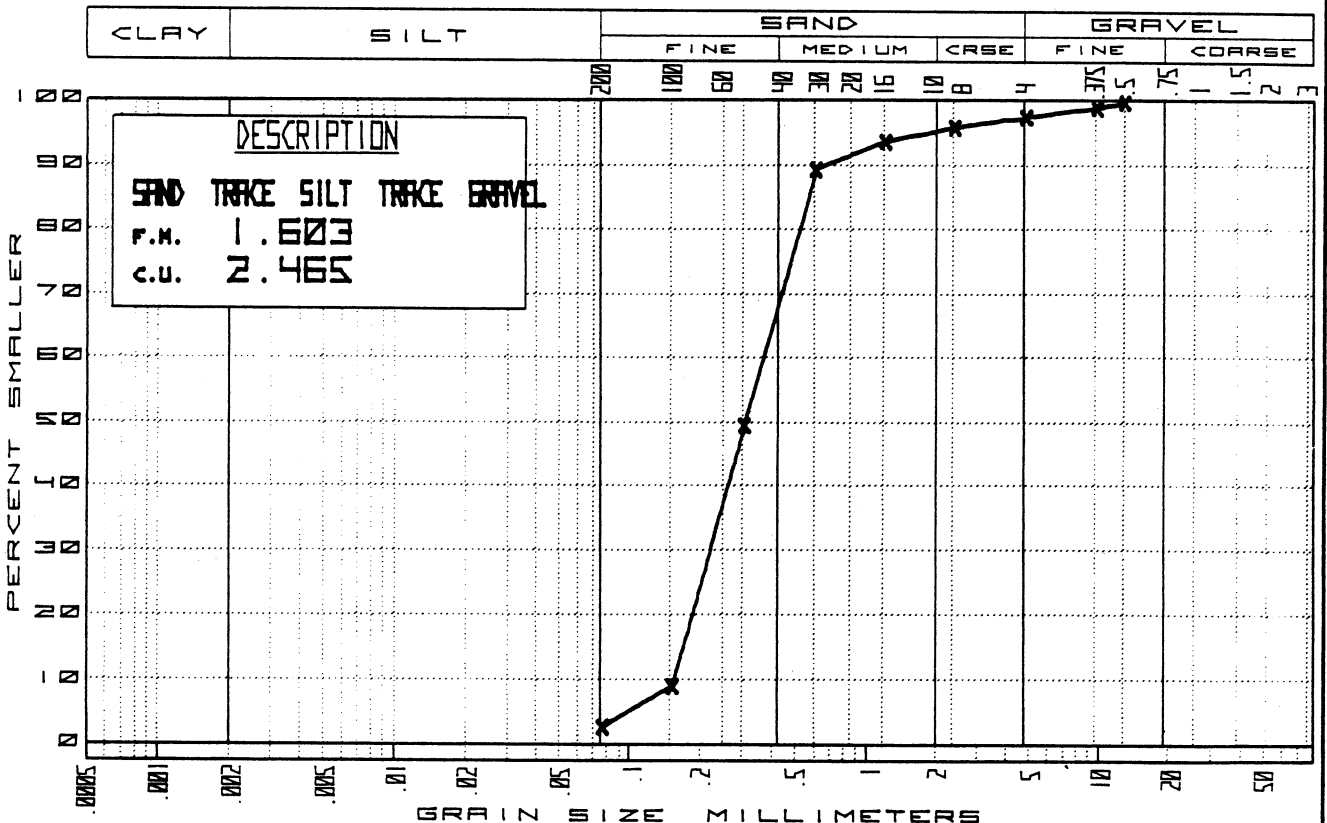
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-10-76 BASELINE A STATION 32+00 OFFSET 0+00 DEPTH 5.0-5.5



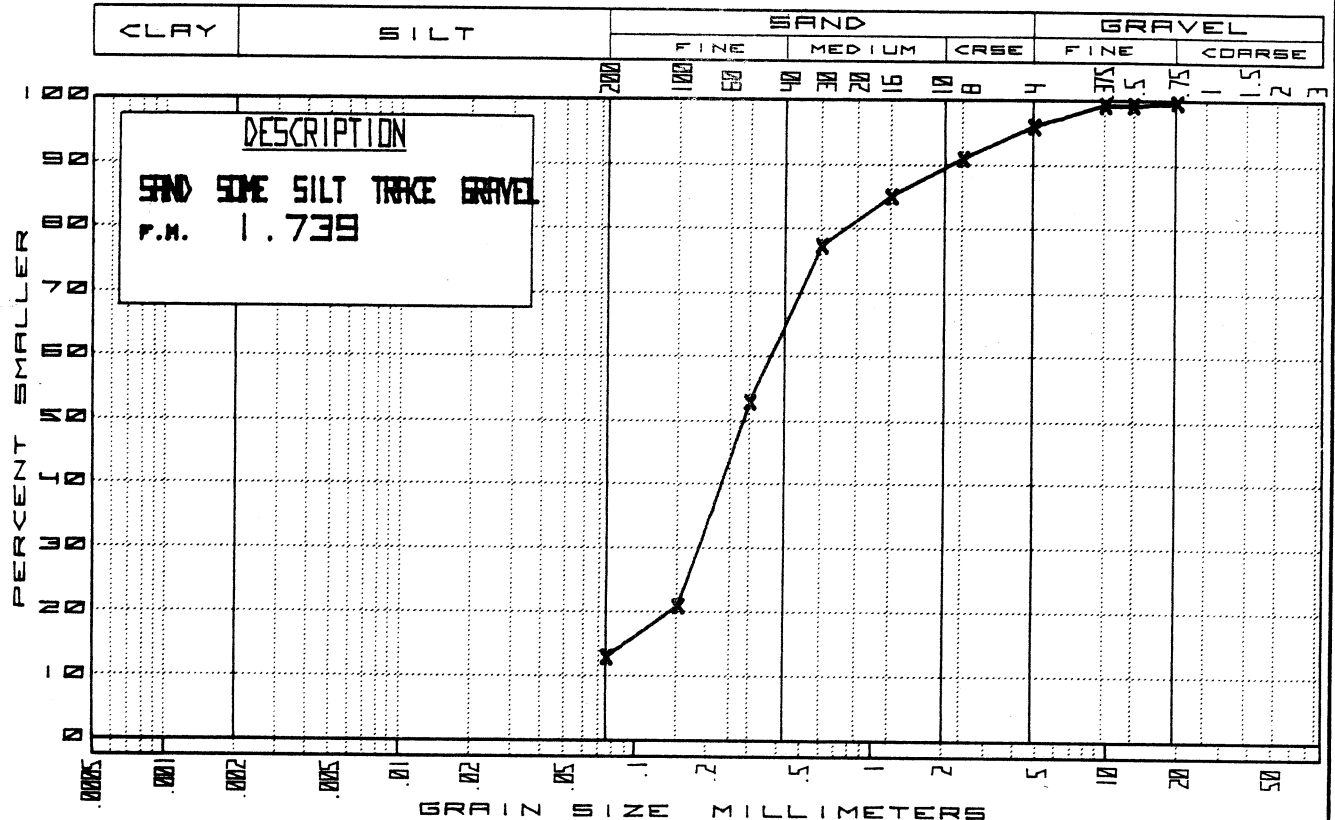
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-10-76 BASELINE A STATION 32+00 OFFSET 0+00 DEPTH 10.5-11.5



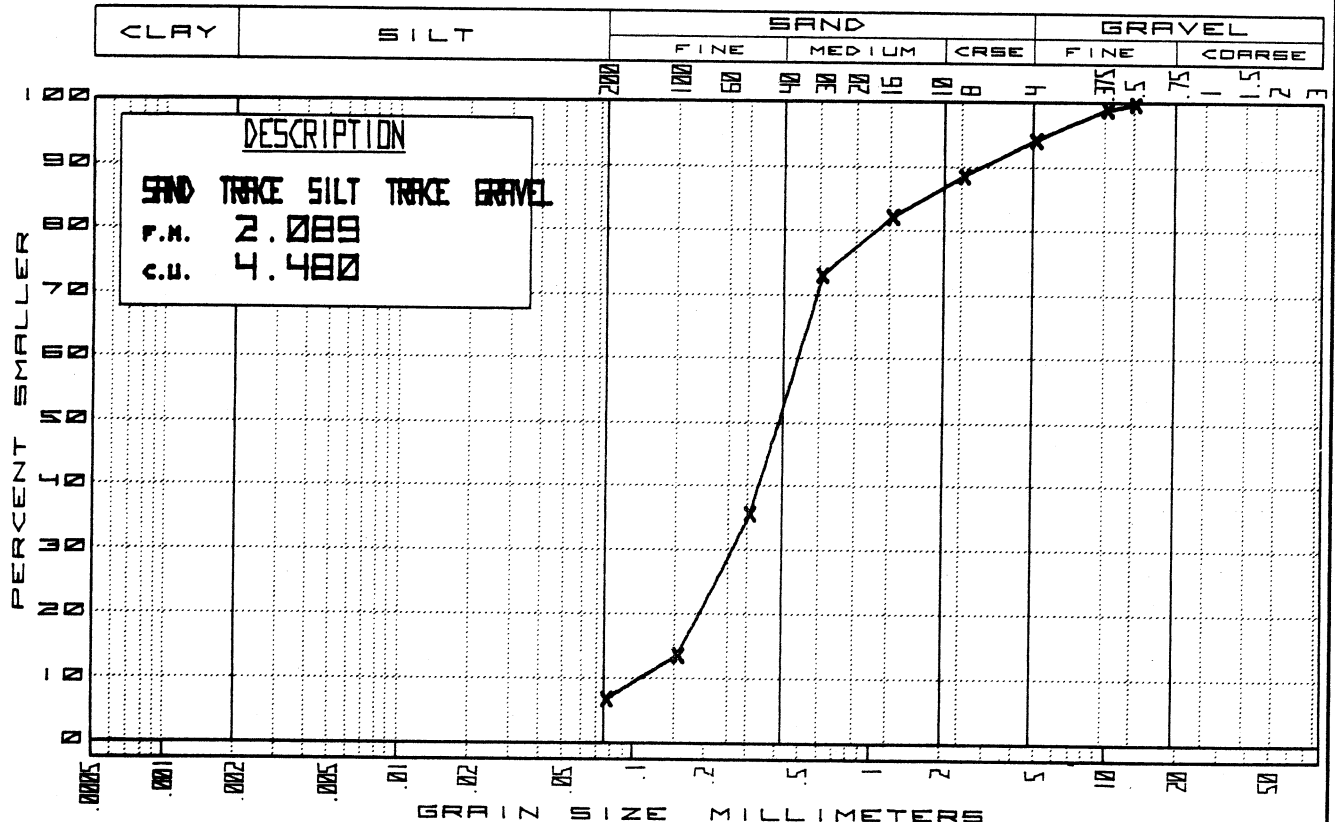
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-10-76 BASELINE A STATION 32+00 OFFSET 4+00E DEPTH 15.0



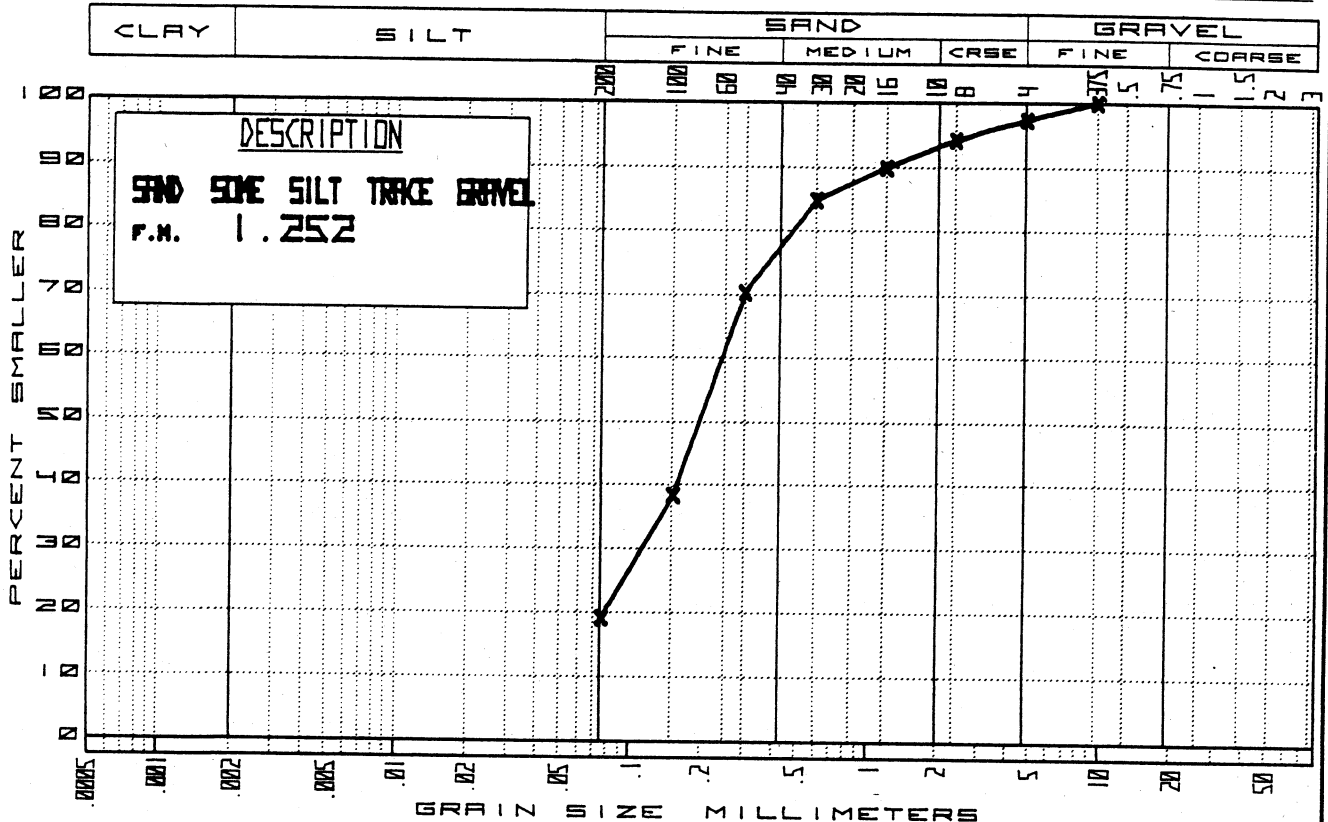
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-10-76 BASELINE A STATION 34+00 OFFSET 3+00W DEPTH 25.0

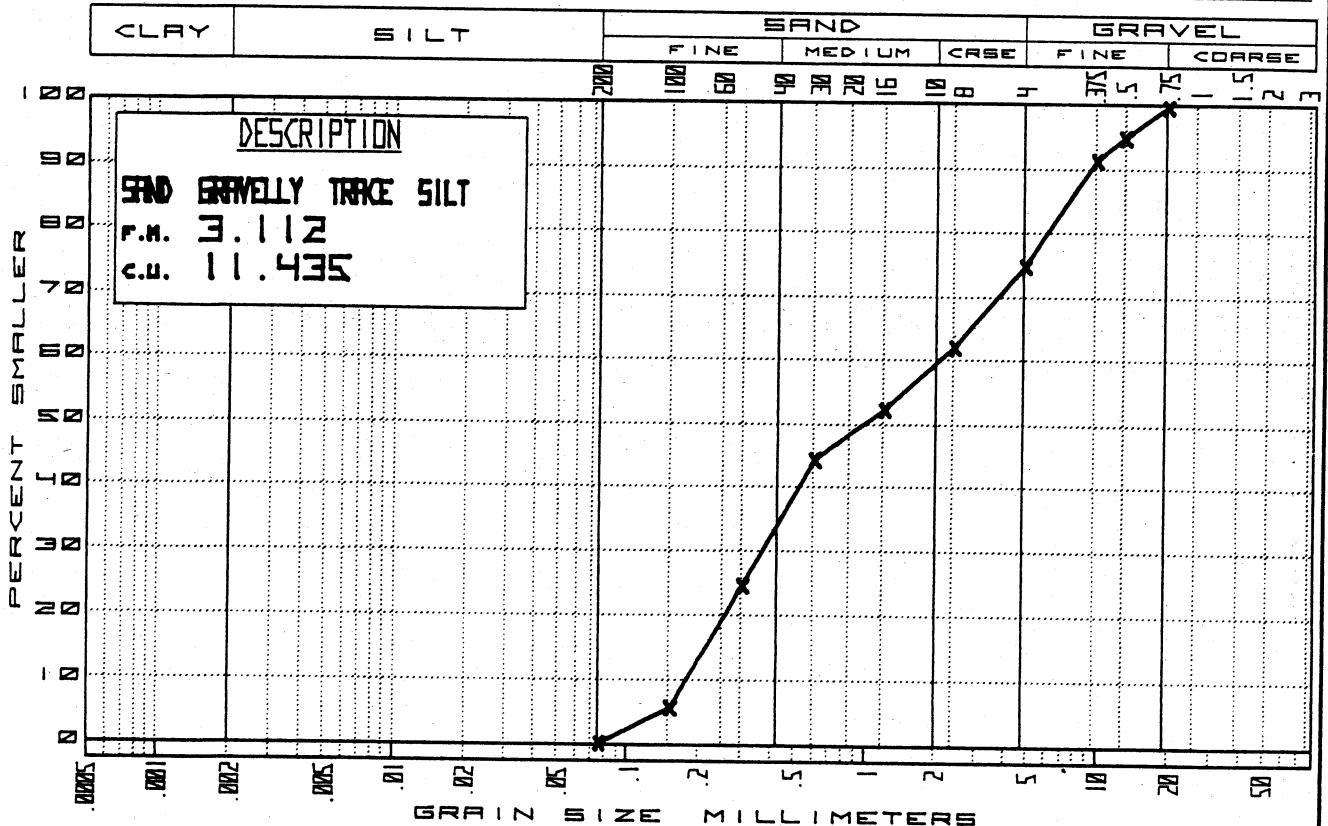


All tests performed in accordance with ASTM & CSA standards.

JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-10-76 BASELINE A STATION 34+00 OFFSET 1+00W DEPTH 5.0-7.0



JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-11-76 BASELINE A STATION 36+00 OFFSET 10+00W DEPTH 0.0-1.0

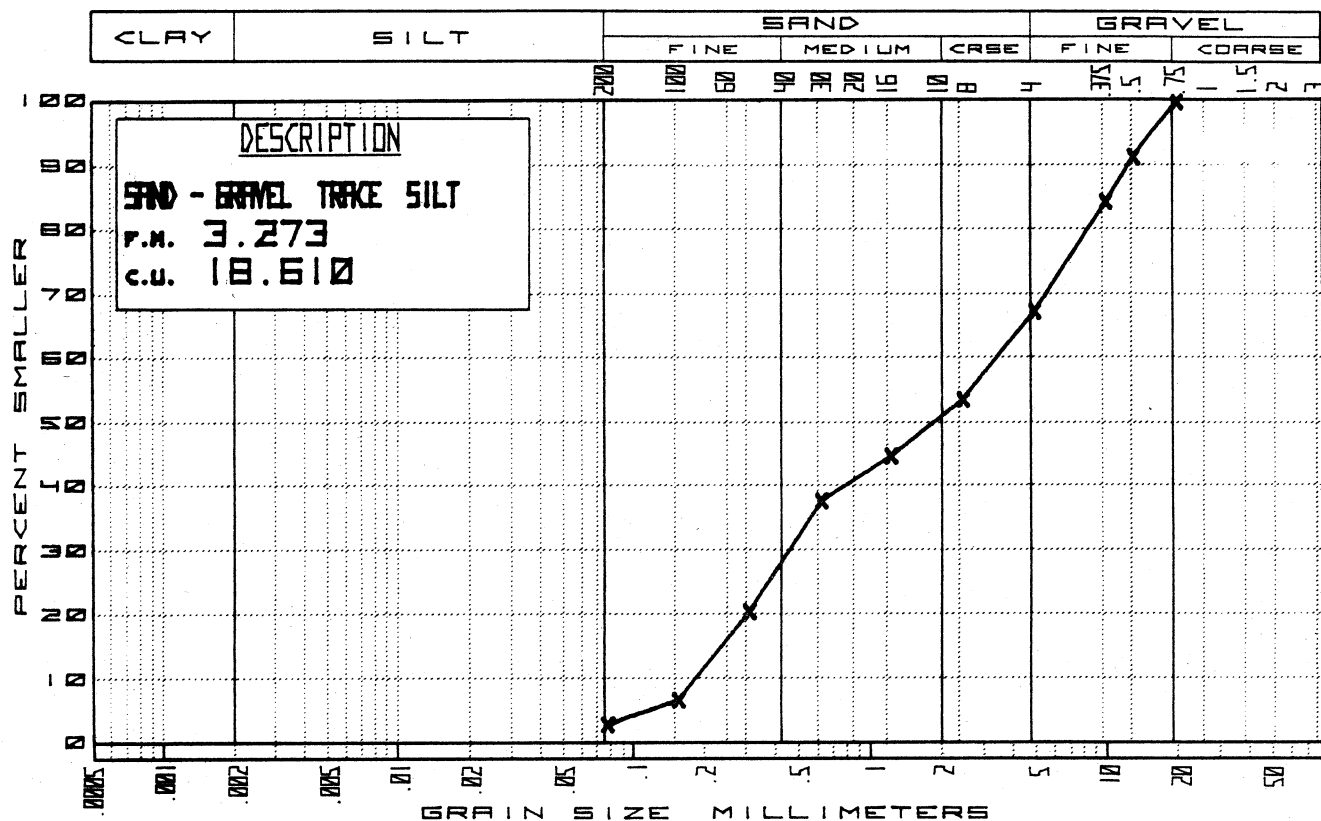


All tests performed in accordance with ASTM & CSA standards.

JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-11-76 BASELINE A STATION 36+00

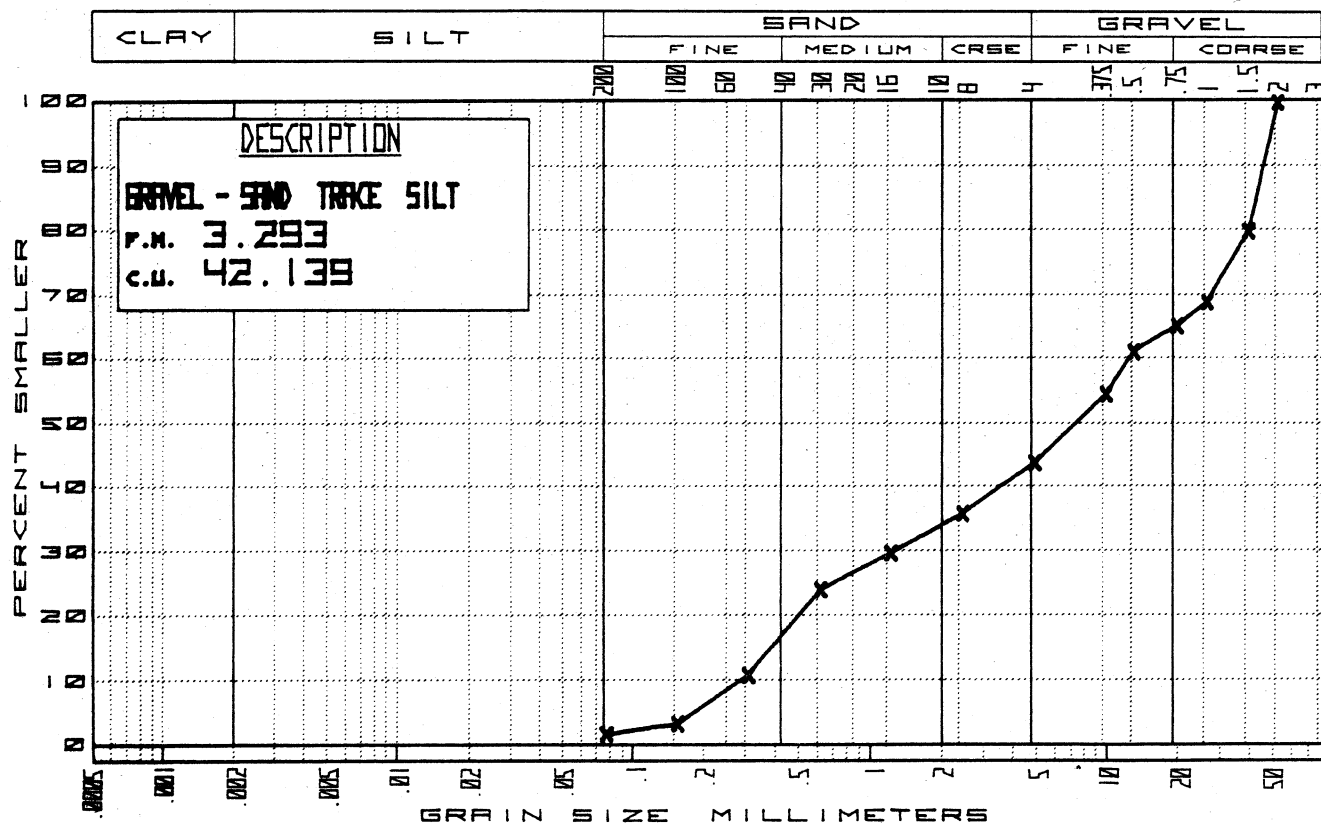
OFFSET 10+00W DEPTH 5.0-7.0



JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

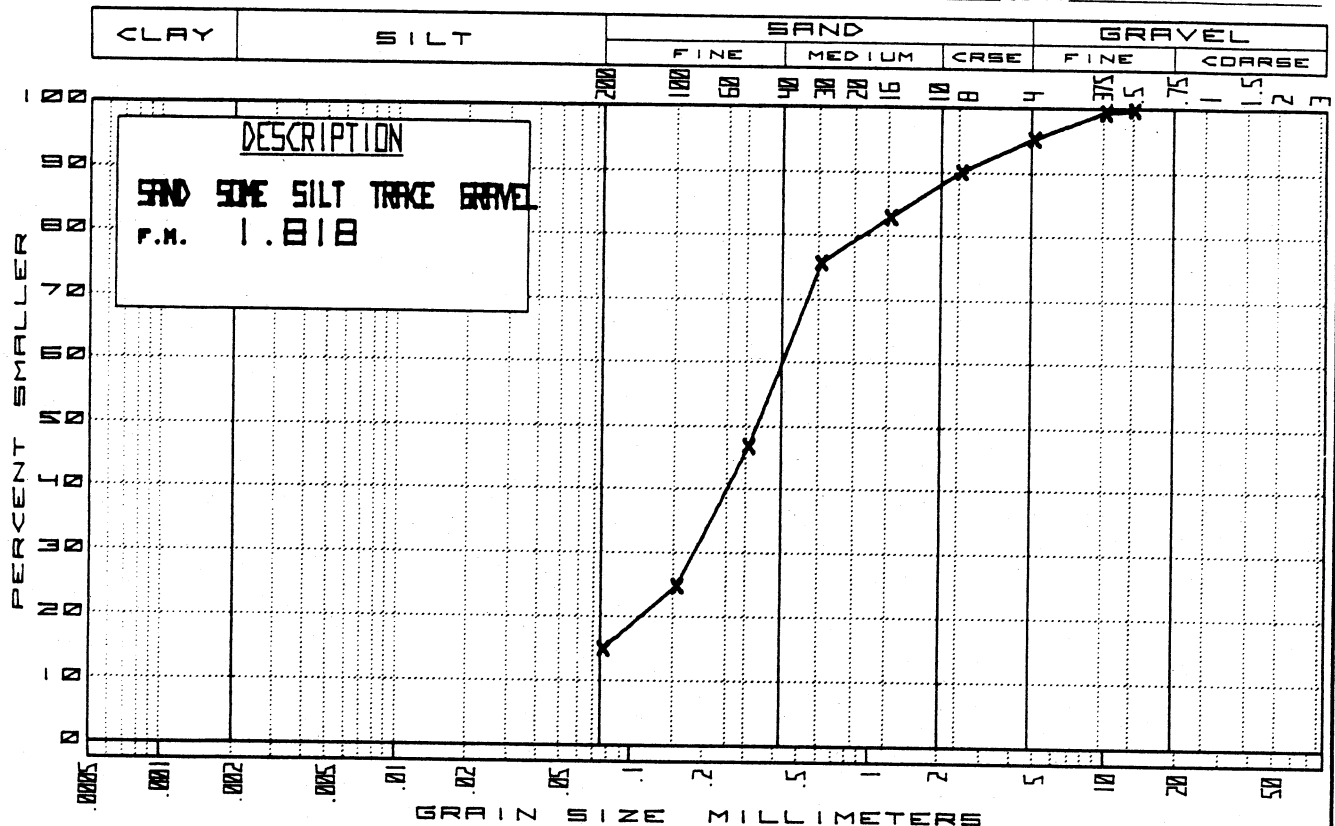
DATE 2-11-76 BASELINE A STATION 36+00

OFFSET 10+00W DEPTH 10.0-15.0



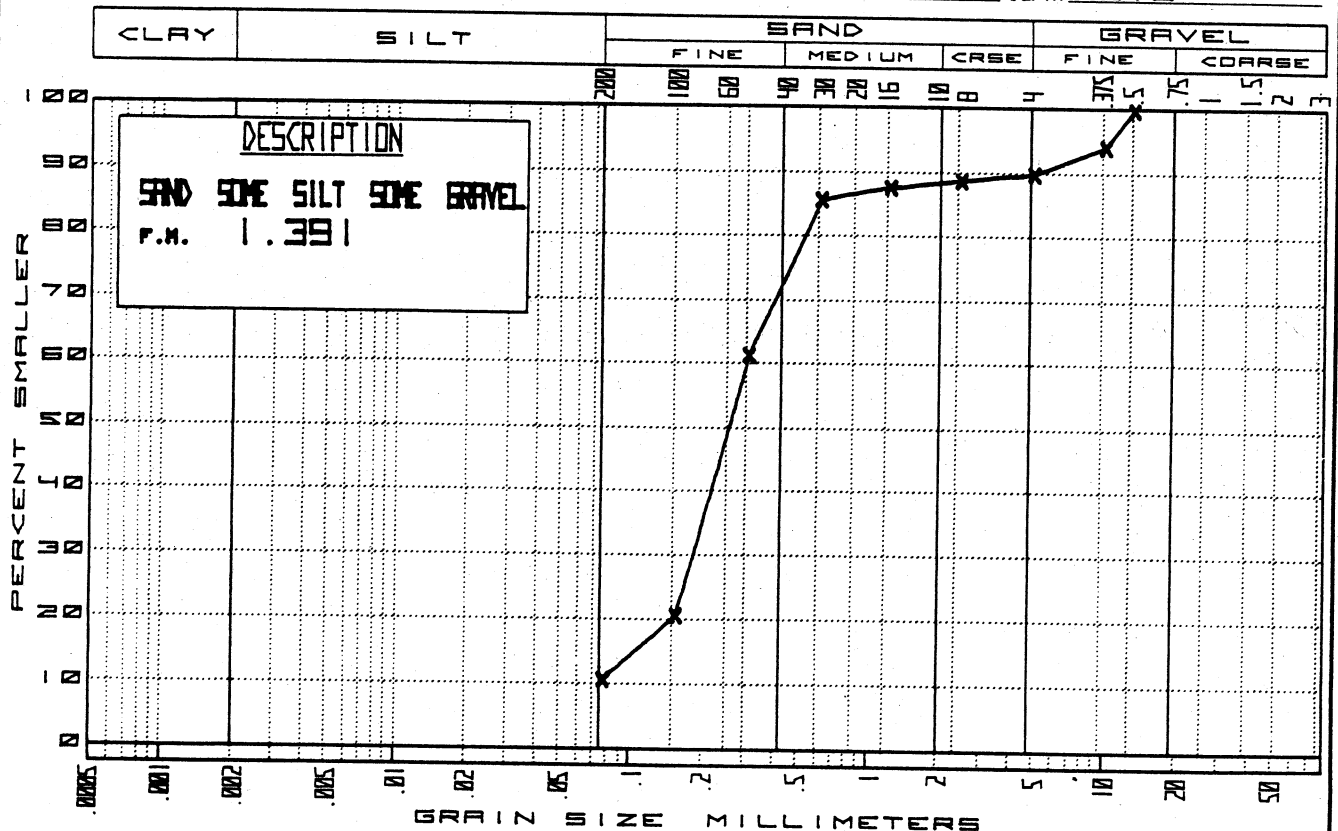
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-10-76 BASELINE A STATION 36+00 OFFSET 0+00 DEPTH 15.0



JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

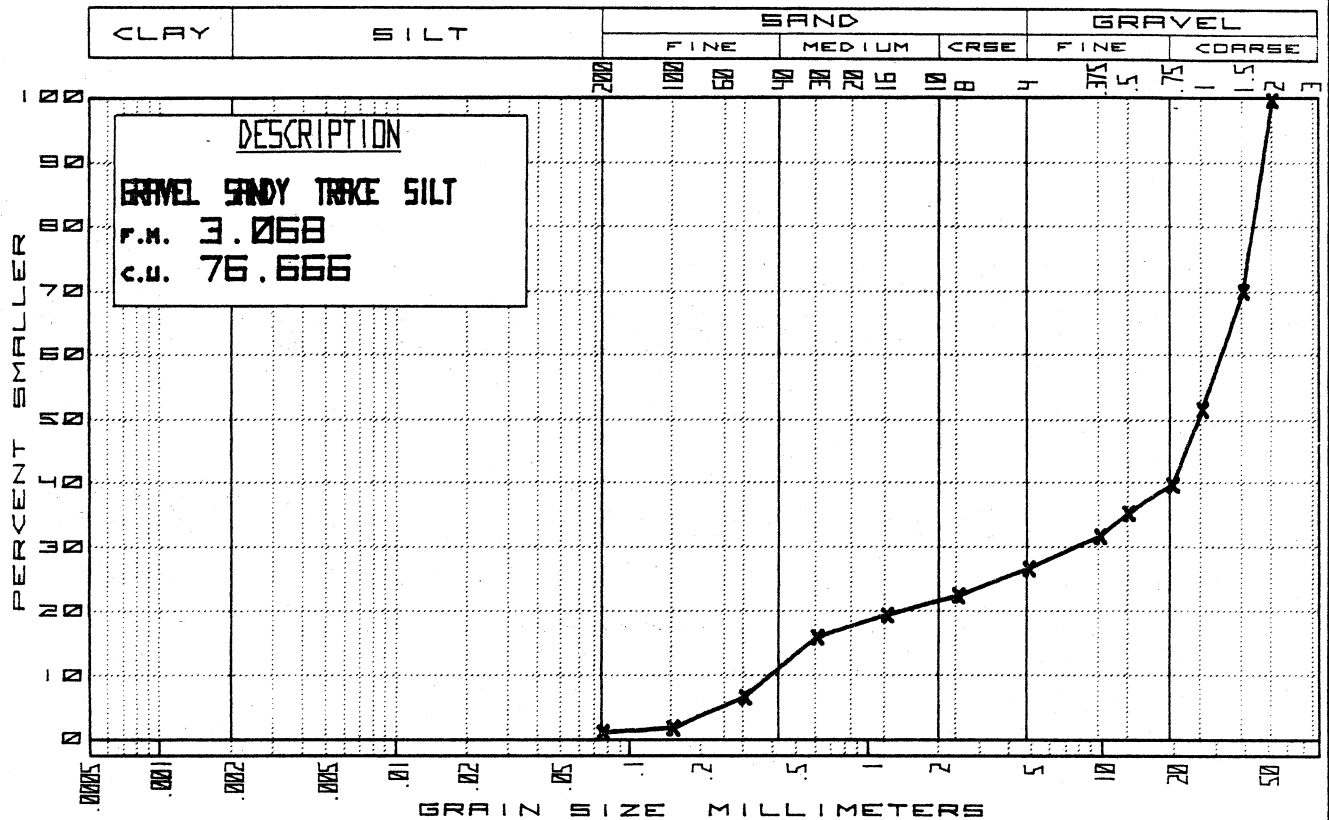
DATE 2-10-76 BASELINE A STATION 36+00 OFFSET 0+00 DEPTH 30.0



All tests performed in accordance with ASTM & CSA standards.

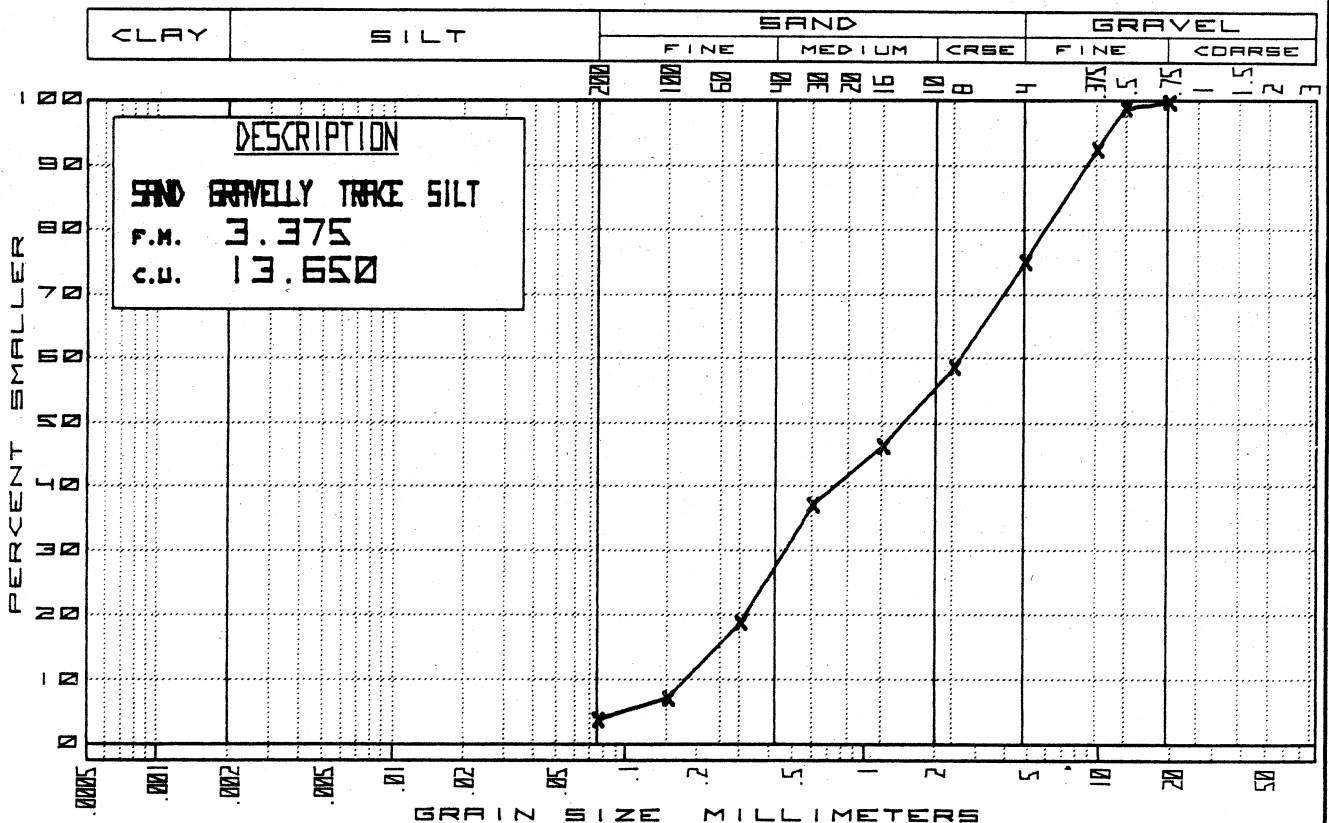
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-11-76 BASELINE A STATION 38+00 OFFSET 14+00W DEPTH 5.0



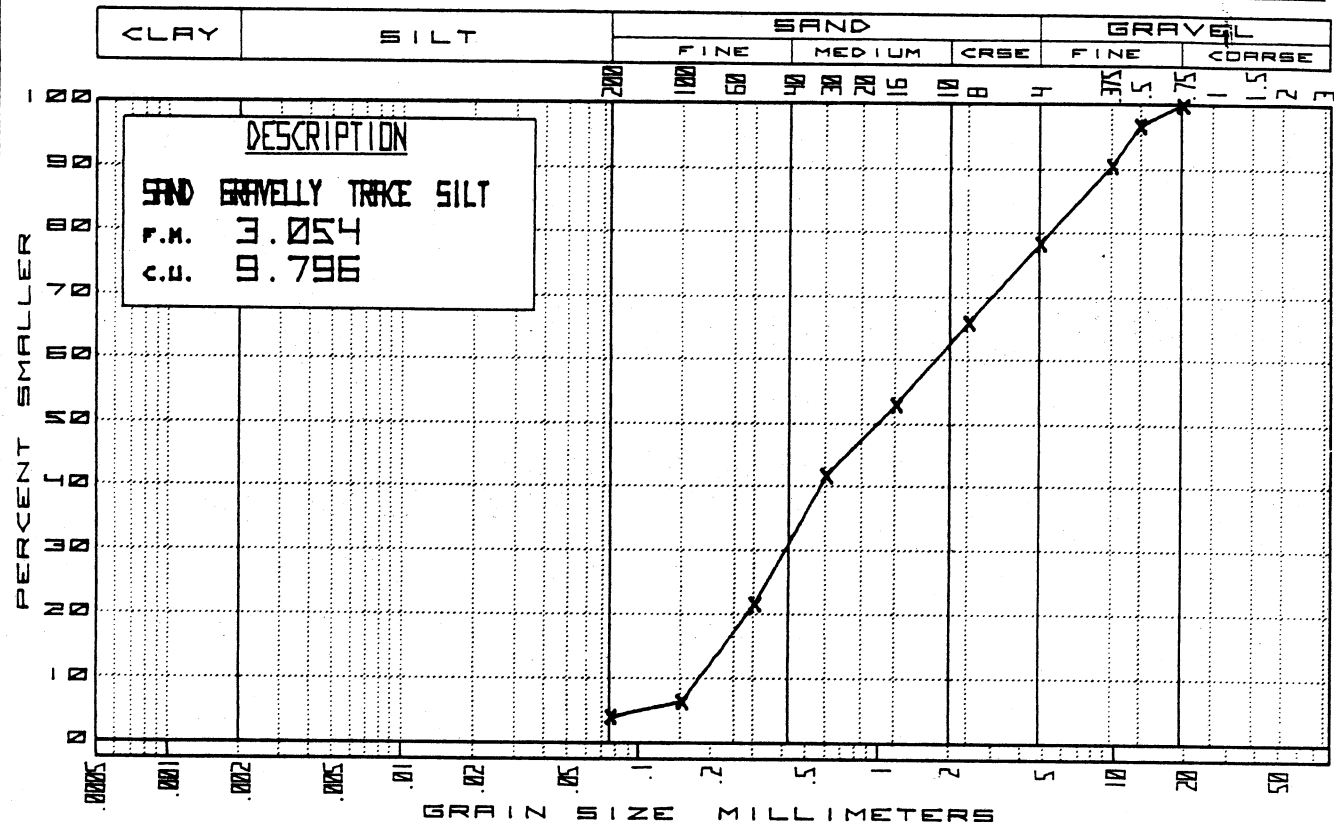
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-10-76 BASELINE A STATION 38+00 OFFSET 12+00W DEPTH 5.0



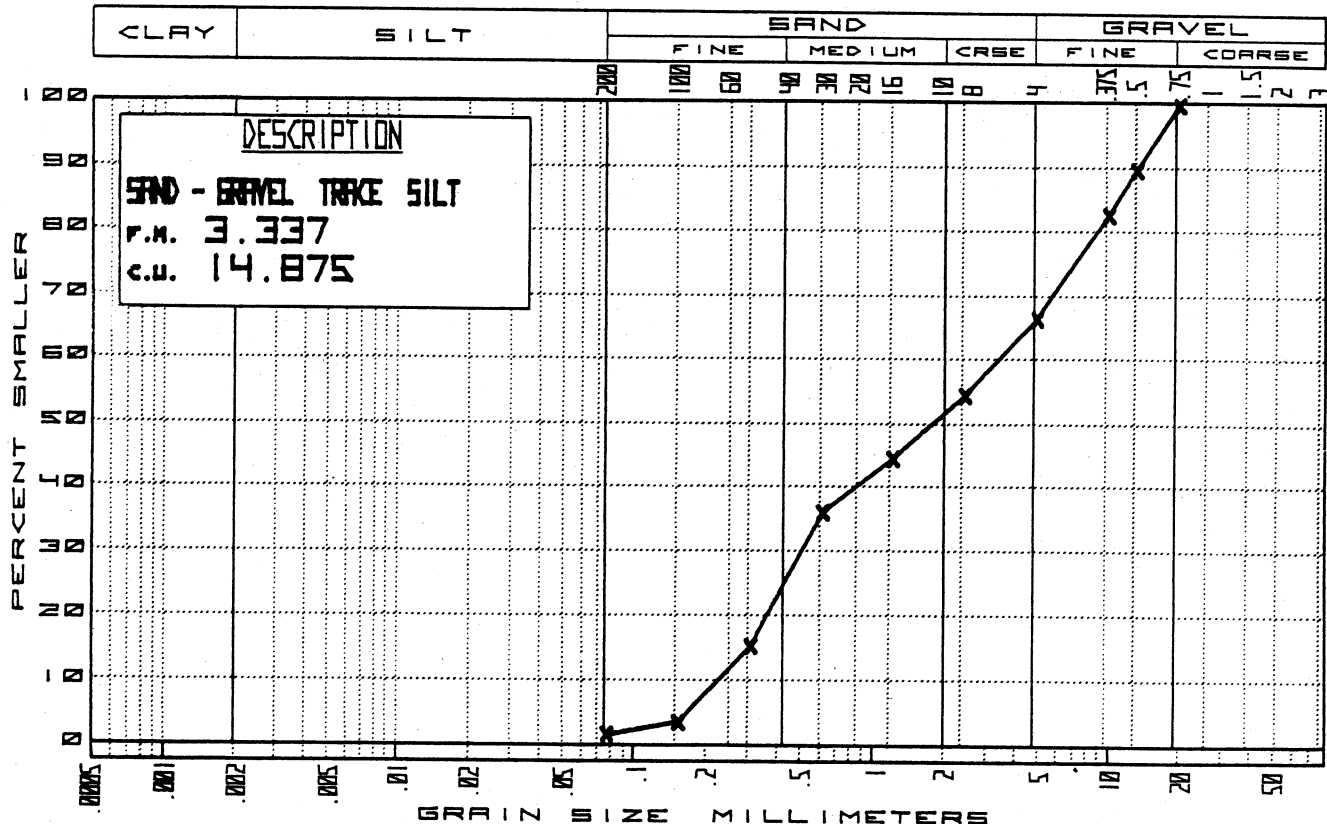
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-10-76 BASELINE A STATION 38+00 OFFSET 8+00W DEPTH 10.0

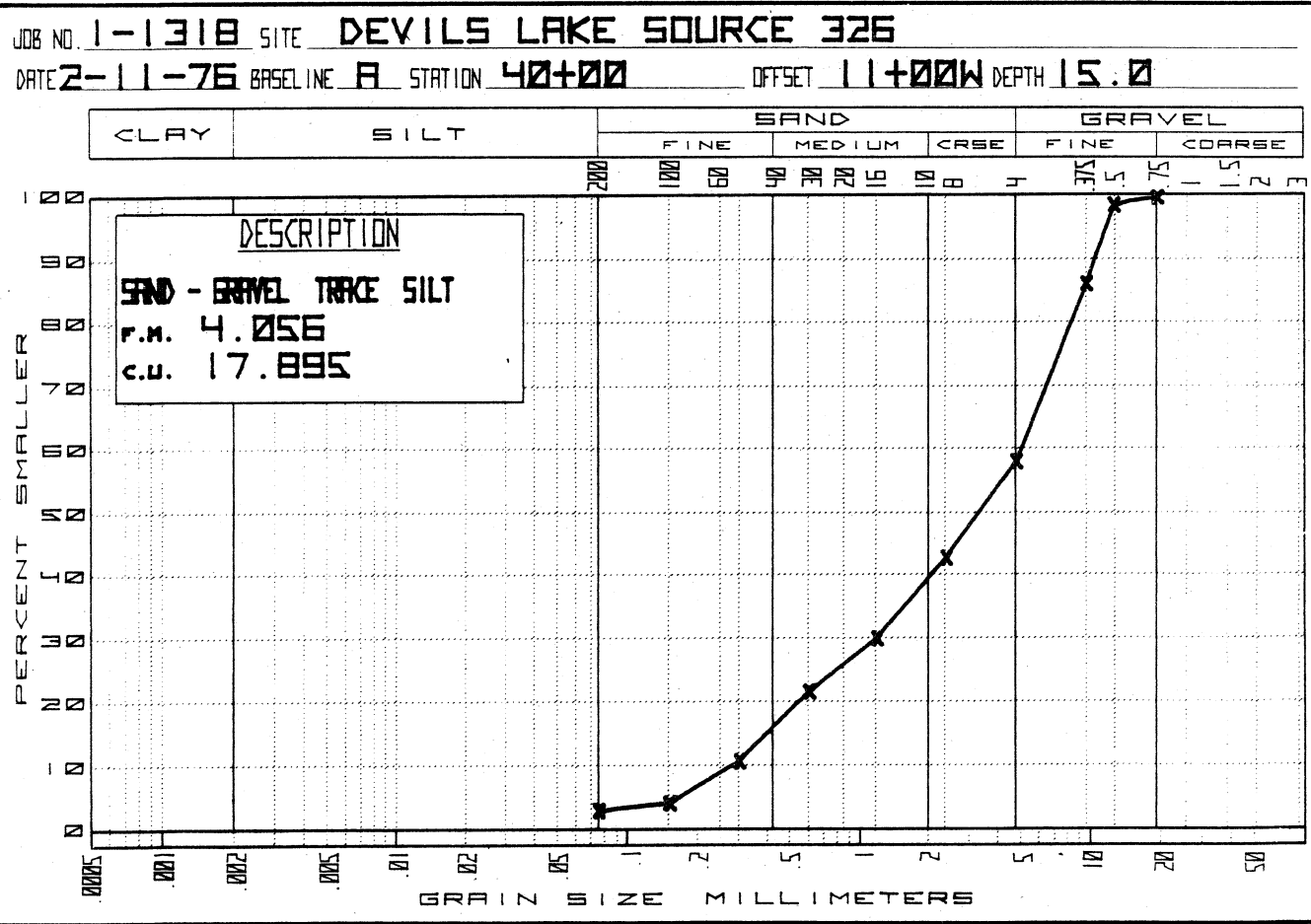
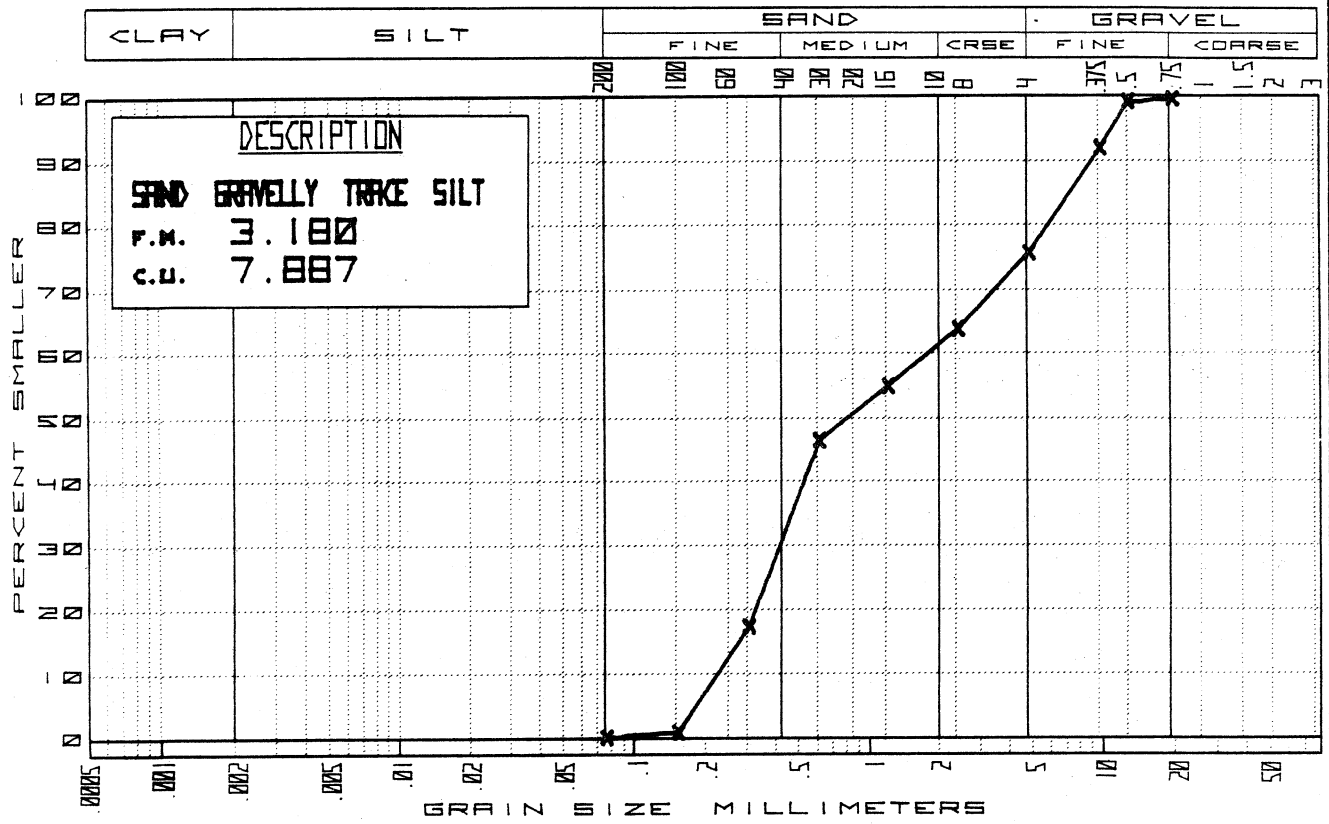


JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-11-76 BASELINE A STATION 38+00 OFFSET 1+00E DEPTH 13.0-14.0



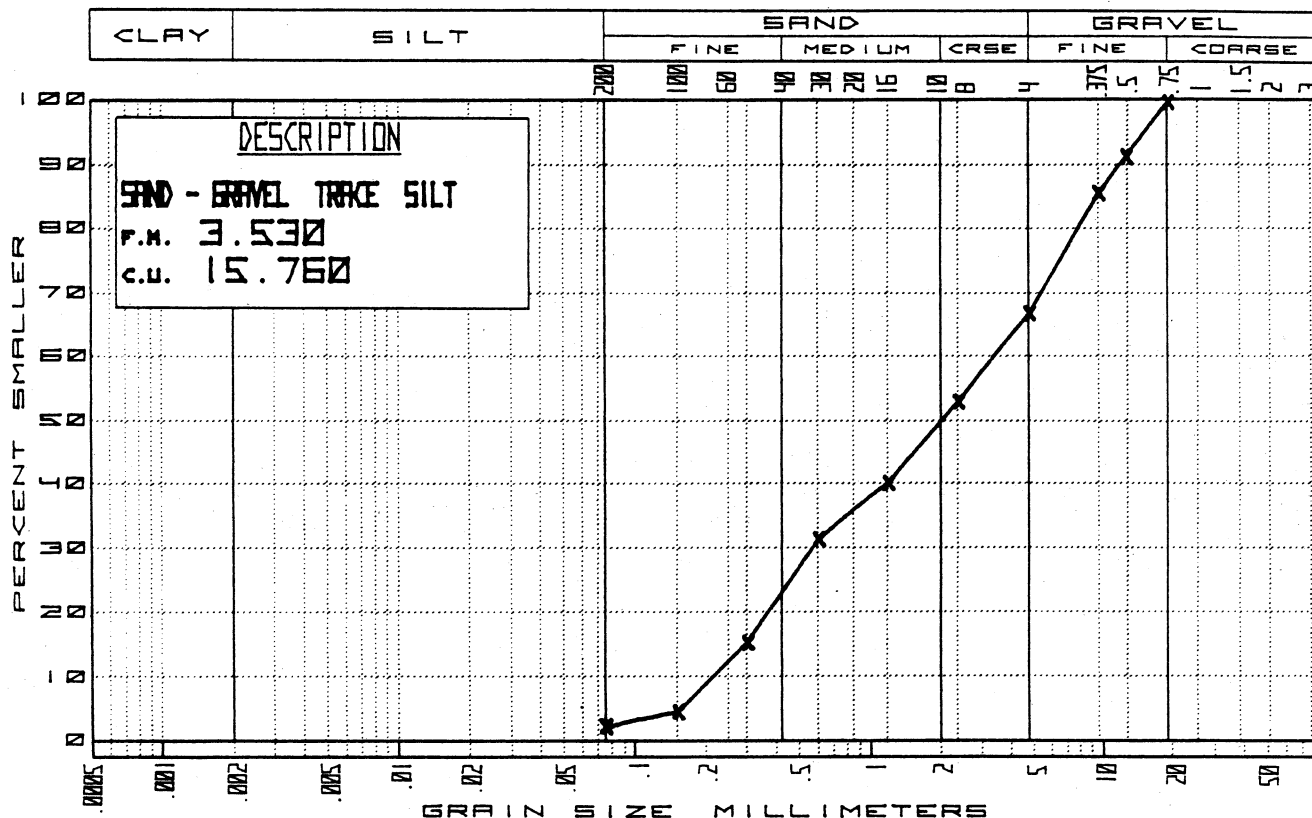
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-10-76 BASELINE A STATION 38+00 OFFSET 1+00E DEPTH 22.0-24.0



All tests performed in accordance with ASTM & CSA standards.

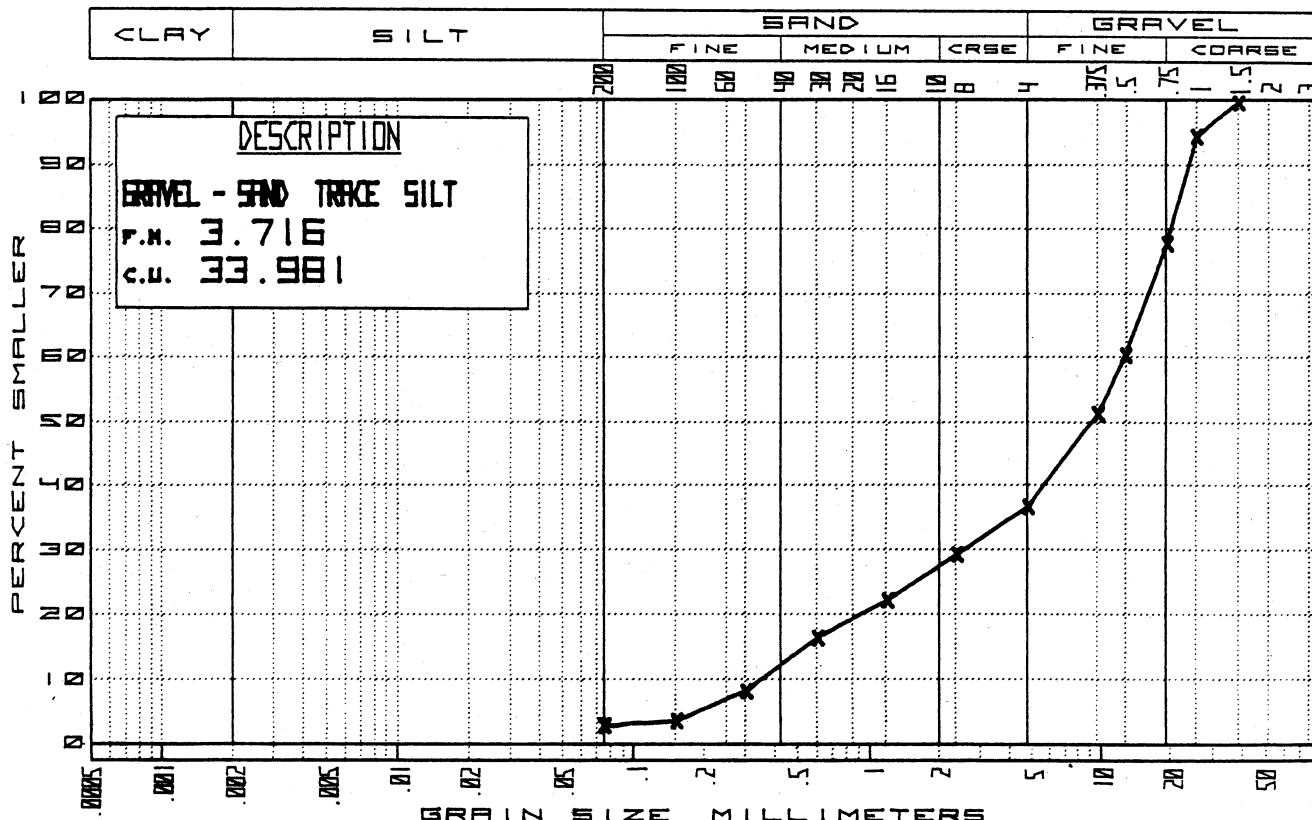
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-11-76 BASELINE A STATION 40+00 OFFSET 9+00W DEPTH 5.0-10.0



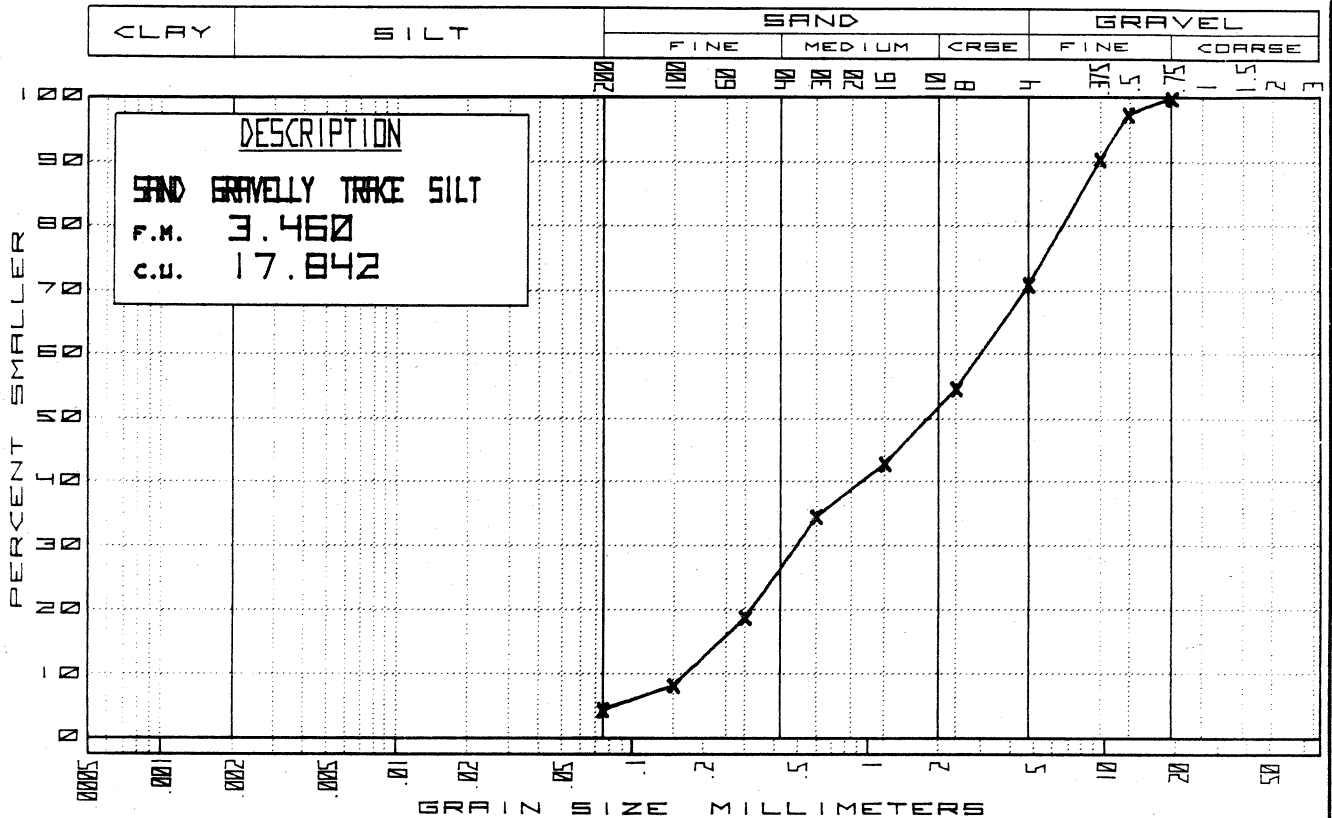
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-11-76 BASELINE A STATION 40+00 OFFSET 9+00W DEPTH 20.0-25.0



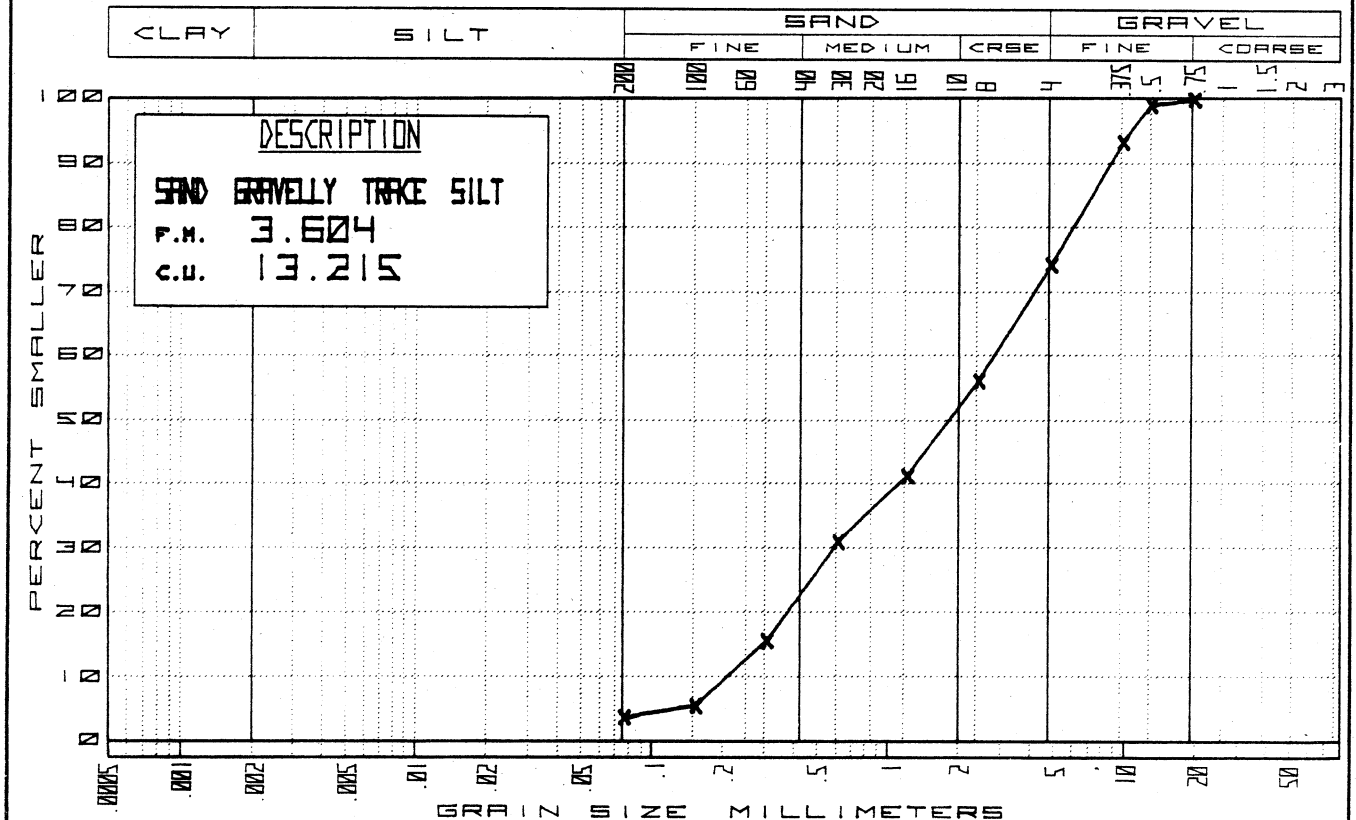
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-10-76 BASELINE A STATION 40+00 OFFSET 7+00W DEPTH 15.0



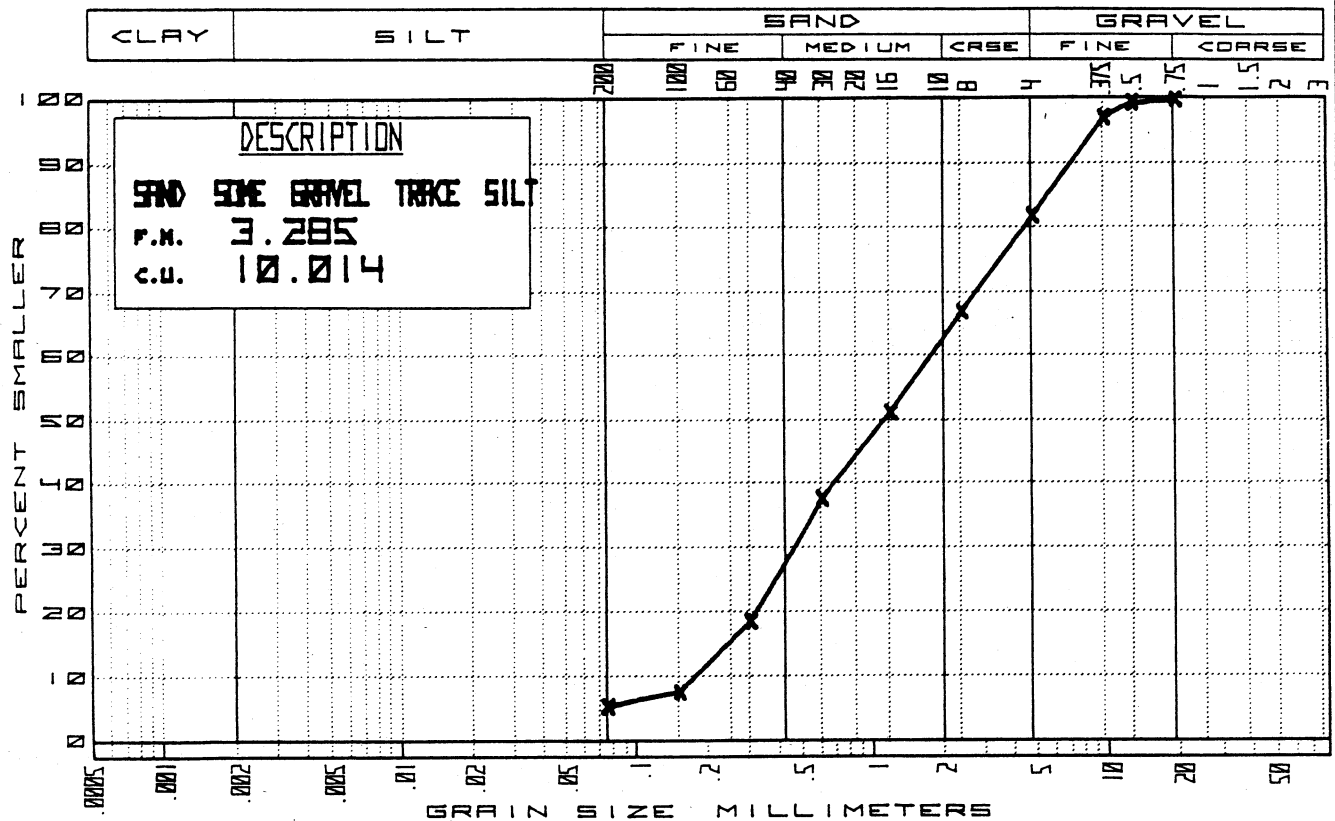
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-10-76 BASELINE A STATION 40+00 OFFSET 0+00 DEPTH 10.0

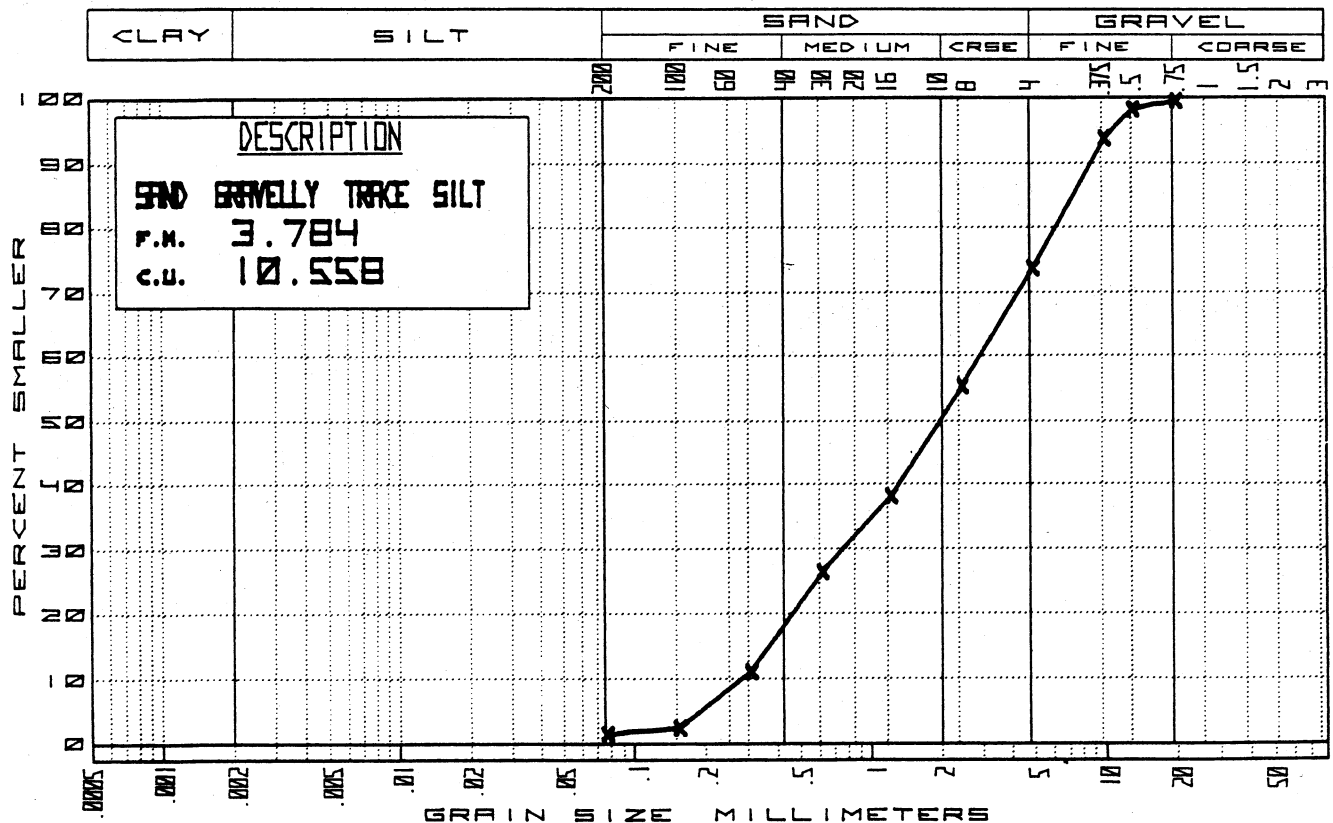


All tests performed in accordance with ASTM & CSA standards.

JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-10-76 BASELINE A STATION 44+00 OFFSET 0+00 DEPTH 15.0

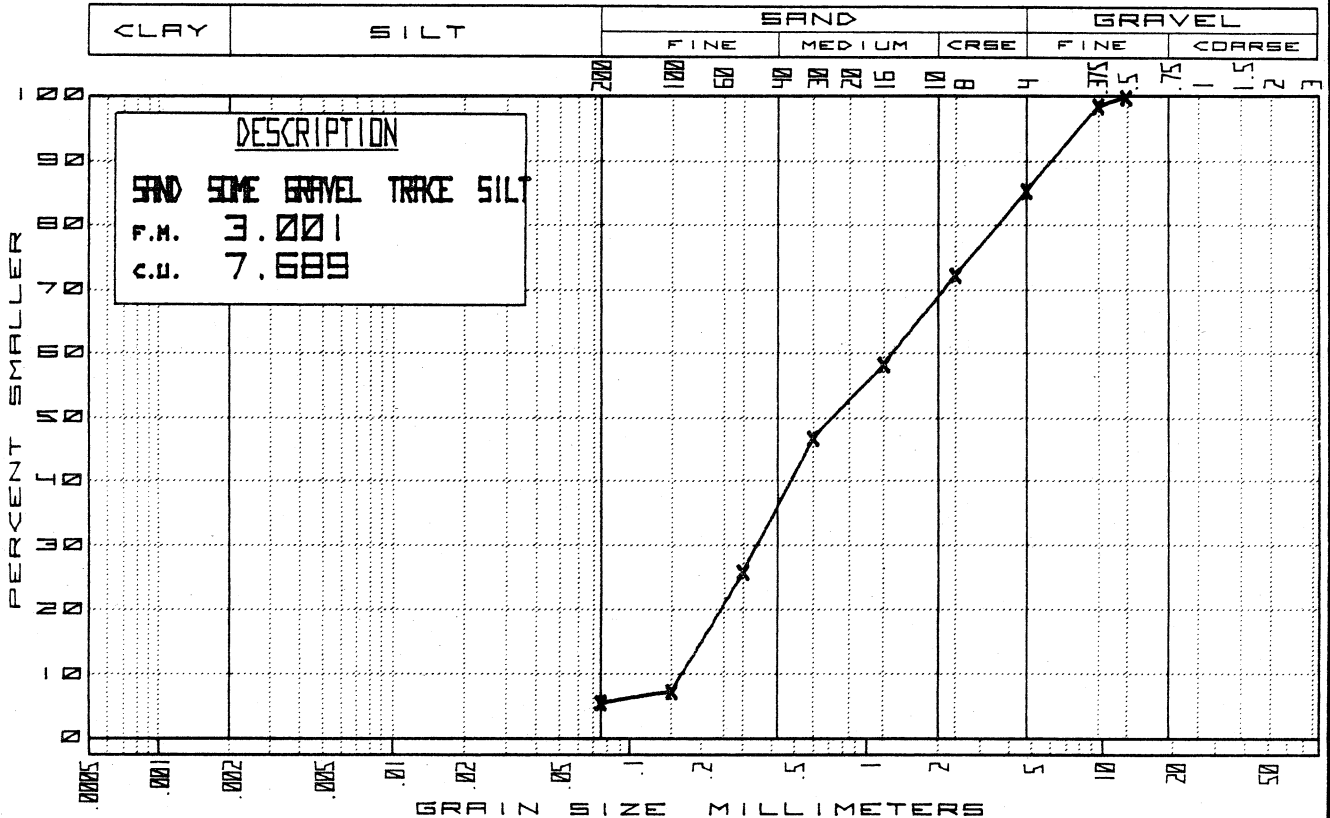


JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-10-76 BASELINE A STATION 44+00 OFFSET 2+00E DEPTH 5.0



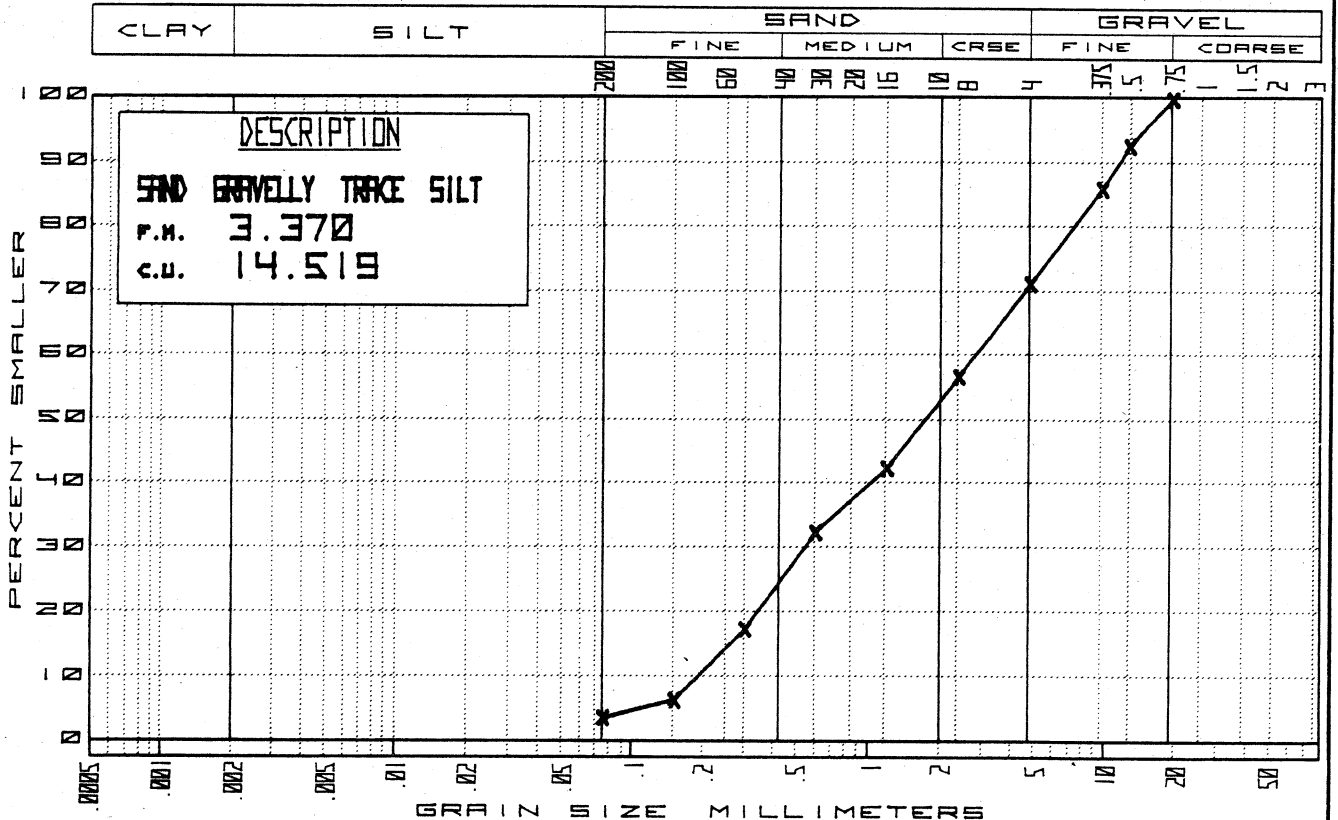
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-10-76 BASELINE A STATION 46+00 OFFSET 3+00E DEPTH 5.0

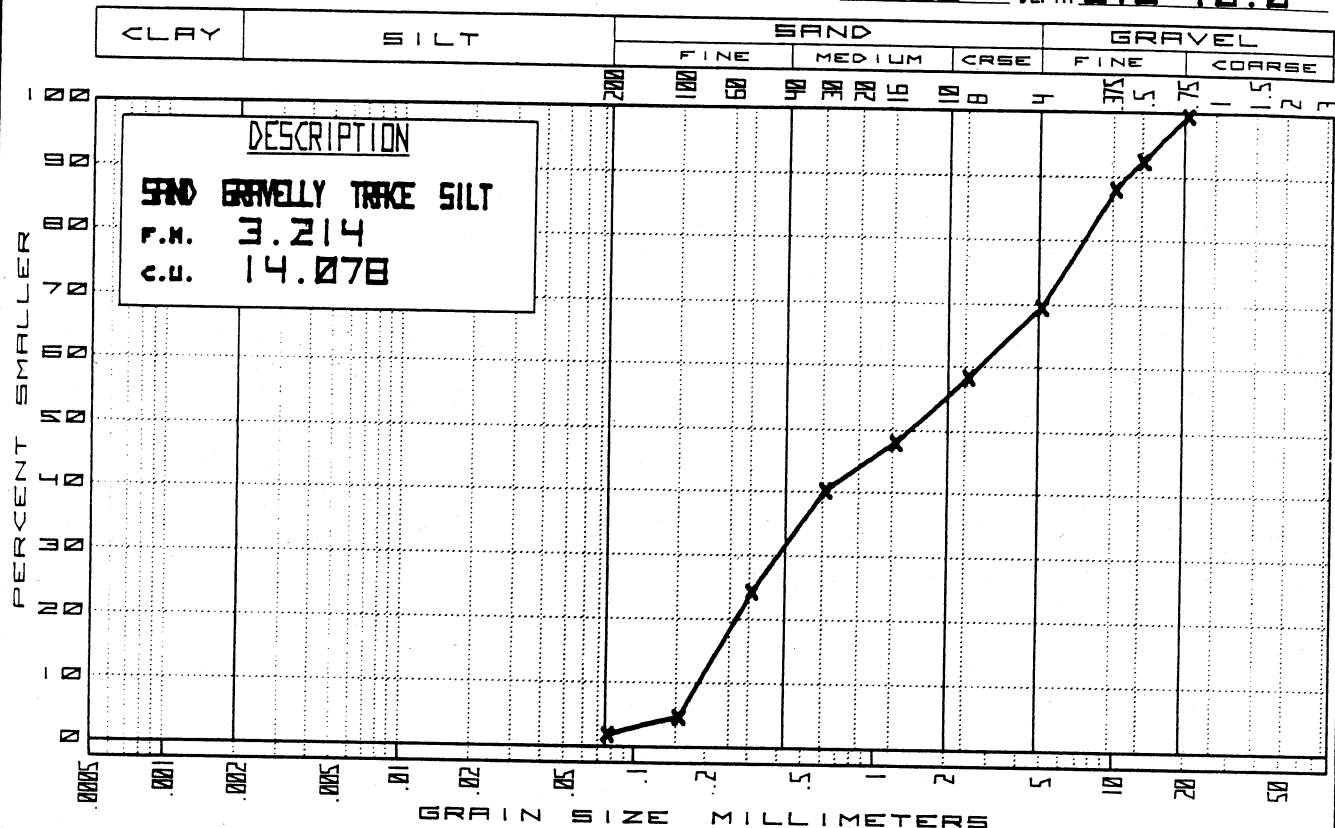


JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

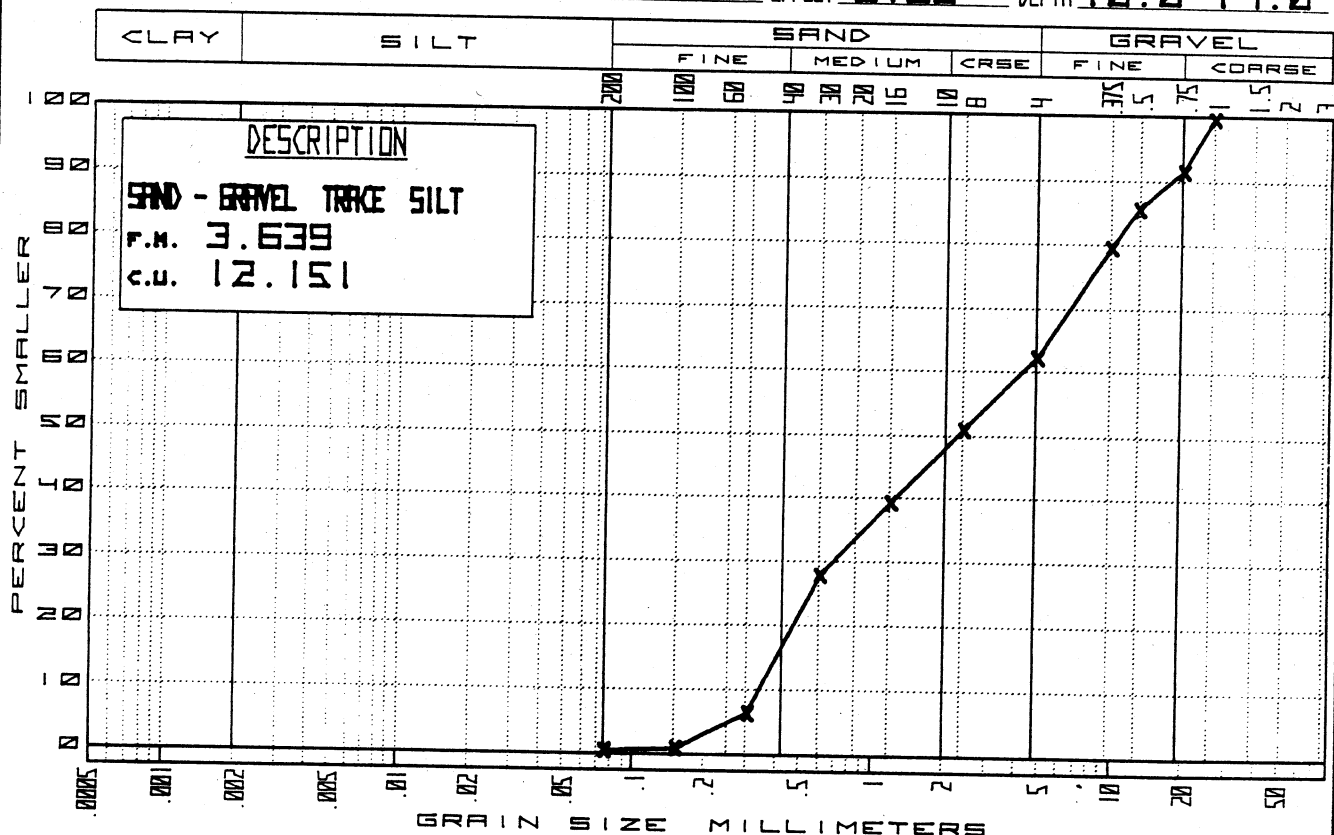
DATE 2-10-76 BASELINE A STATION 46+00 OFFSET 3+50E DEPTH 0.0-1.0



JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-10-76 BASELINE A STATION 46+00 OFFSET 0+00 DEPTH 5.0-10.0



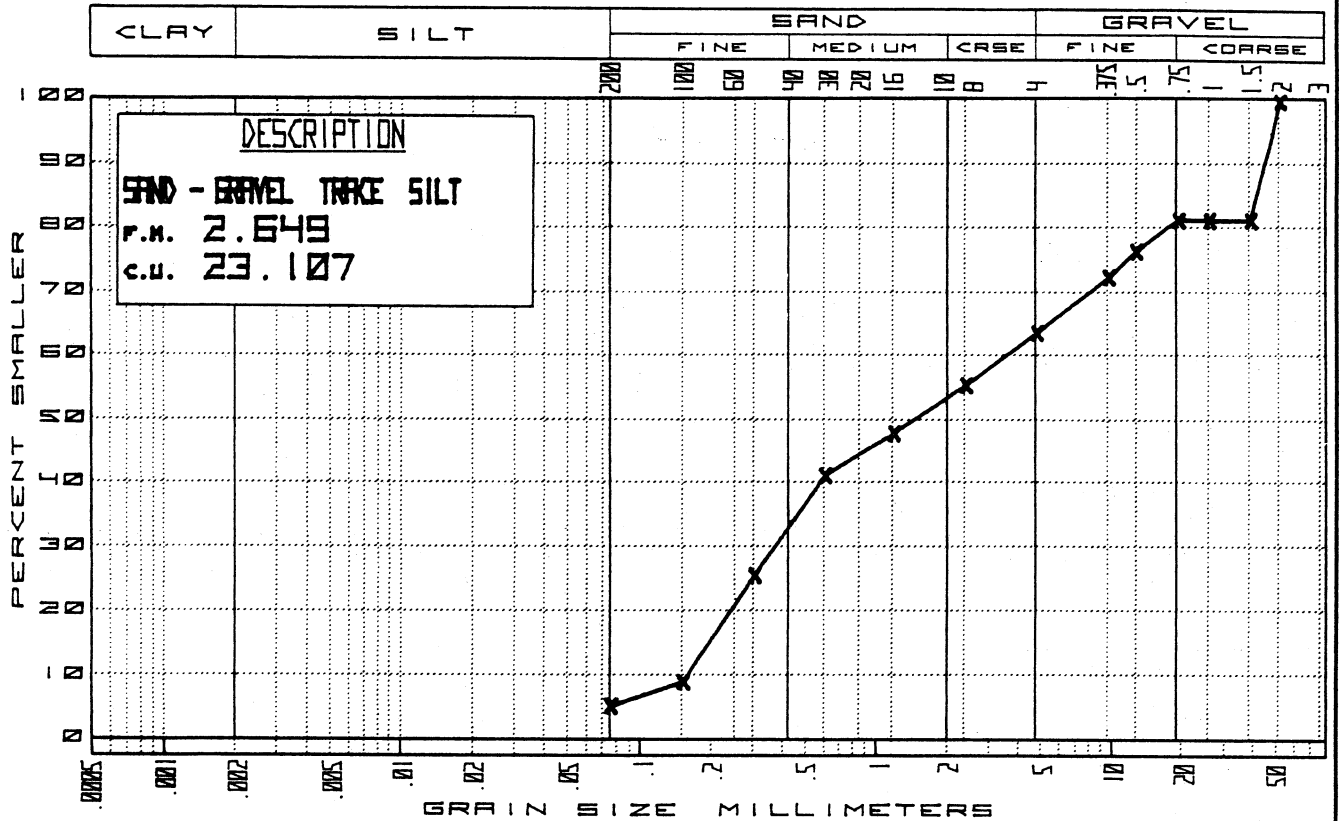
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-11-76 BASELINE A STATION 46+00 OFFSET 0+00 DEPTH 10.0-14.0



All tests performed in accordance with ASTM & CSA standards.

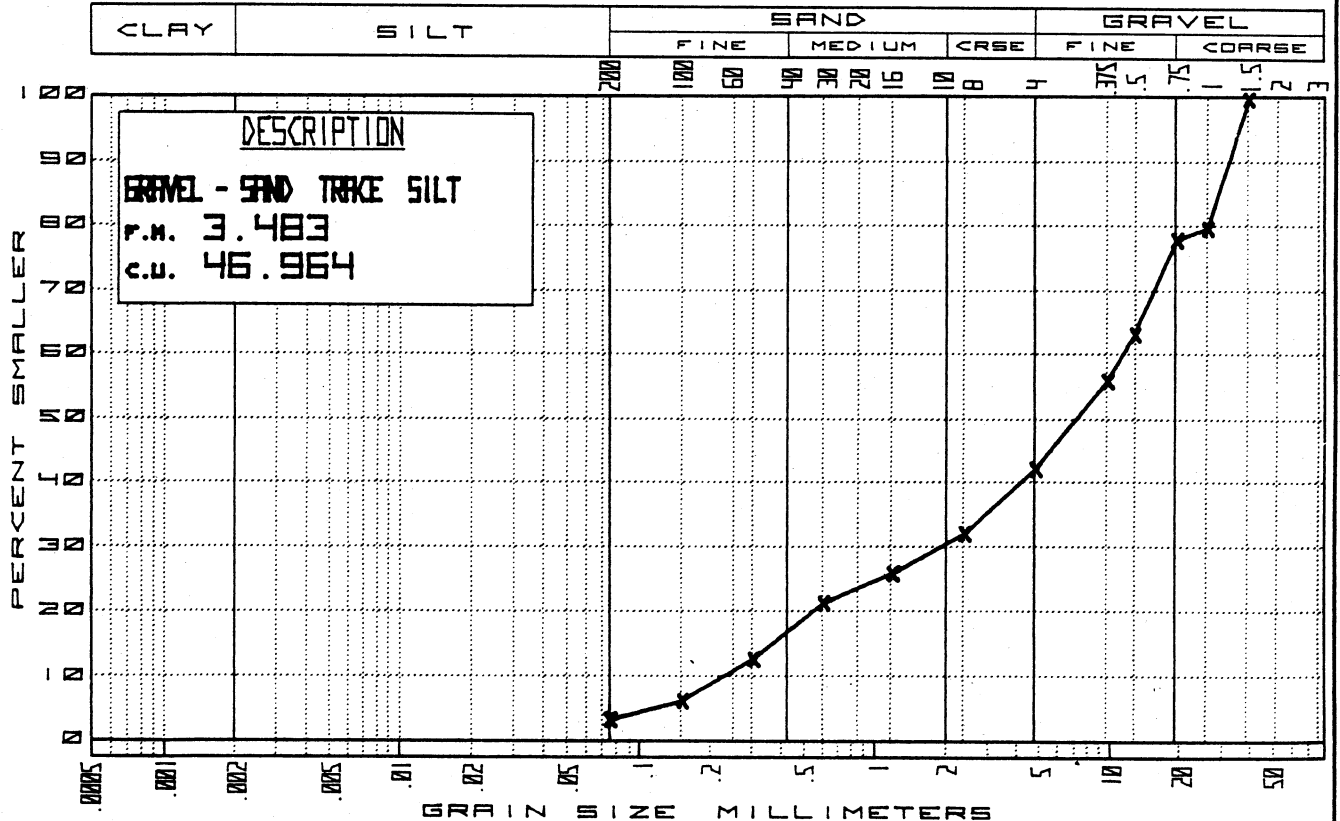
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-11-76 BASELINE A STATION 52+00 OFFSET 3+00W DEPTH 5.0-7.0



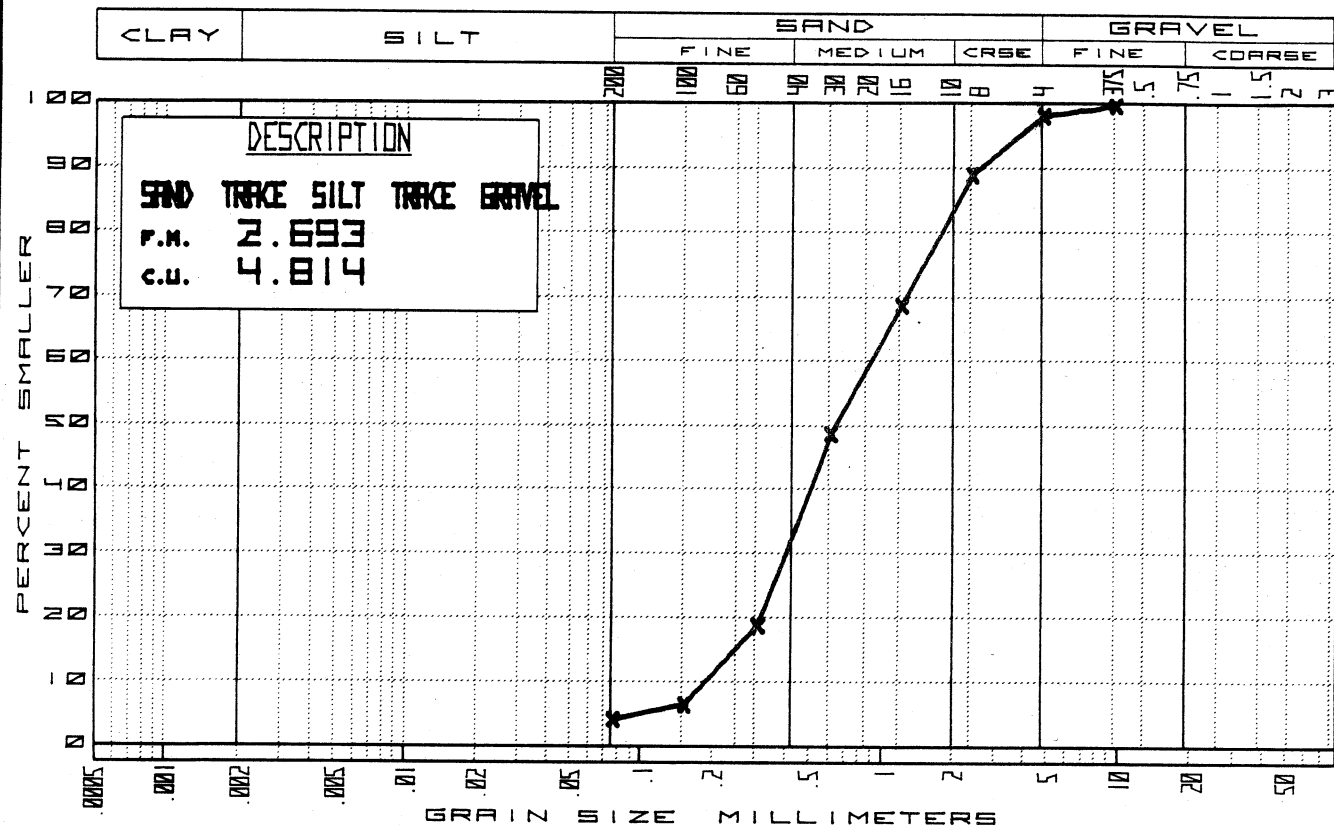
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-11-76 BASELINE A STATION 52+00 OFFSET 3+00W DEPTH 16.0-17.0



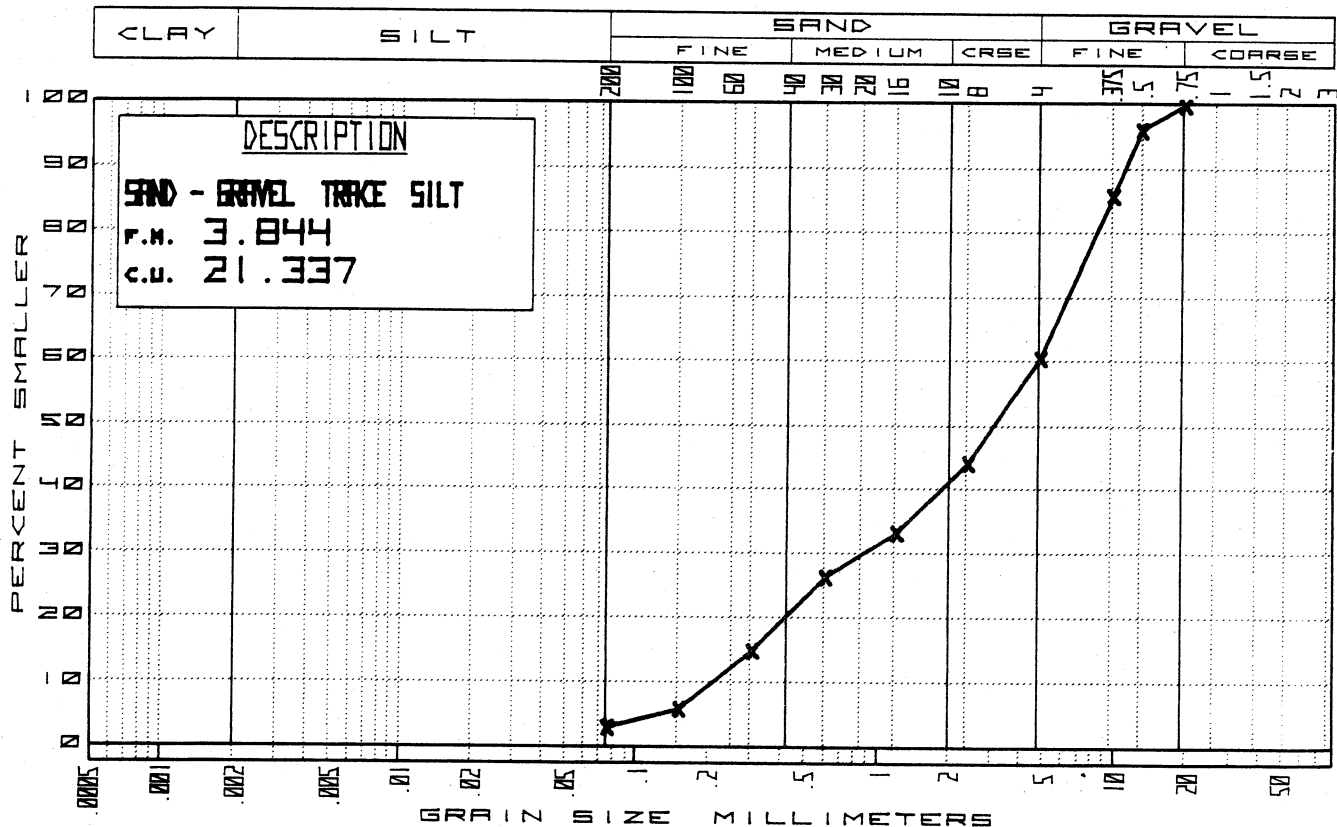
JOB NO. **1-1318** SITE **DEVILS LAKE SOURCE 326**

DATE **2-10-76** BASELINE **A** STATION **52+00** OFFSET **3+00W** DEPTH **27.0-28.0**



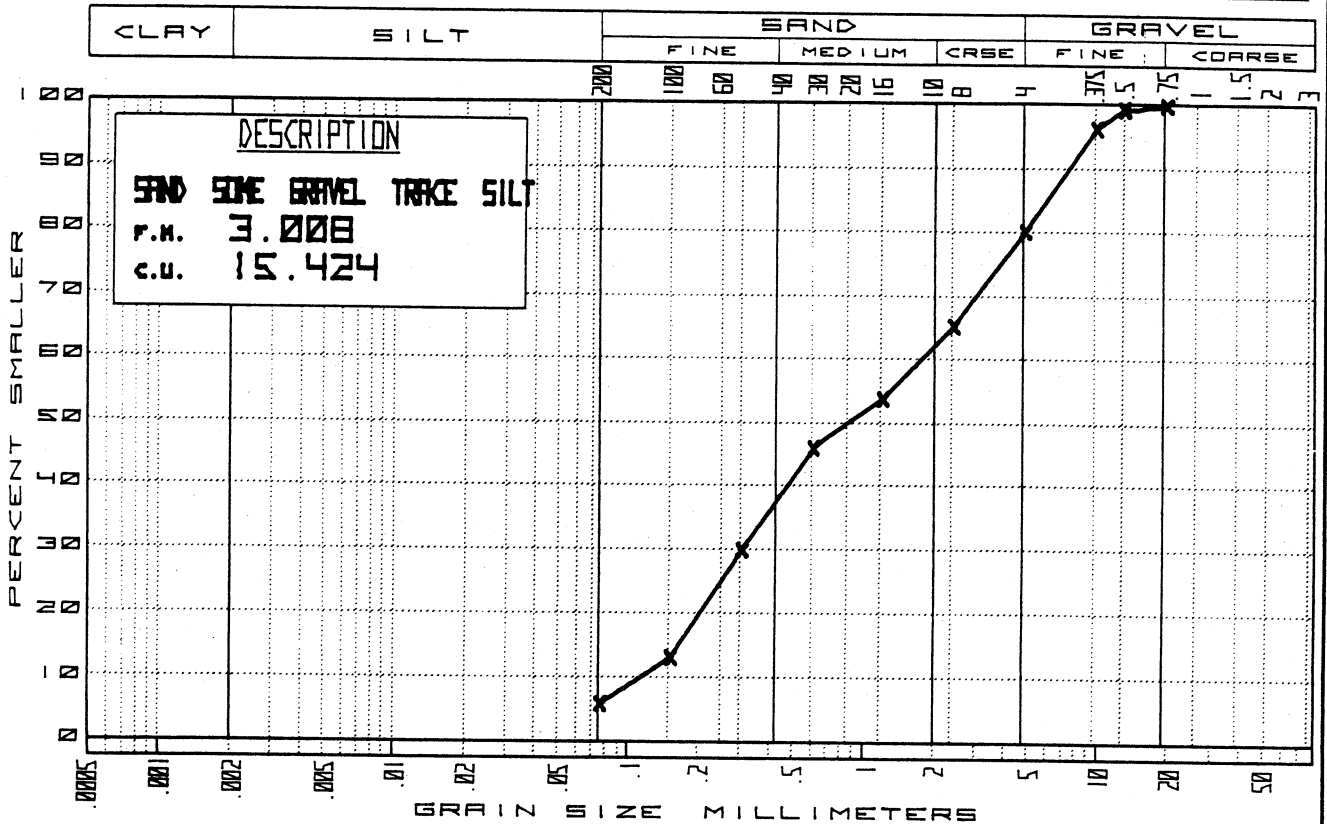
JOB NO. **1-1318** SITE **DEVILS LAKE SOURCE 326**

DATE **2-11-76** BASELINE **A** STATION **52+00** OFFSET **1+00W** DEPTH **15.0**

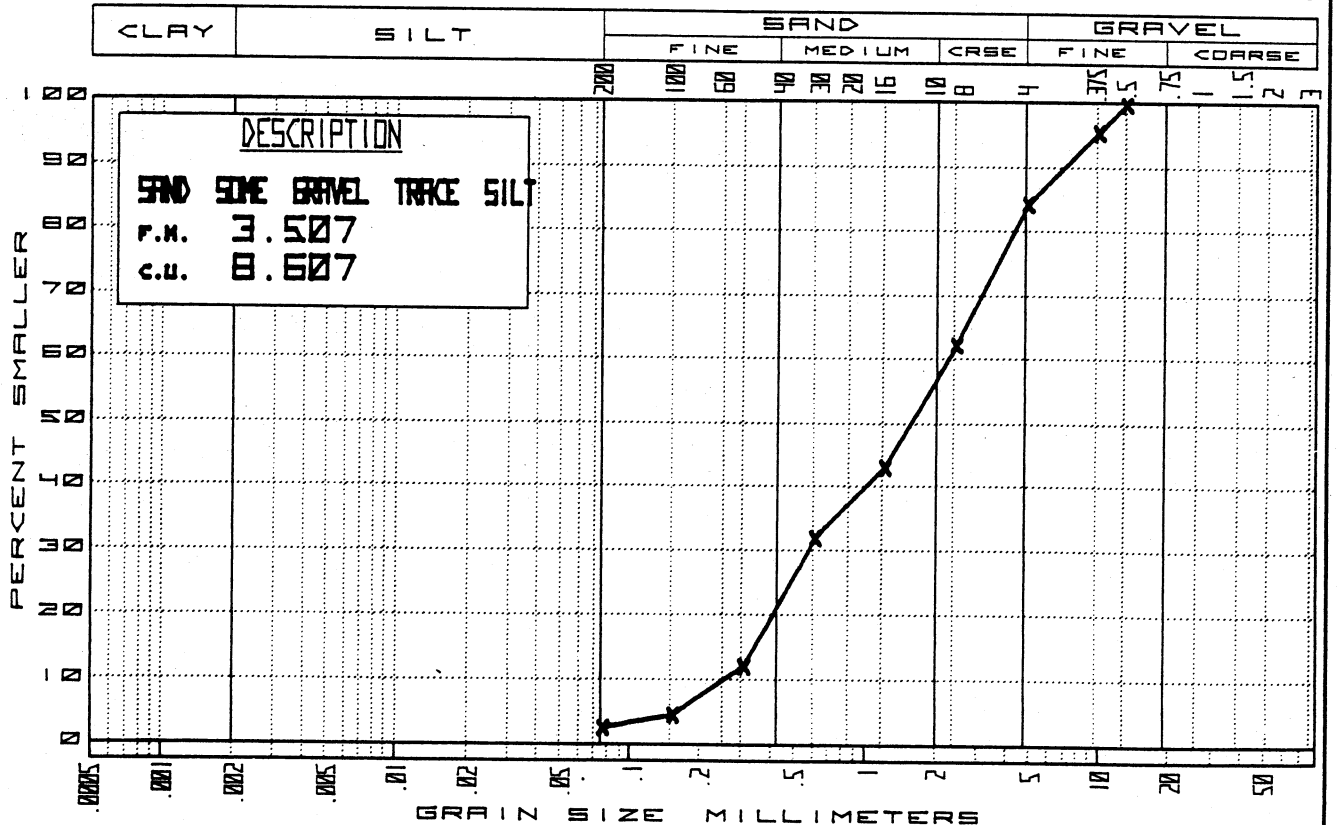


All tests performed in accordance with ASTM & CSA standards.

JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-10-76 BASELINE A STATION 54+00 OFFSET 2+00W DEPTH 5.0

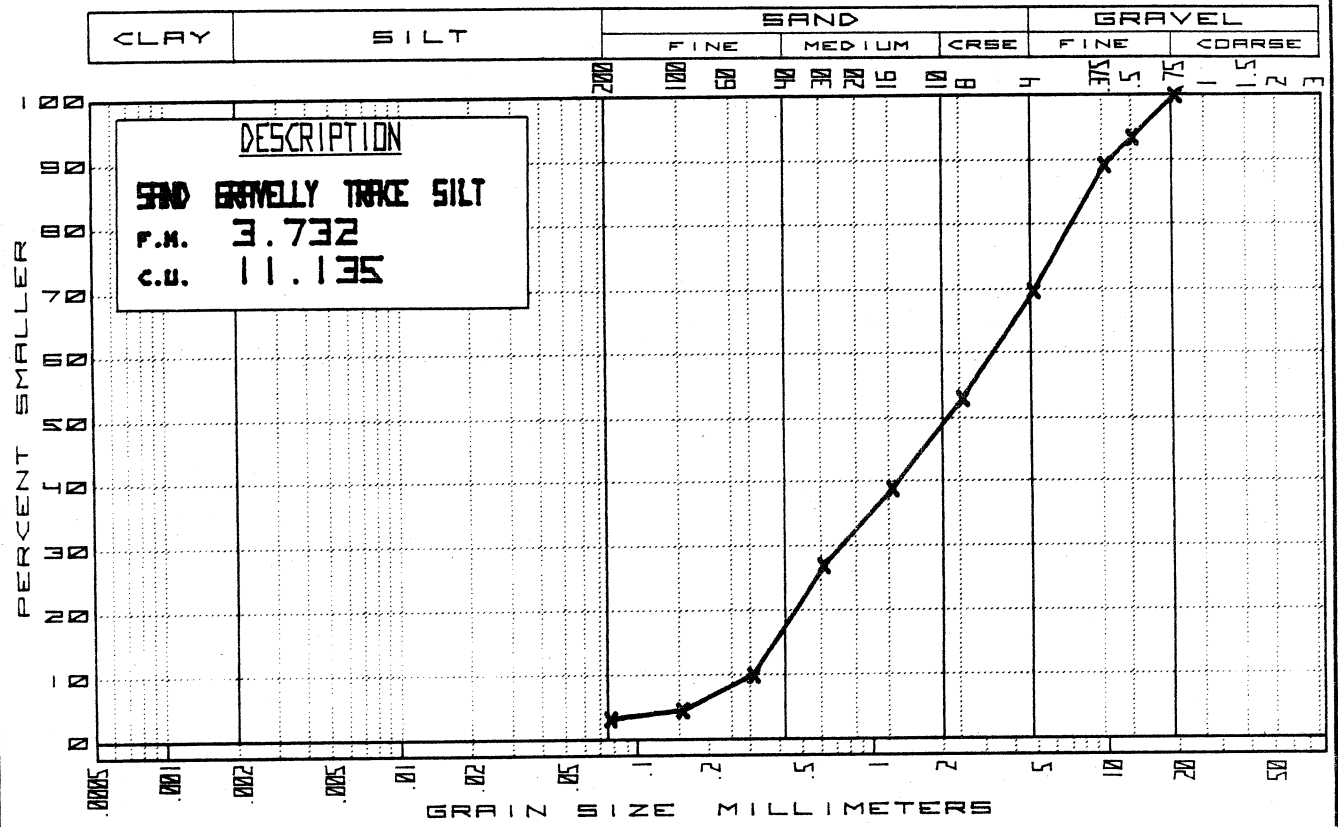


JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-10-76 BASELINE A STATION 54+00 OFFSET 2+00W DEPTH 30.0

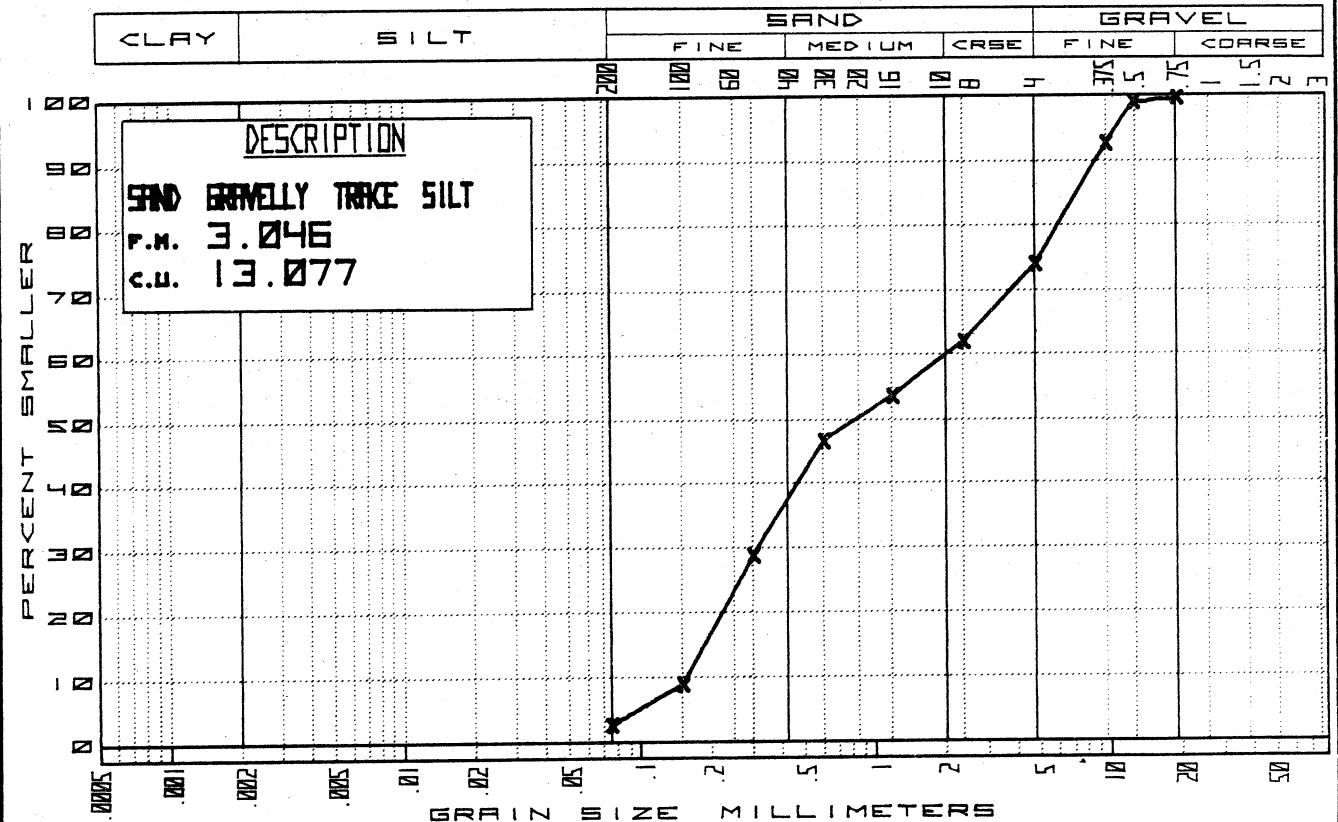


All tests performed in accordance with ASTM & CSA standards.

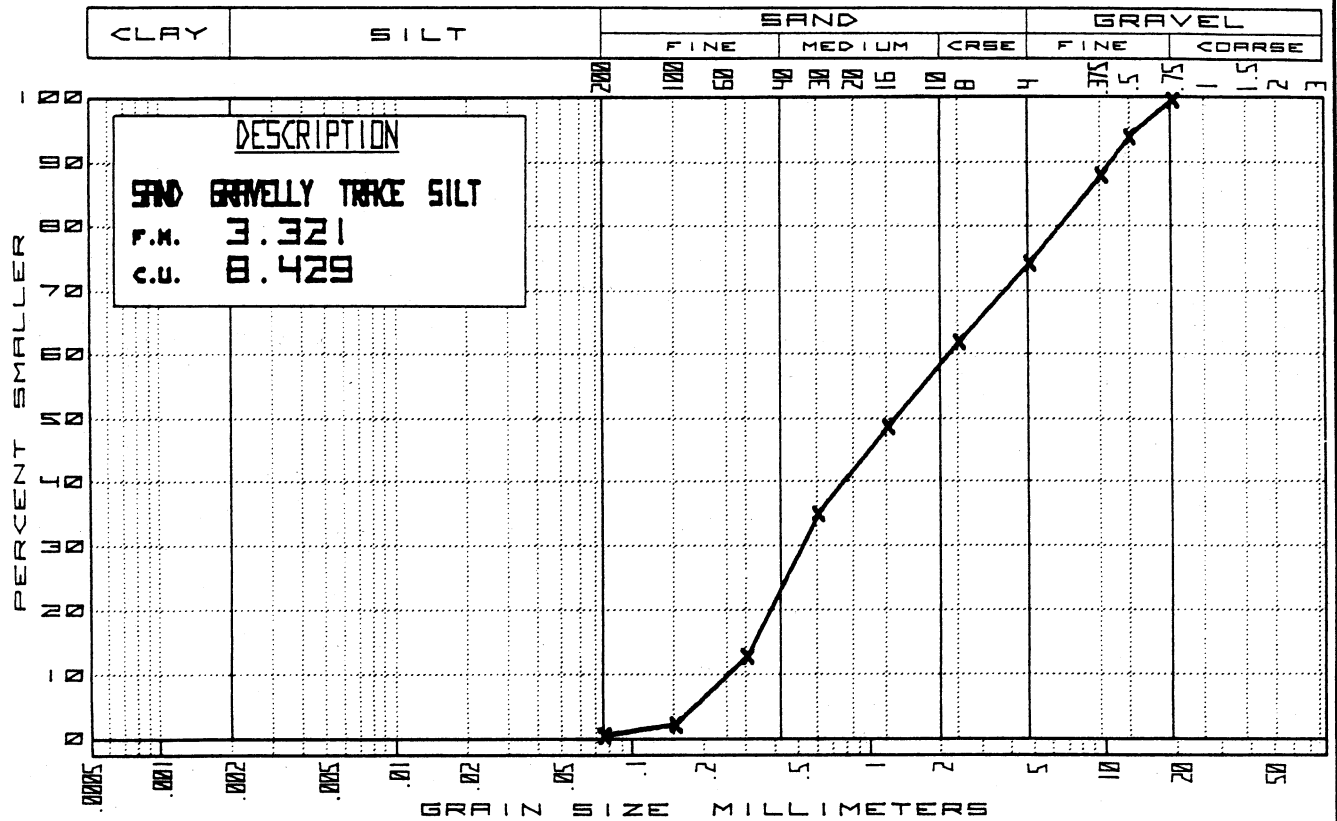
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-10-76 BASELINE A STATION 56+00 OFFSET 3+00W DEPTH 5.0-7.0



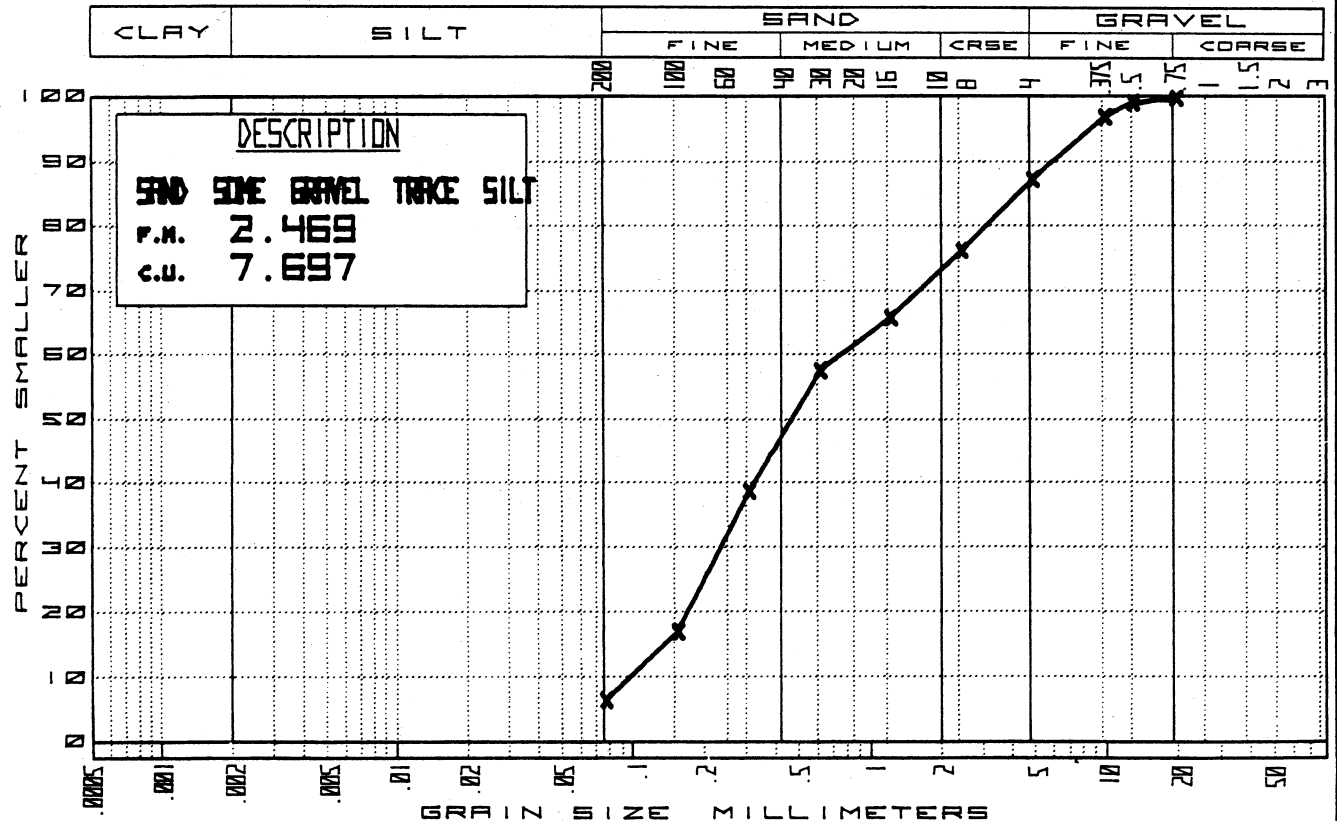
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-11-76 BASELINE A STATION 56+00 OFFSET 1+00W DEPTH 11.0-12.0



JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-10-76 BASELINE A STATION 56+00 OFFSET 1+00W DEPTH 15.0-20.0

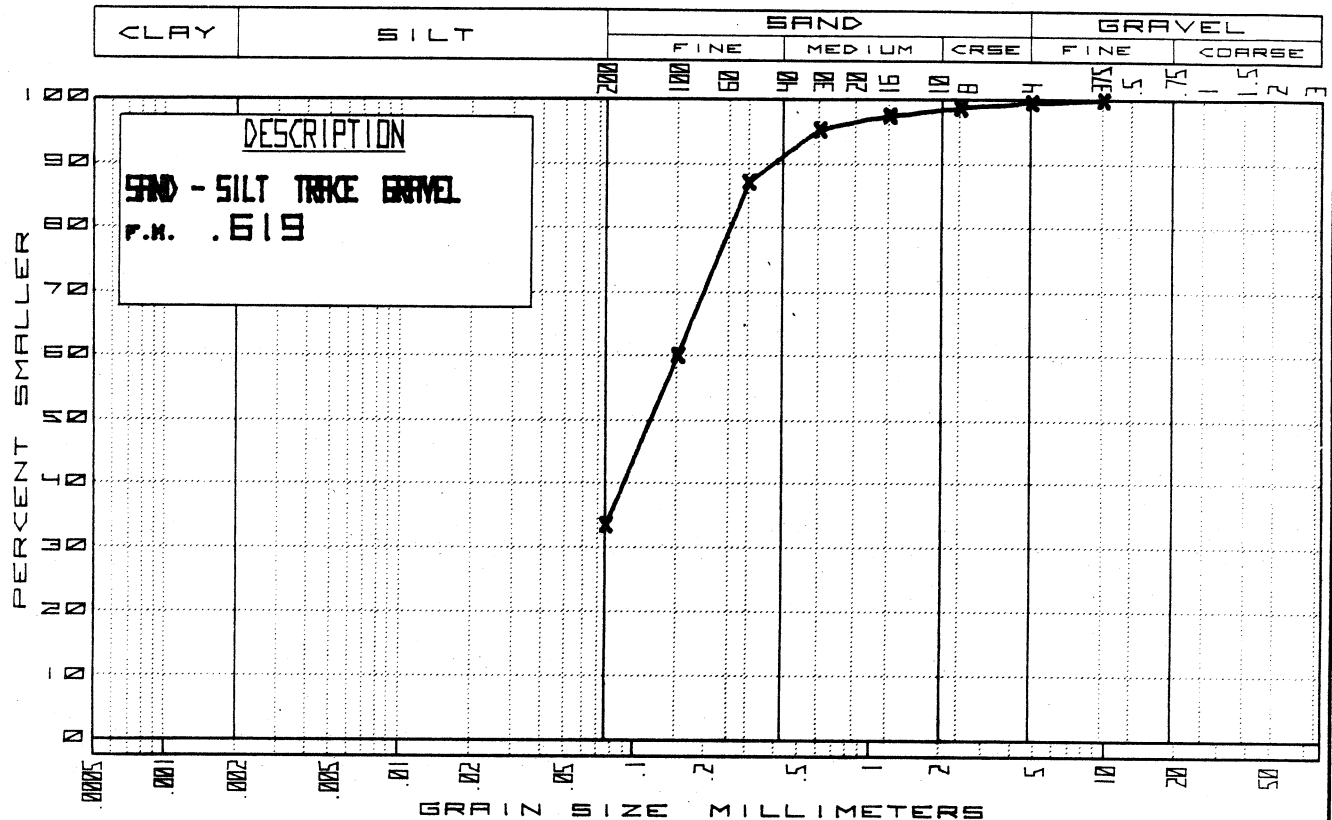


JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326
 DATE 2-10-76 BASELINE A STATION 58+00 OFFSET 1+00W DEPTH 5.0



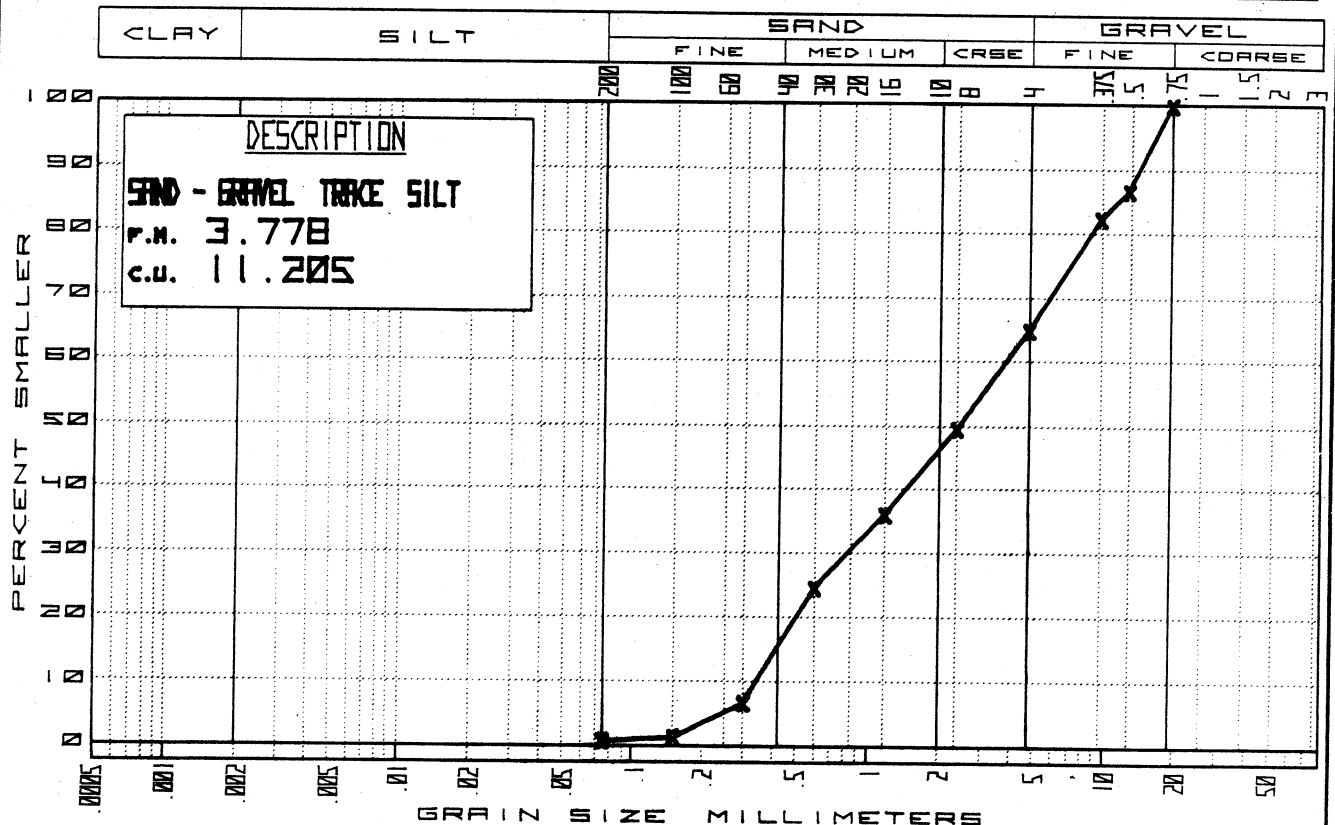
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-18-76 BASELINE A STATION 60+00 OFFSET 0+00 DEPTH 7.5-9.0



JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

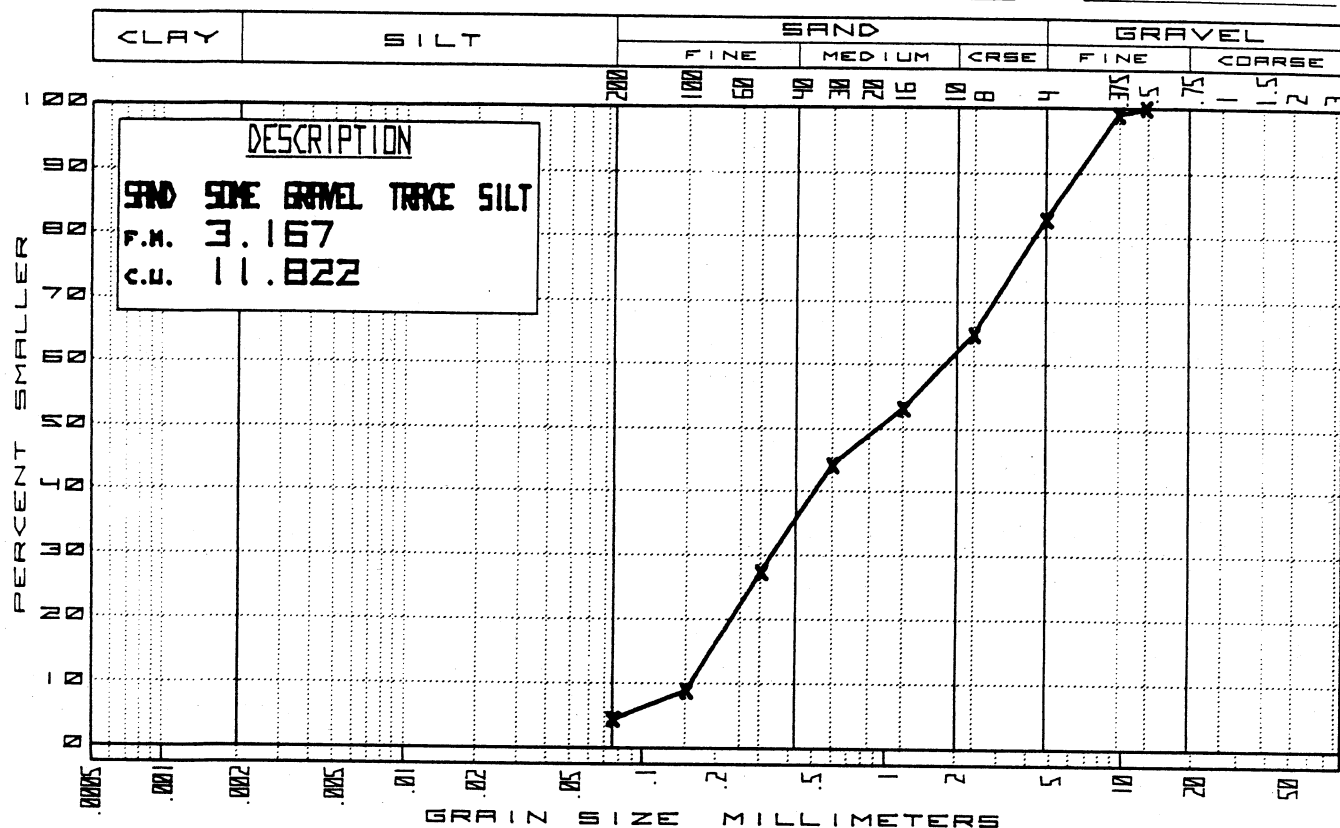
DATE 2-12-76 BASELINE A STATION 60+00 OFFSET 0+00 DEPTH 17.0-20.0



All tests performed in accordance with ASTM & CSA standards.

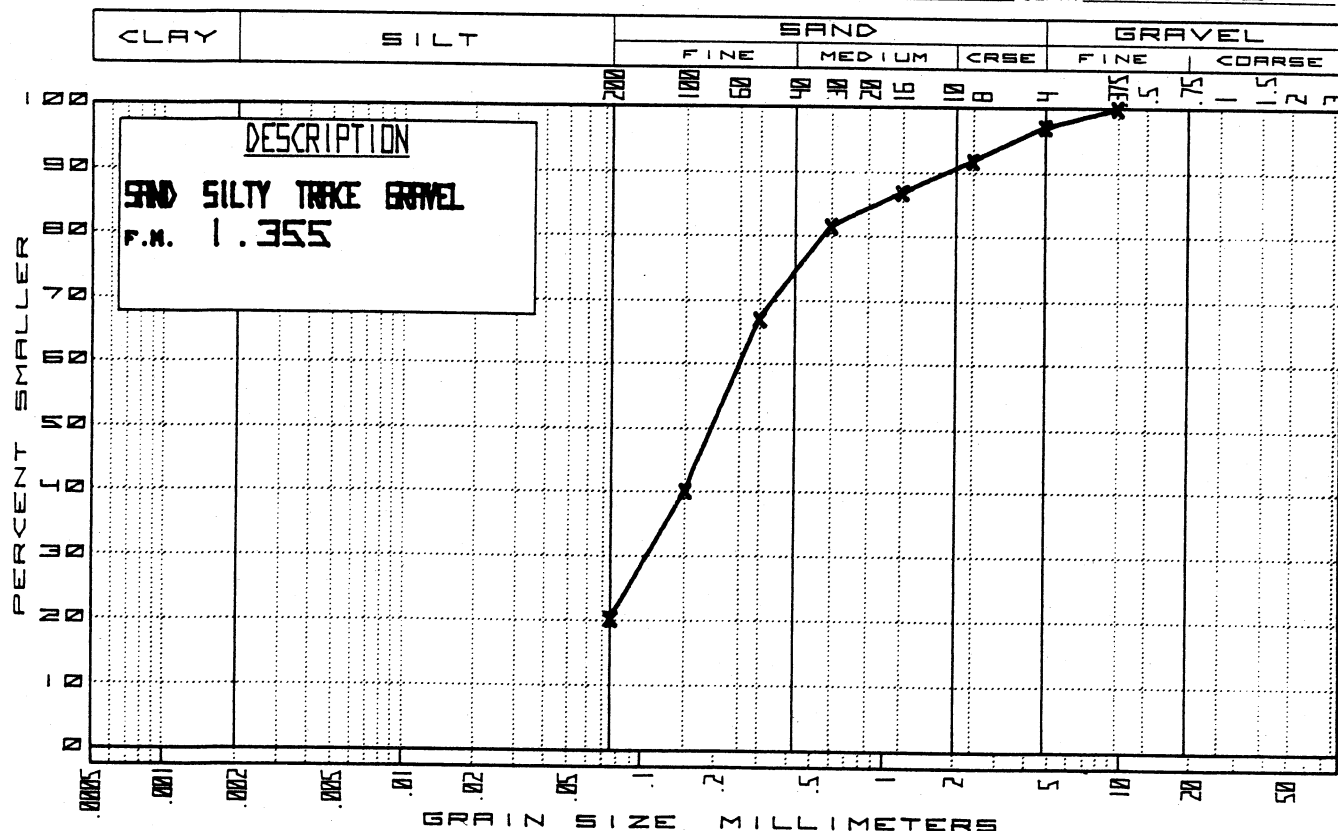
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-12-76 BASELINE A STATION 64+00 OFFSET 0+00 DEPTH 10.0



JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

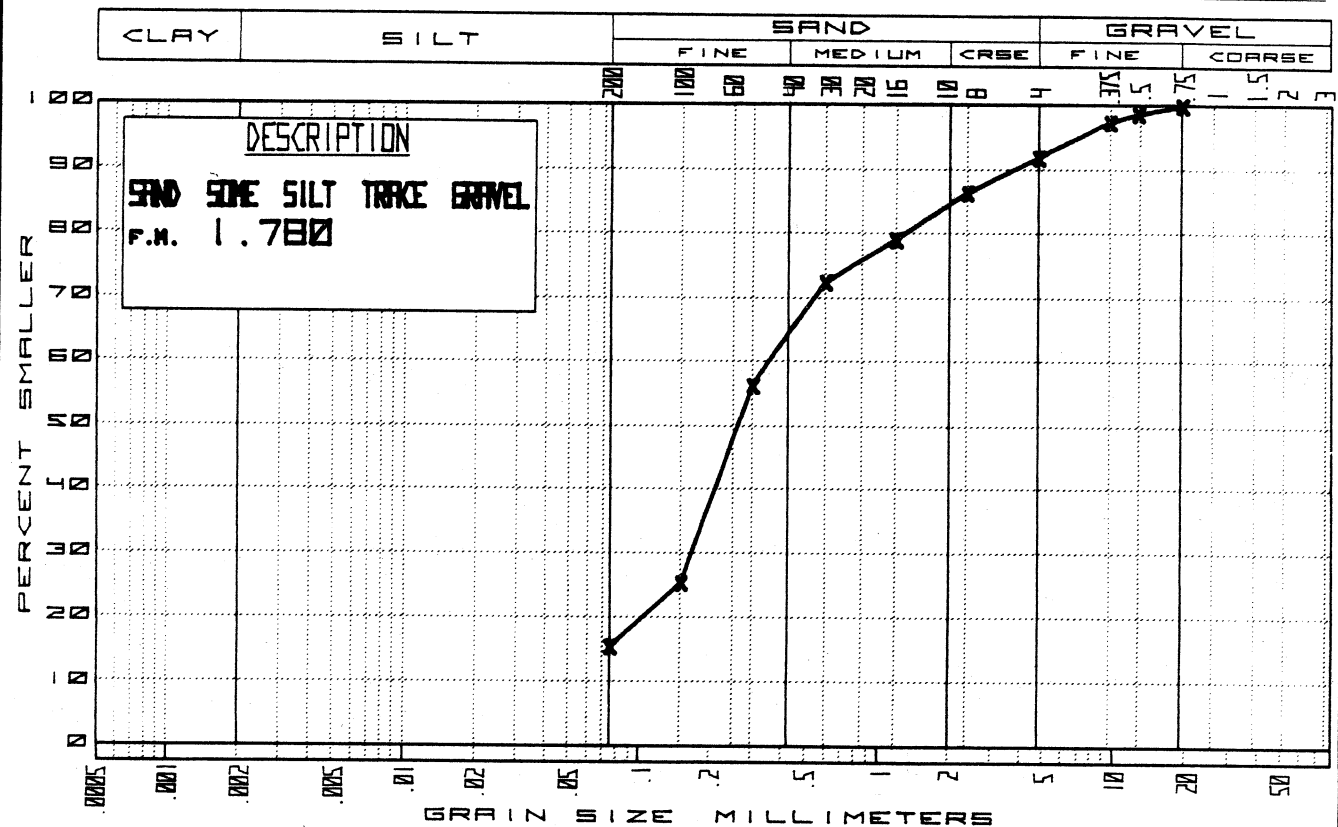
DATE 2-12-76 BASELINE A STATION 64+00 OFFSET 2+80E DEPTH 2.0-3.0



All tests performed in accordance with ASTM & CSA standards.

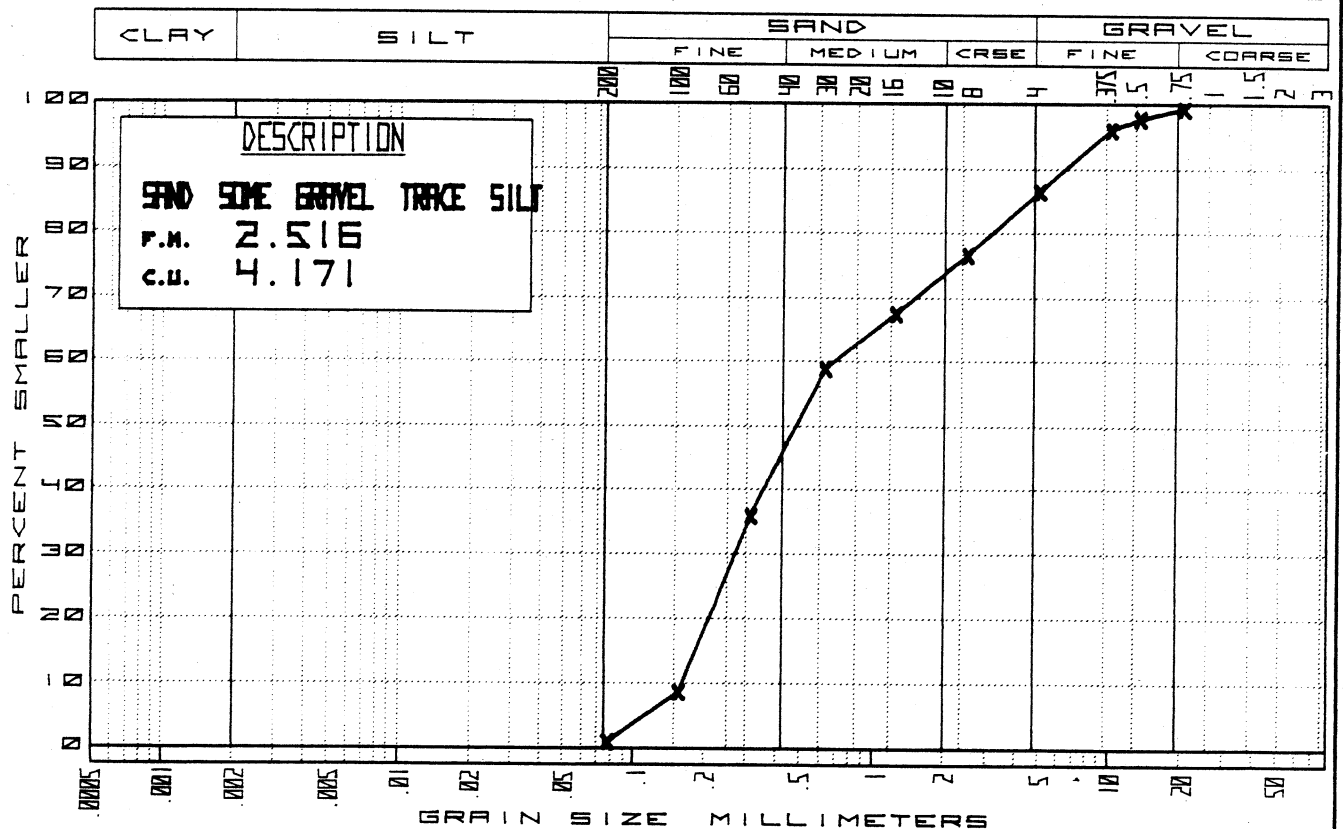
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-12-76 BASELINE A STATION 64+30 OFFSET 1+90E DEPTH 2.0-5.0



JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

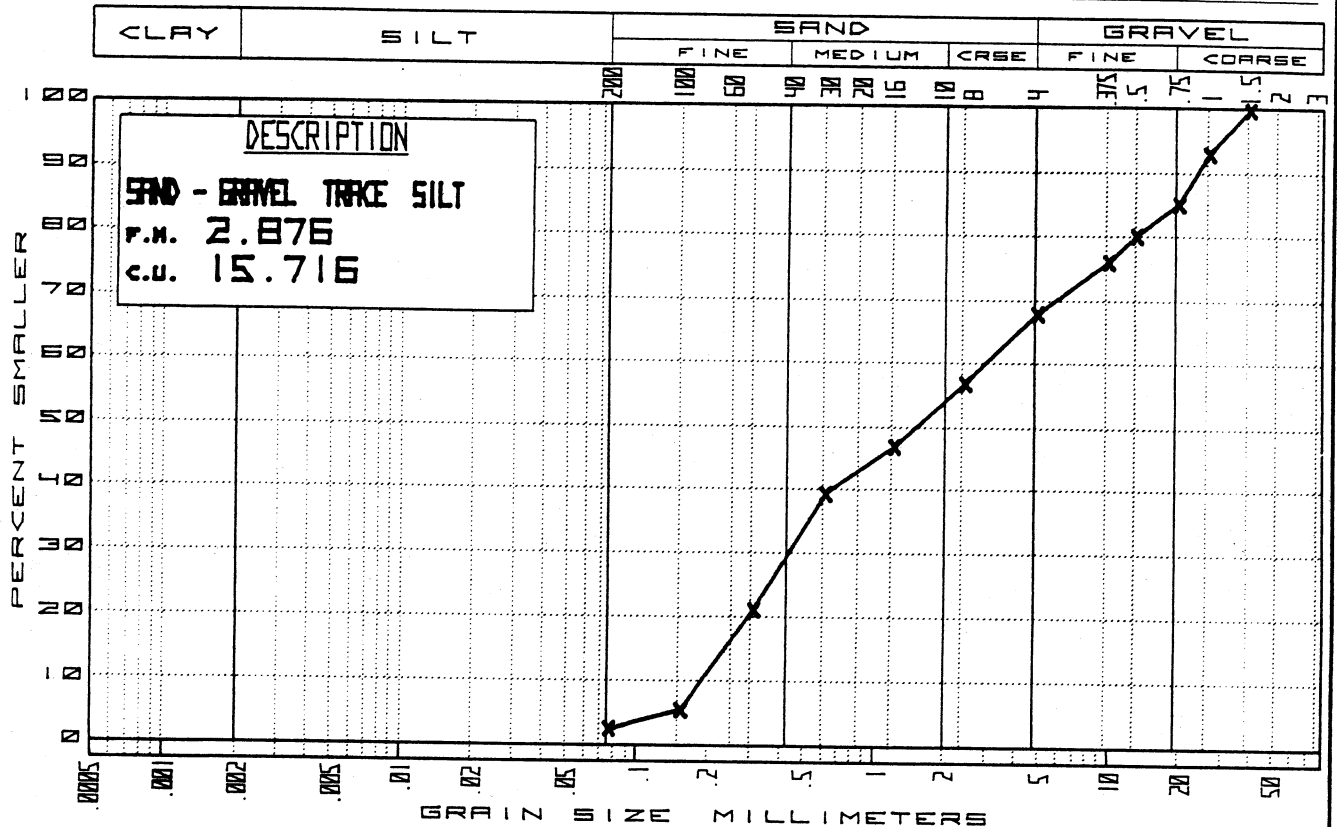
DATE 2-10-76 BASELINE A STATION 66+00N OFFSET 1+00W DEPTH 0.0-1.0



All tests performed in accordance with ASTM & CSA standards.

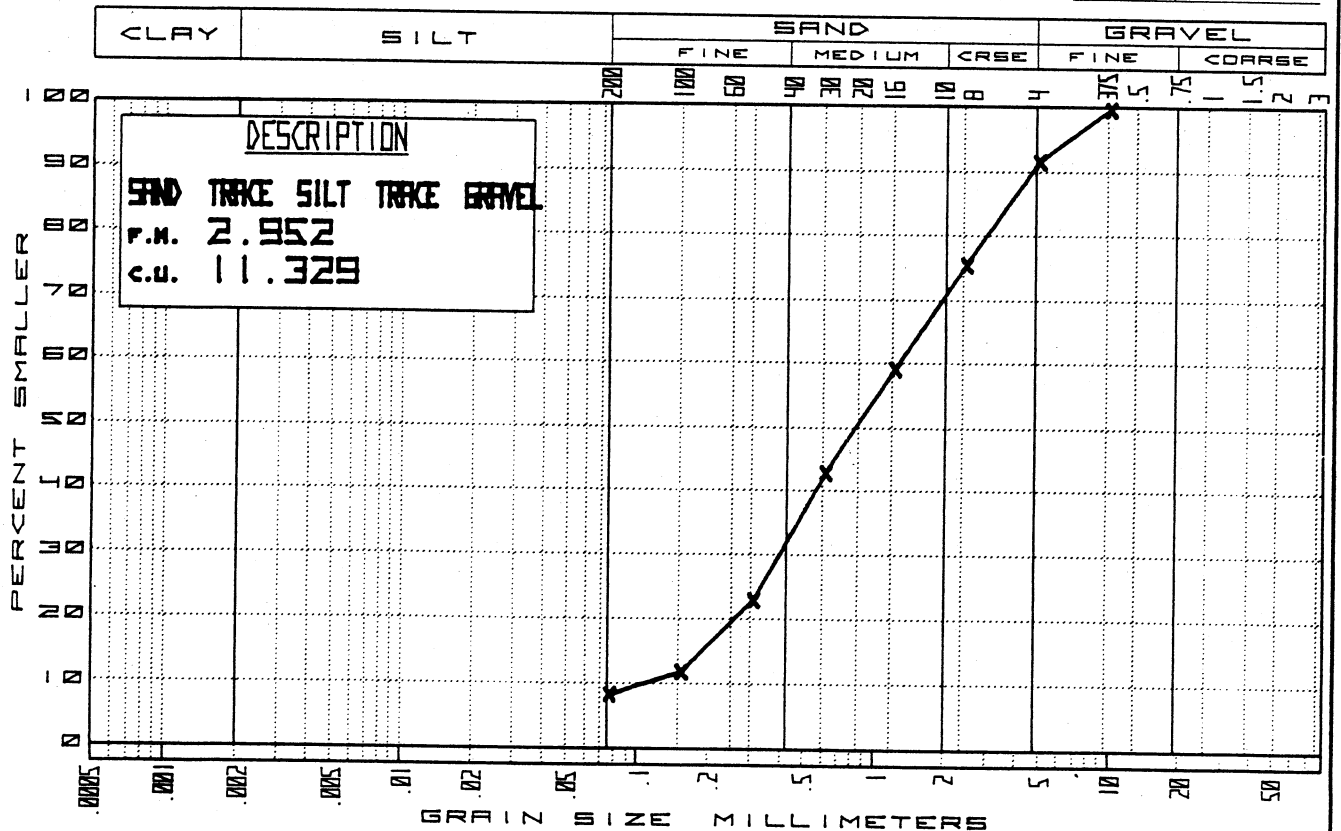
JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

DATE 2-11-76 BASELINE A STATION 66+00 OFFSET 1+00W DEPTH 5.0-9.0



JOB NO. 1-1318 SITE DEVILS LAKE SOURCE 326

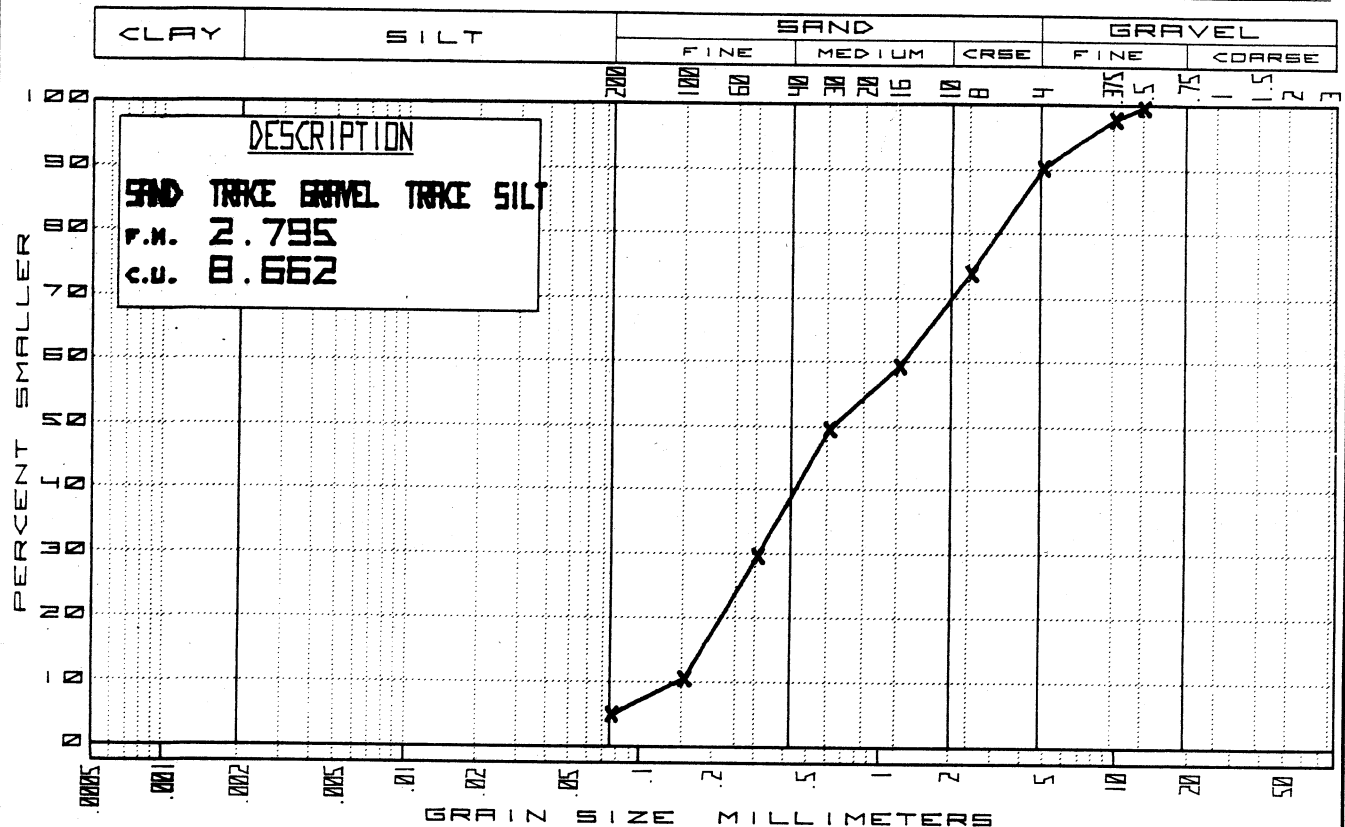
DATE 2-11-76 BASELINE A STATION 66+00 OFFSET 2+00E DEPTH 16.0



All tests performed in accordance with ASTM & CSA standards.

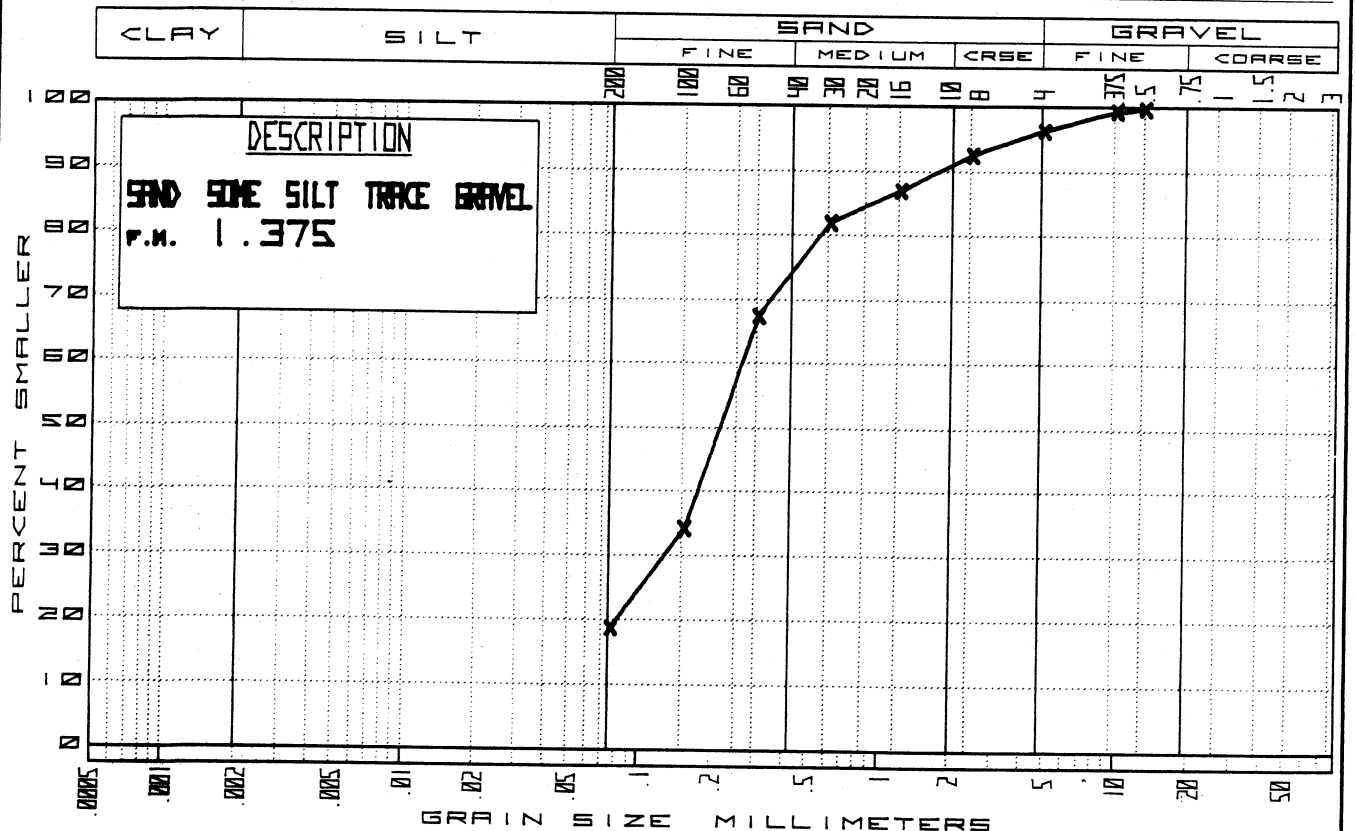
JOB NO. **1-1318** SITE **DEVILS LAKE SOURCE 326**

DATE **2-11-76** BASELINE **A** STATION **67+00** OFFSET **0+00** DEPTH **10.0**



JOB NO. **1-1318** SITE **DEVILS LAKE SOURCE 326**

DATE **2-11-76** BASELINE **A** STATION **70+00** OFFSET **1+00W** DEPTH **5.0**



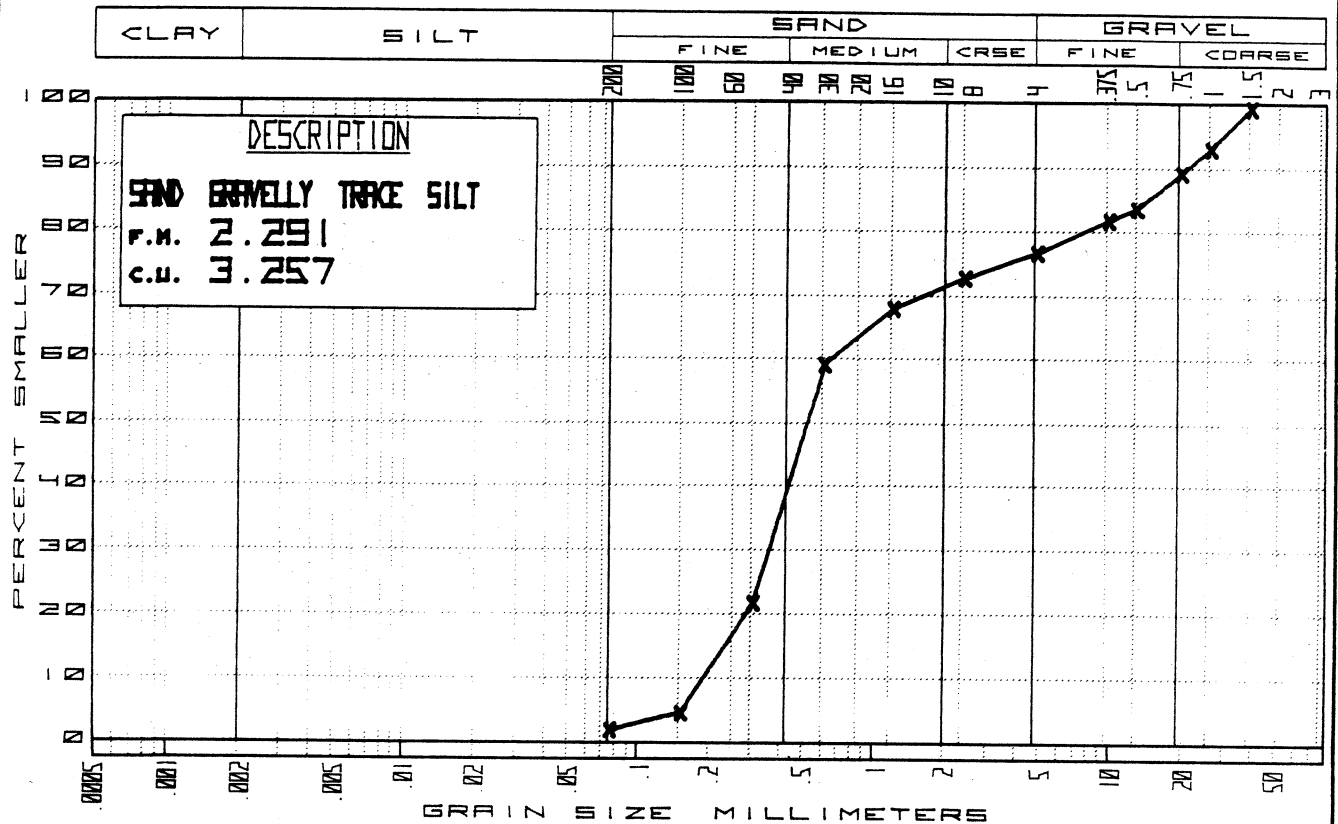
All tests performed in accordance with ASTM & CSA standards.

Lucas Point , Source 303

Grain Size Curves

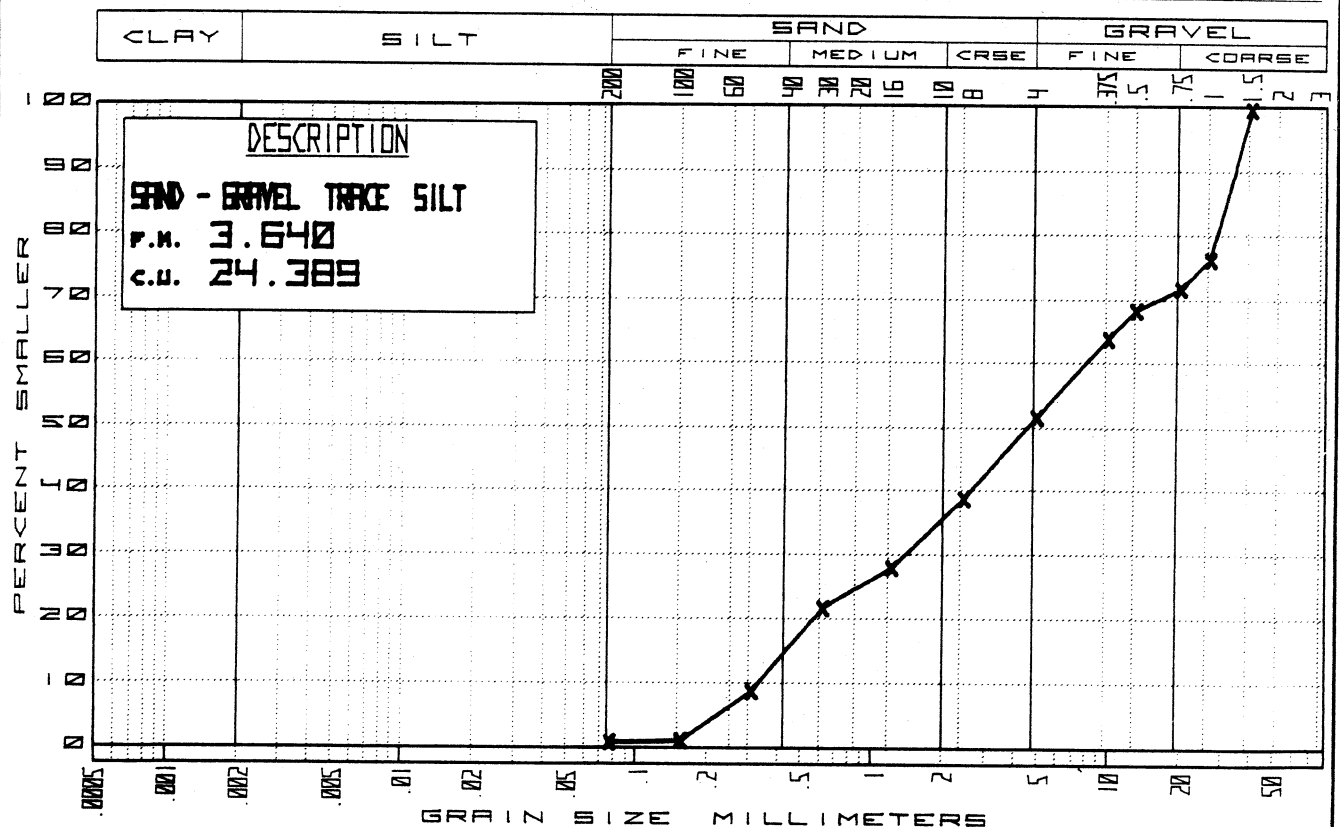
JOB NO. 1-1318 SITE LUCAS POINT SOURCE 303

DATE 2-11-76 BASELINE A STATION 0+00 OFFSET 0+00 DEPTH 5.0-10.0



JOB NO. 1-1318 SITE LUCAS POINT SOURCE 303

DATE 2-11-76 BASELINE A STATION 2+00 OFFSET 1+005 DEPTH 5.0-9.0

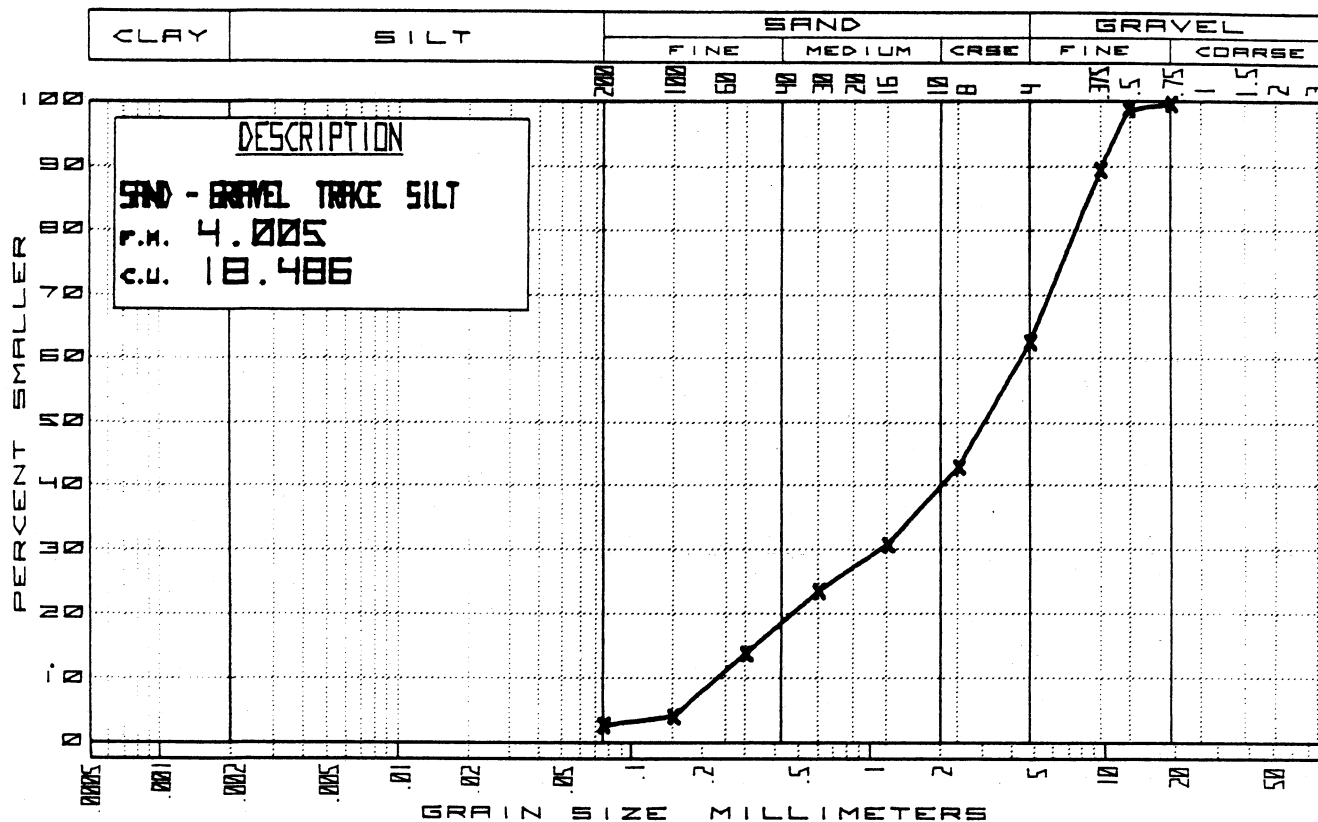


All tests performed in accordance with ASTM & CSA standards.

JOB NO. 1-1318 SITE LUCAS POINT SOURCE 303

DATE 2-12-76 BASELINE A STATION 2+00

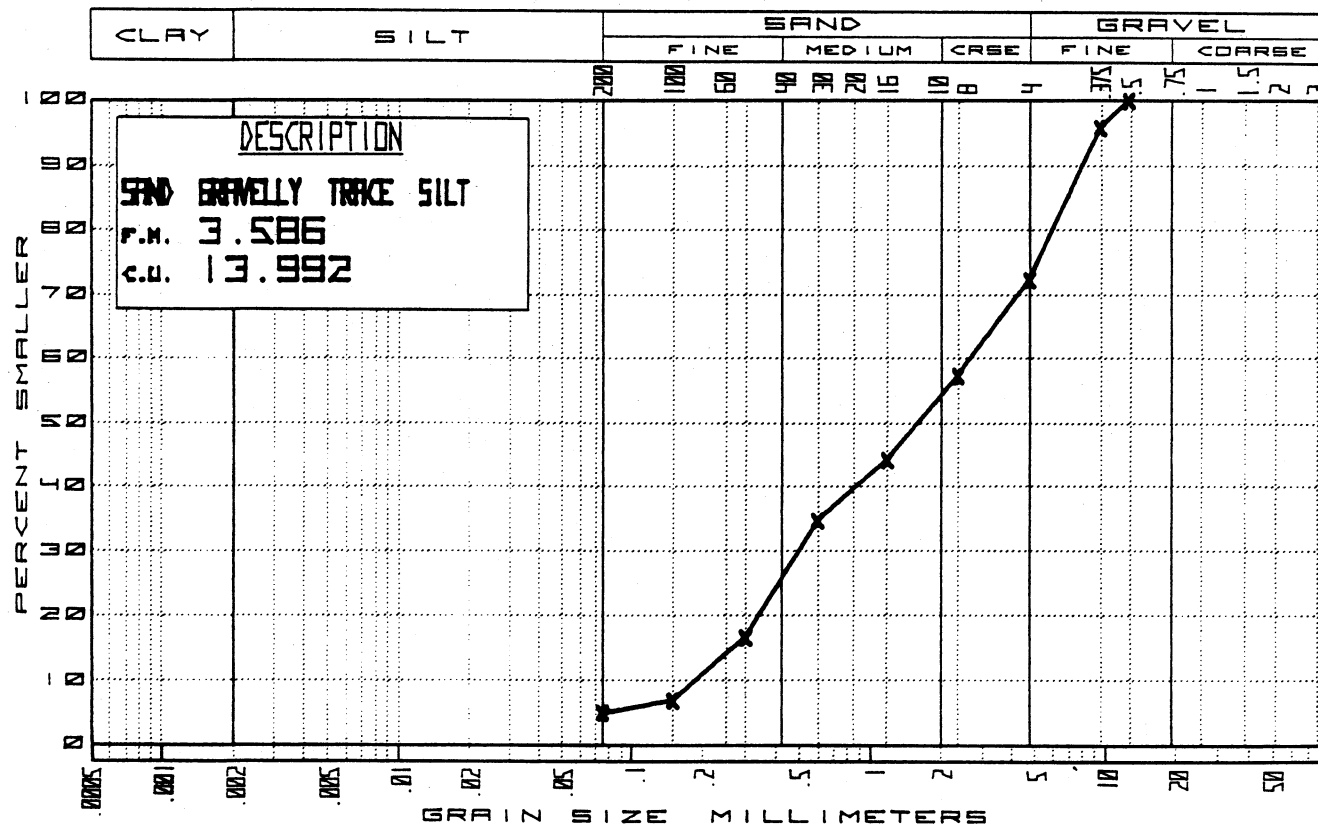
OFFSET 1+00N DEPTH 5.0



JOB NO. 1-1318 SITE LUCAS POINT SOURCE 303

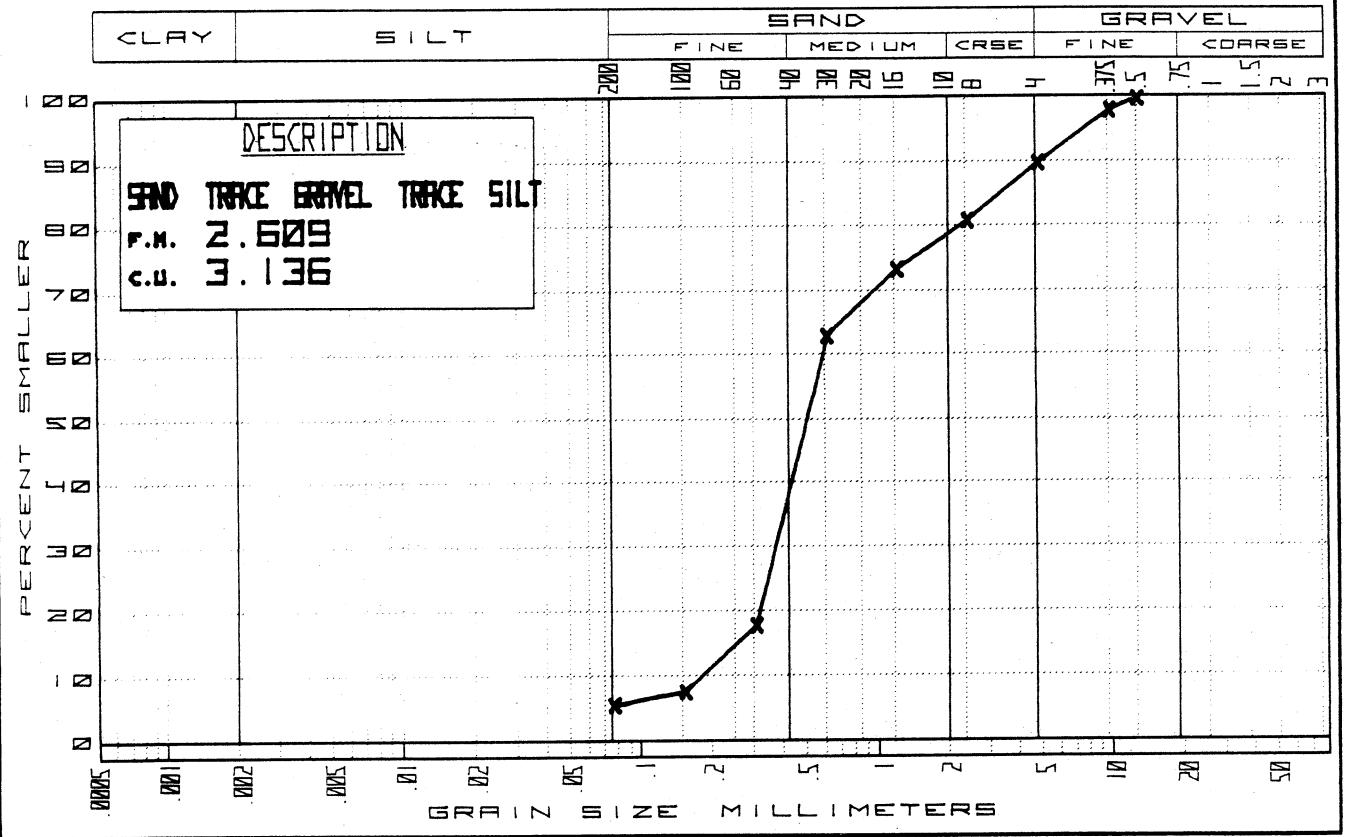
DATE 2-12-76 BASELINE A STATION 4+00

OFFSET 1+005 DEPTH 10.0



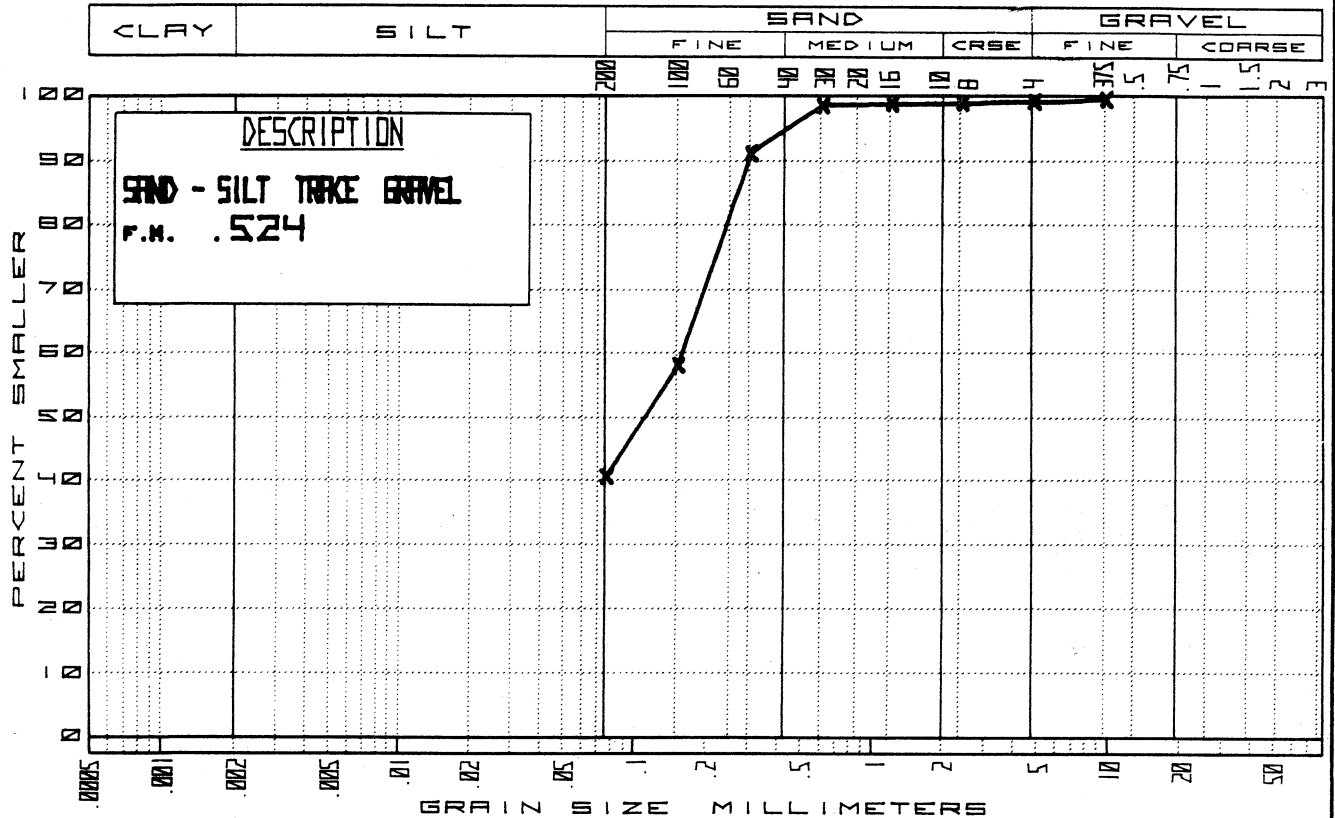
All tests performed in accordance with ASTM & CSA standards.

JOB NO. 1-1318 SITE LUCAS POINT SOURCE 303
 DATE 2-11-76 BASELINE A STATION 10+00 OFFSET 0+00 DEPTH 5.0-6.0

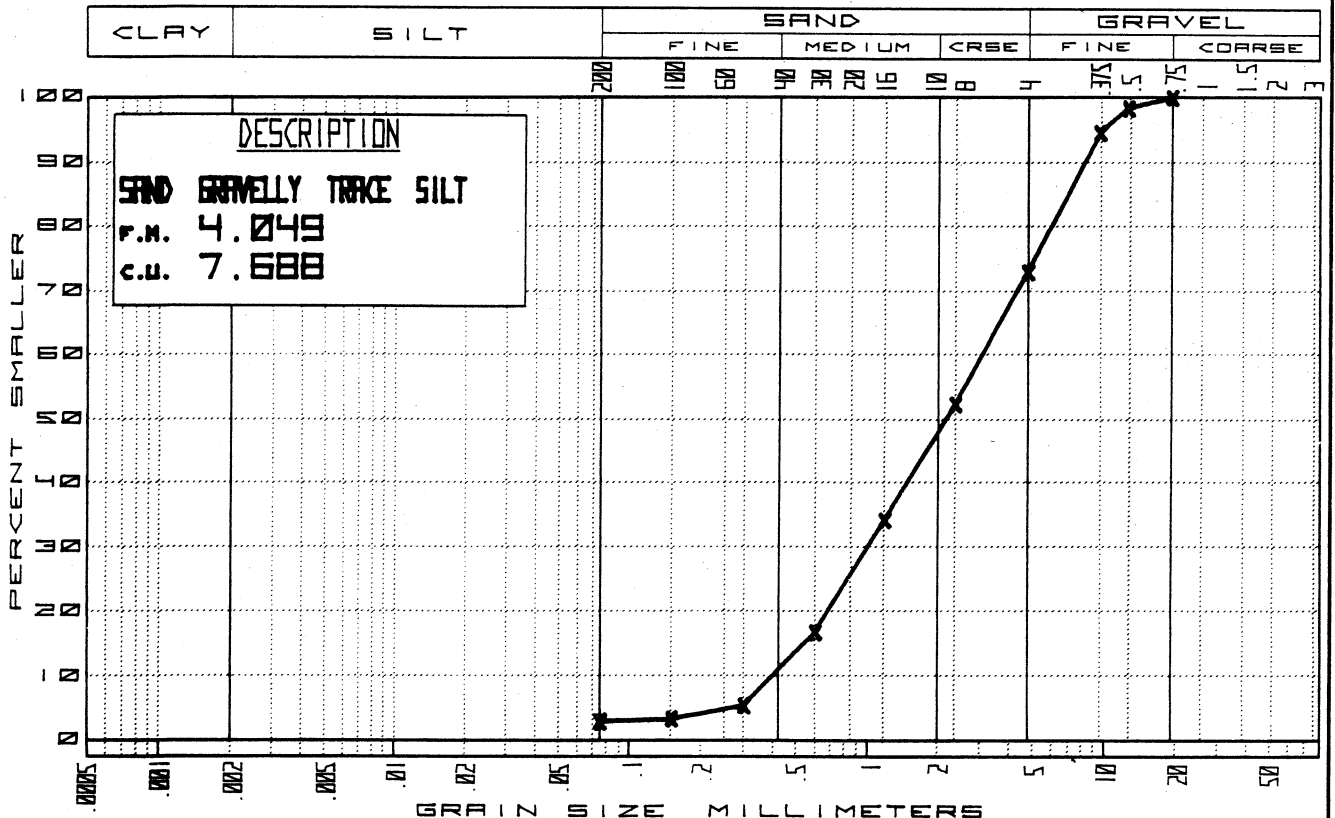


All tests performed in accordance with ASTM & CSA standards.

JOB NO. 1-1318 SITE LU CAS POINT SOURCE 303
 DATE 2-12-76 BASELINE B STATION 0+00 OFFSET 0+00 DEPTH 10.0

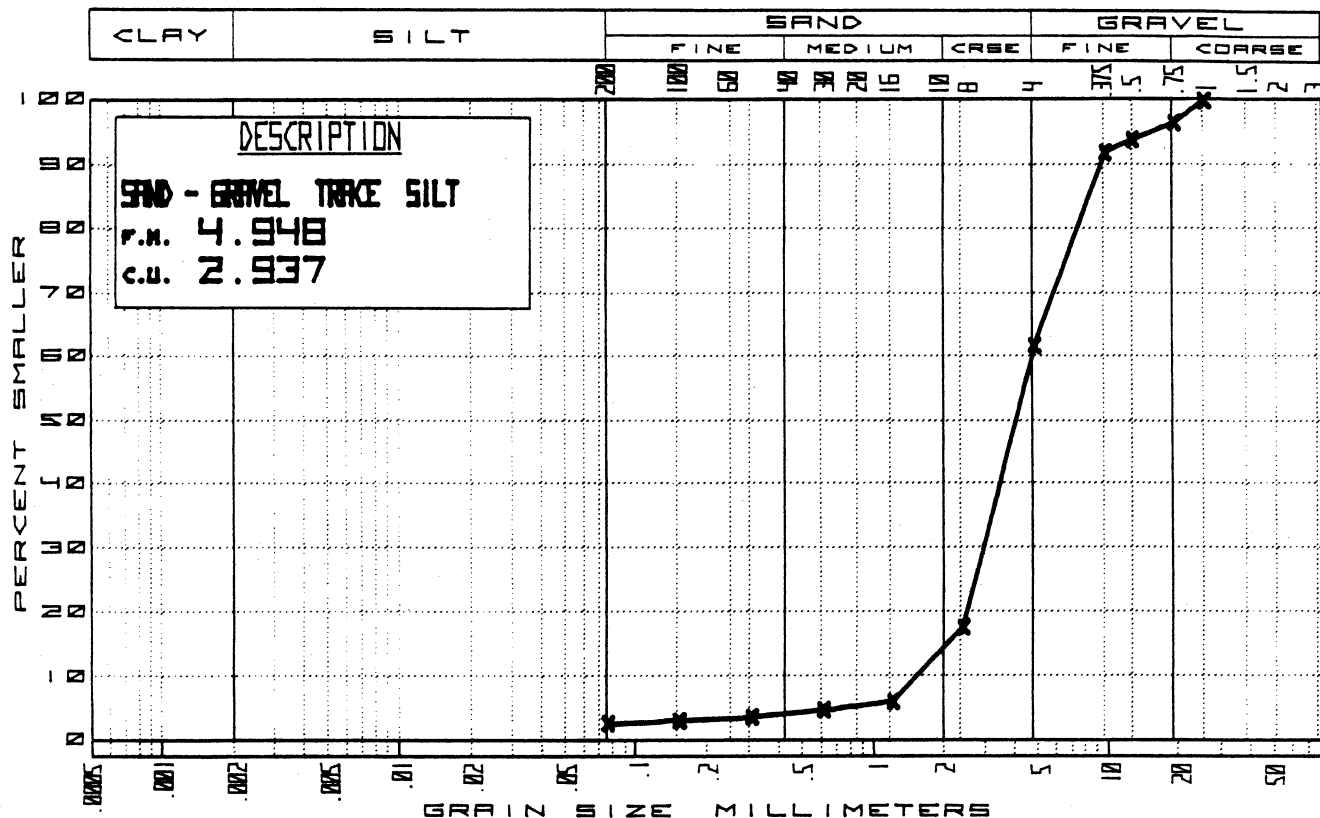


JOB NO. 1-1318 SITE LU CAS POINT SOURCE 303
 DATE 2-12-76 BASELINE B STATION 1+68 OFFSET 0+00 DEPTH 20.0



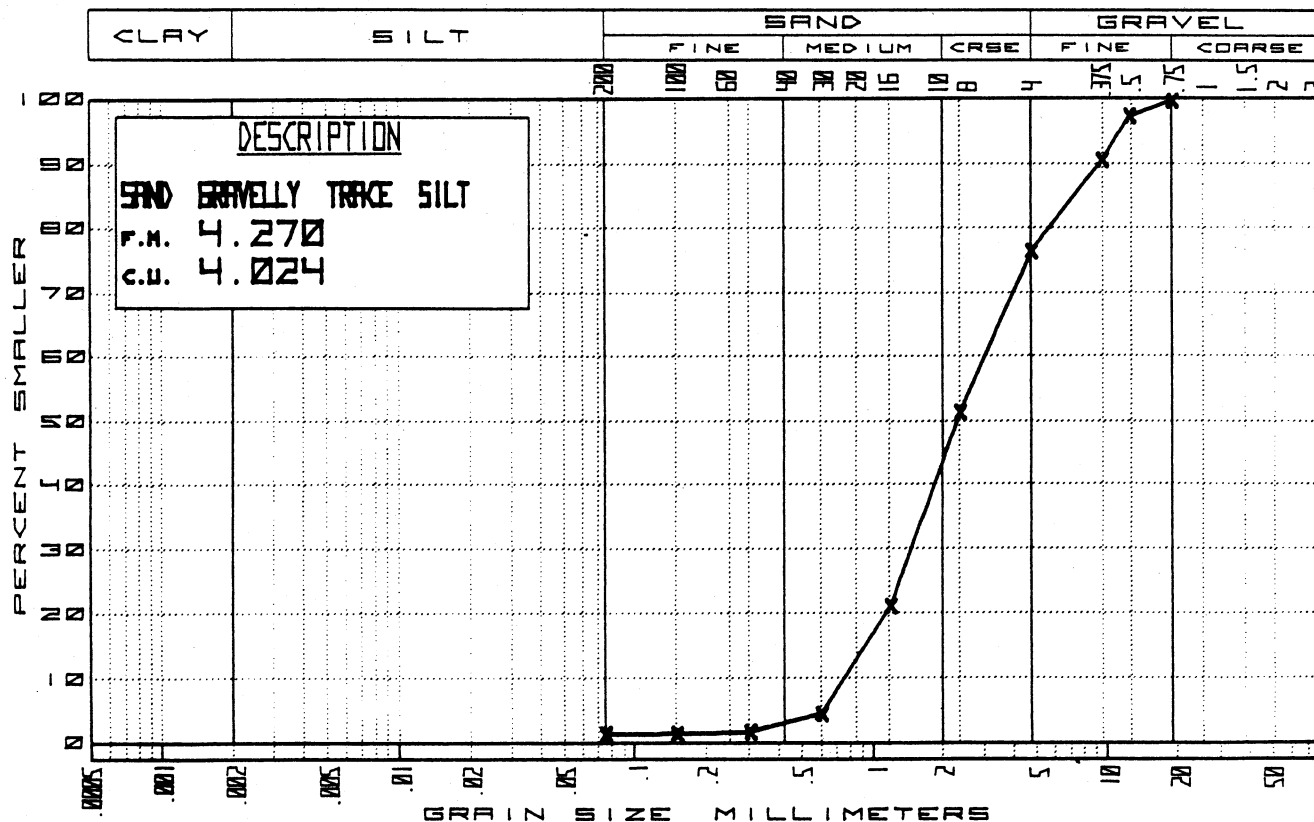
JOB NO. 1-1318 SITE LUCAS POINT SOURCE 303

DATE 2-13-76 BASELINE B STATION 4+00 OFFSET 1+005 DEPTH 0.0-1.0

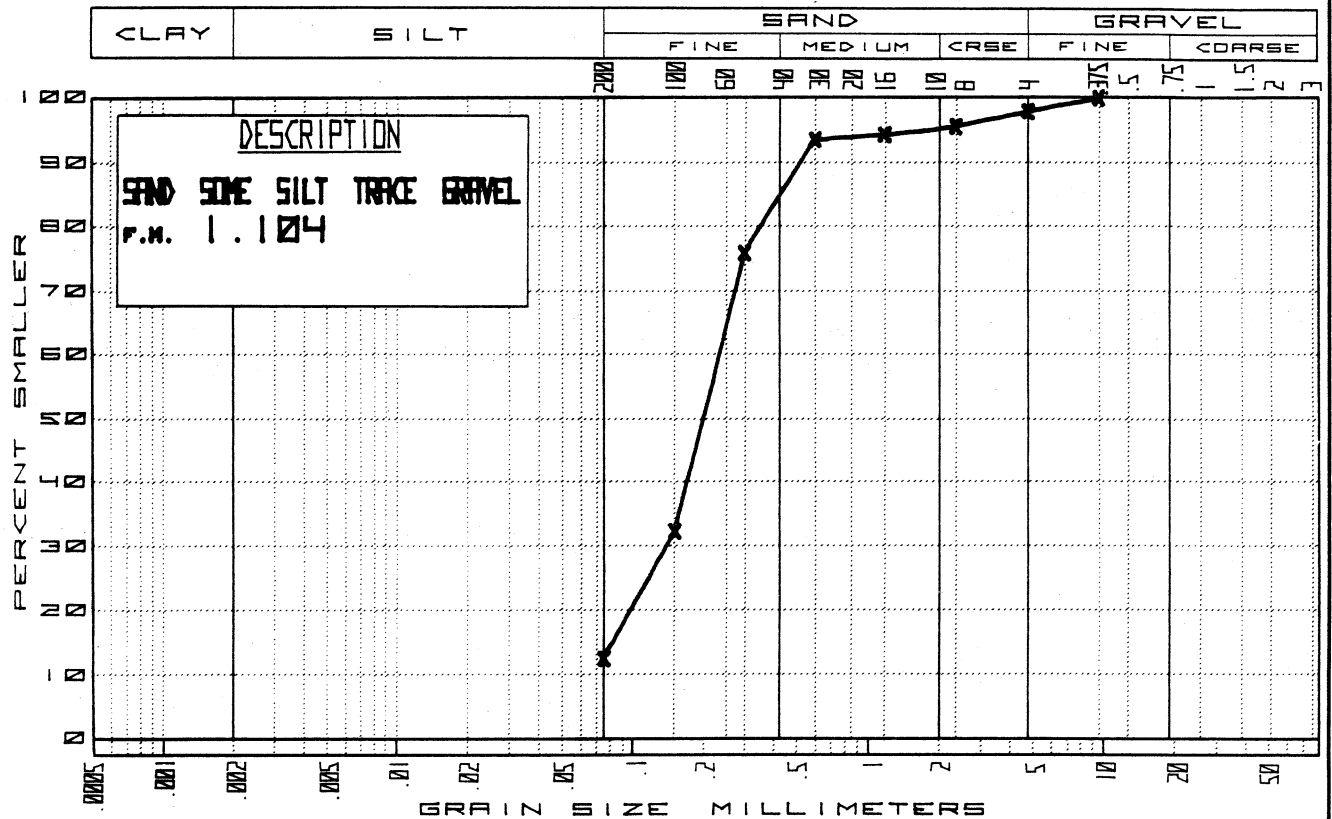


JOB NO. 1-1318 SITE LUCAS POINT SOURCE 303

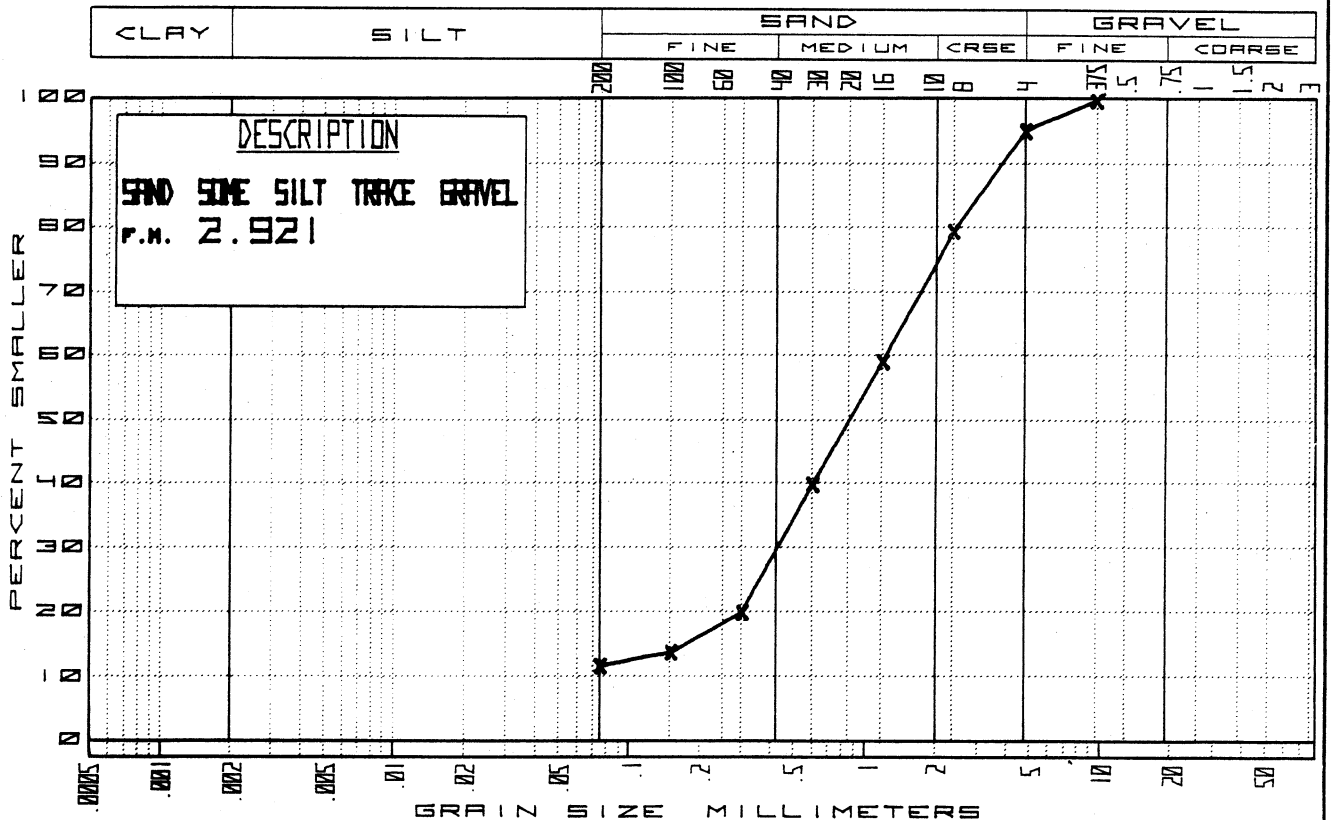
DATE 2-11-76 BASELINE B STATION 4+00 OFFSET 0+00 DEPTH 7.0-12.0



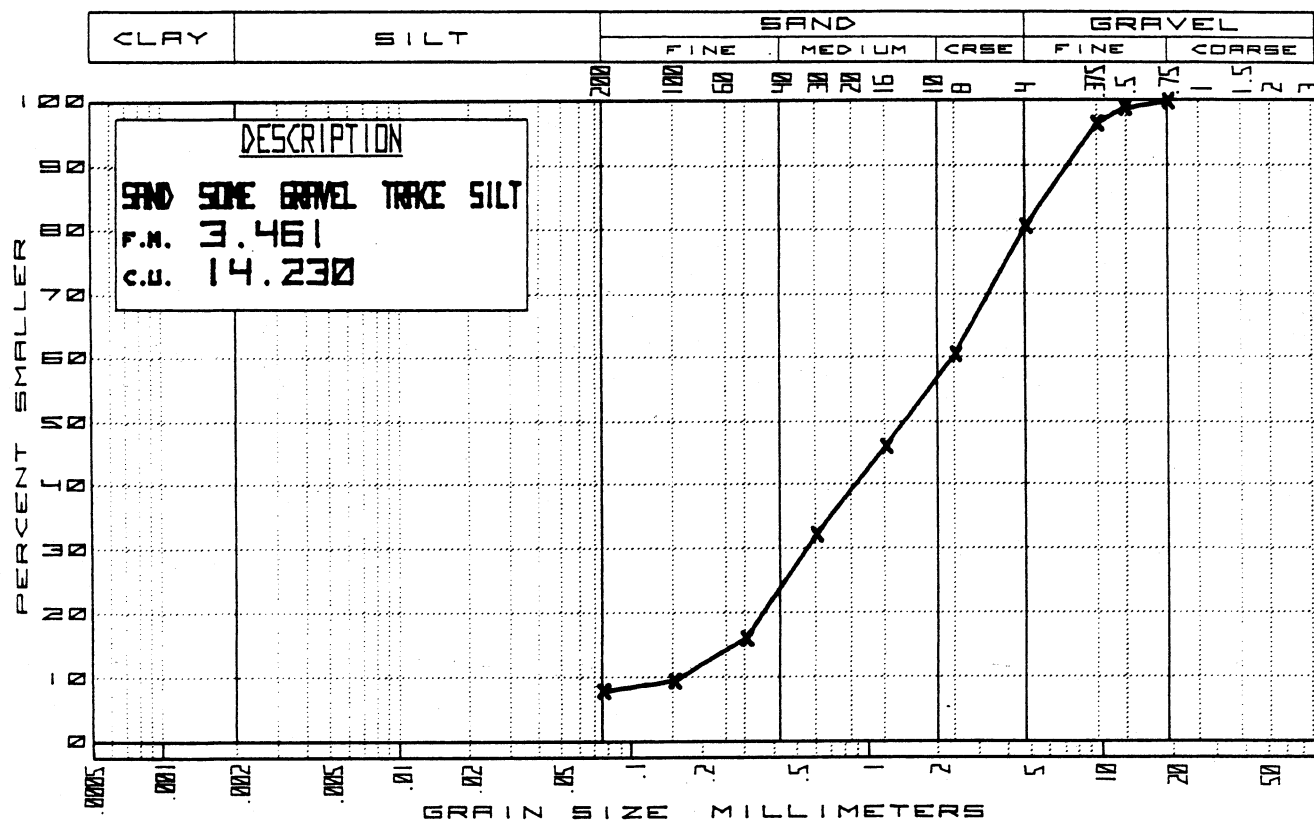
JOB NO. 1-1318 SITE LUCAS POINT SOURCE 303
 DATE 2-12-76 BASELINE B STATION 4+00 OFFSET 1+00N DEPTH 5.0



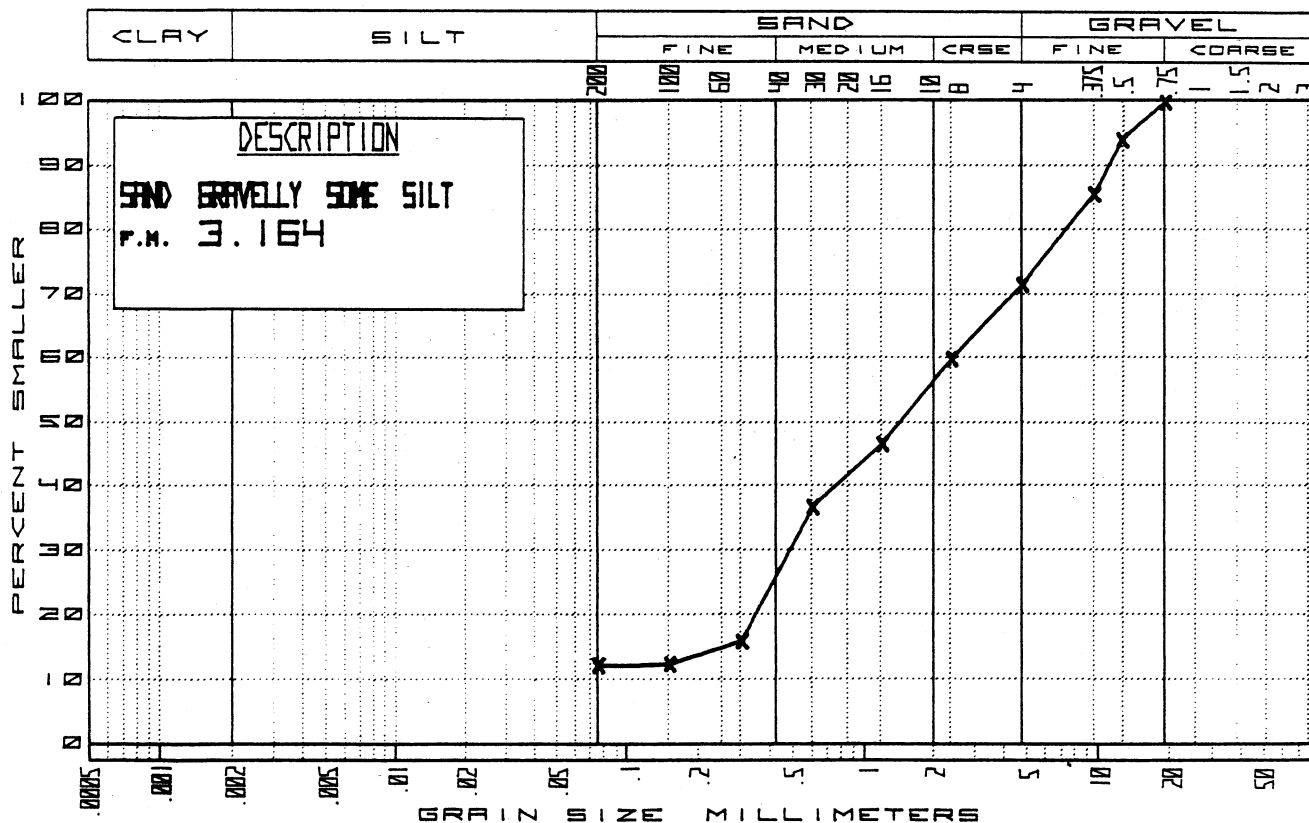
JOB NO. 1-1318 SITE LUCAS POINT SOURCE 303
 DATE 2-11-76 BASELINE B STATION 4+00 OFFSET 2+00N DEPTH 25.0



DATE 2-12-76 BASELINE B STATION 6+00 OFFSET 0+00 DEPTH 15.0



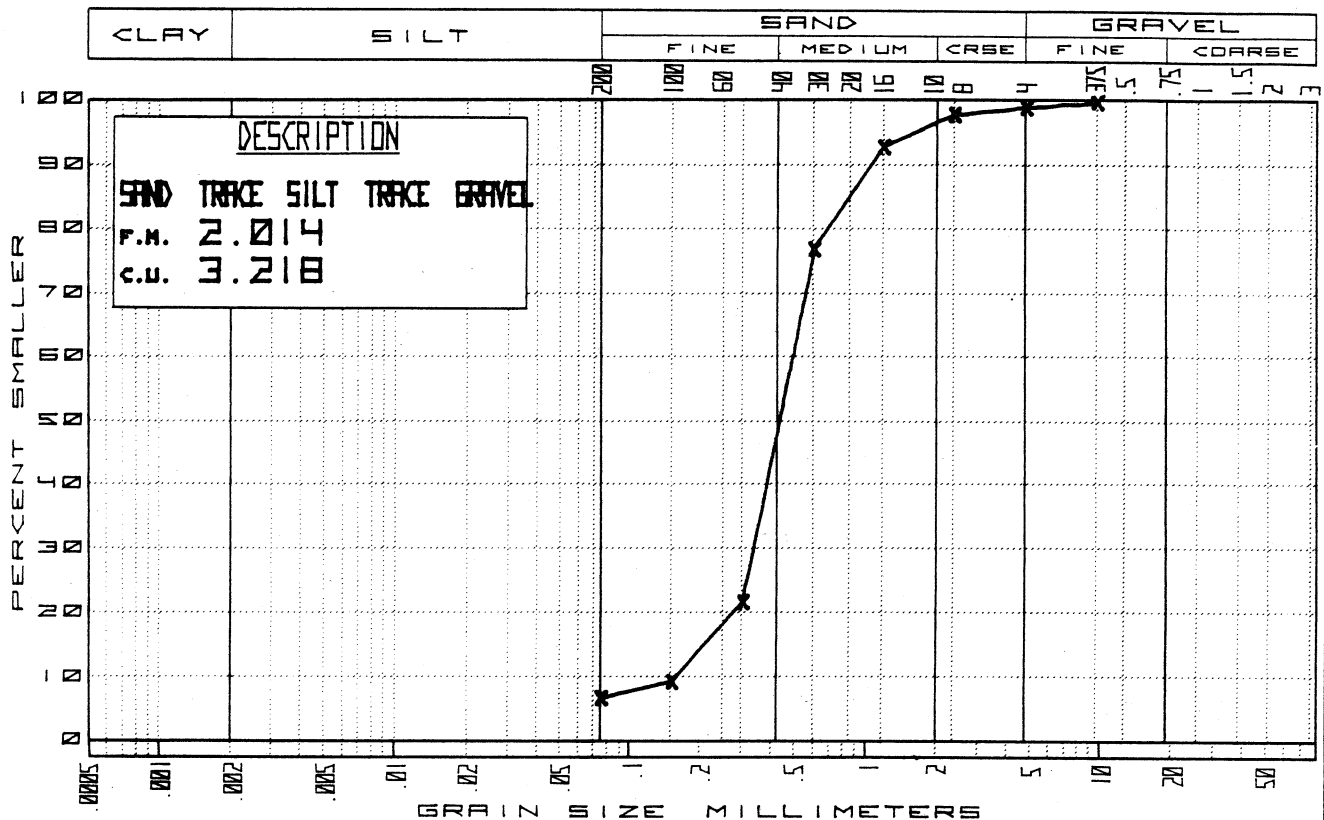
DATE 2-11-76 BASELINE B STATION 8+00 OFFSET 0+00 DEPTH 8.0-9.0



All tests performed in accordance with ASTM & CSA standards.

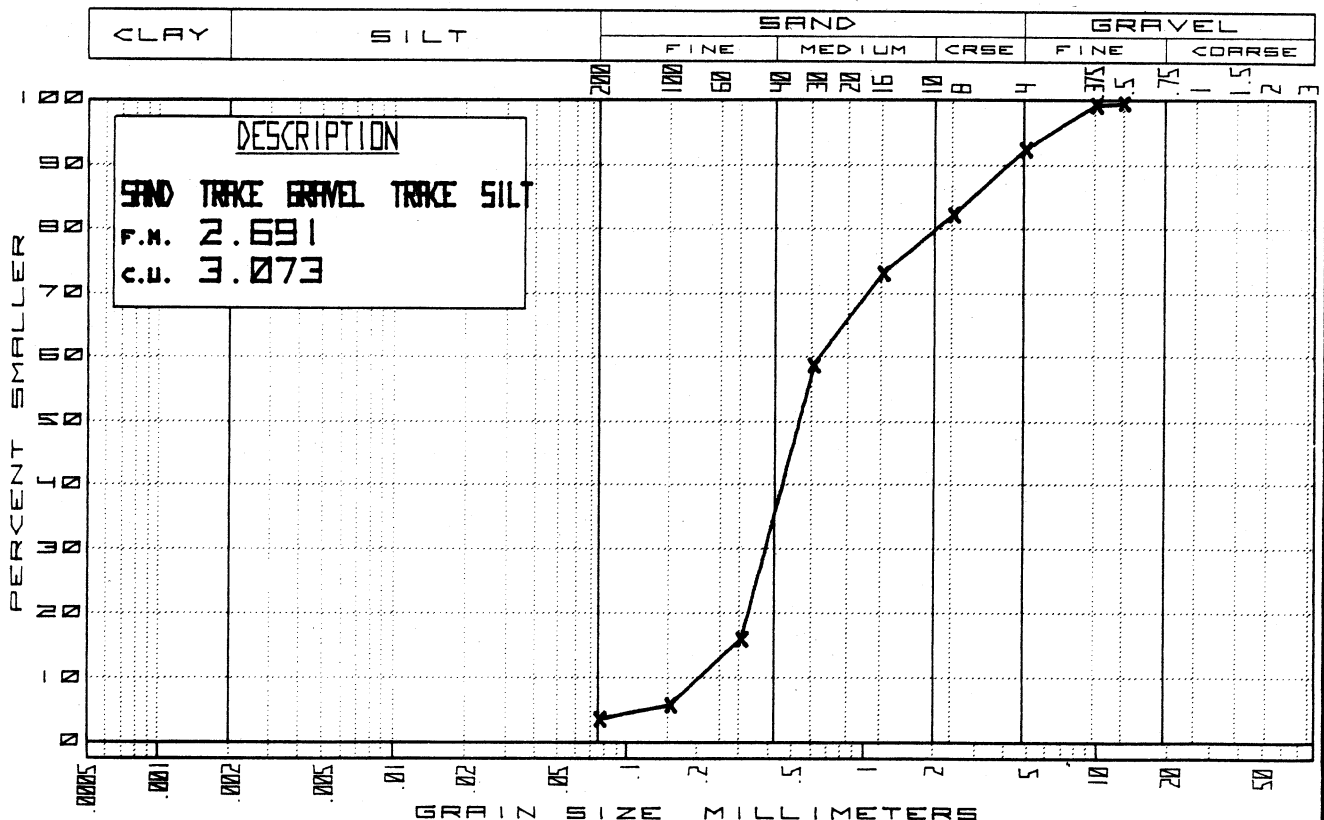
JOB NO. 1-1318 SITE LUCAS POINT SOURCE 303

DATE 2-11-76 BASELINE B STATION 10+00 OFFSET 1+00N DEPTH 15.0



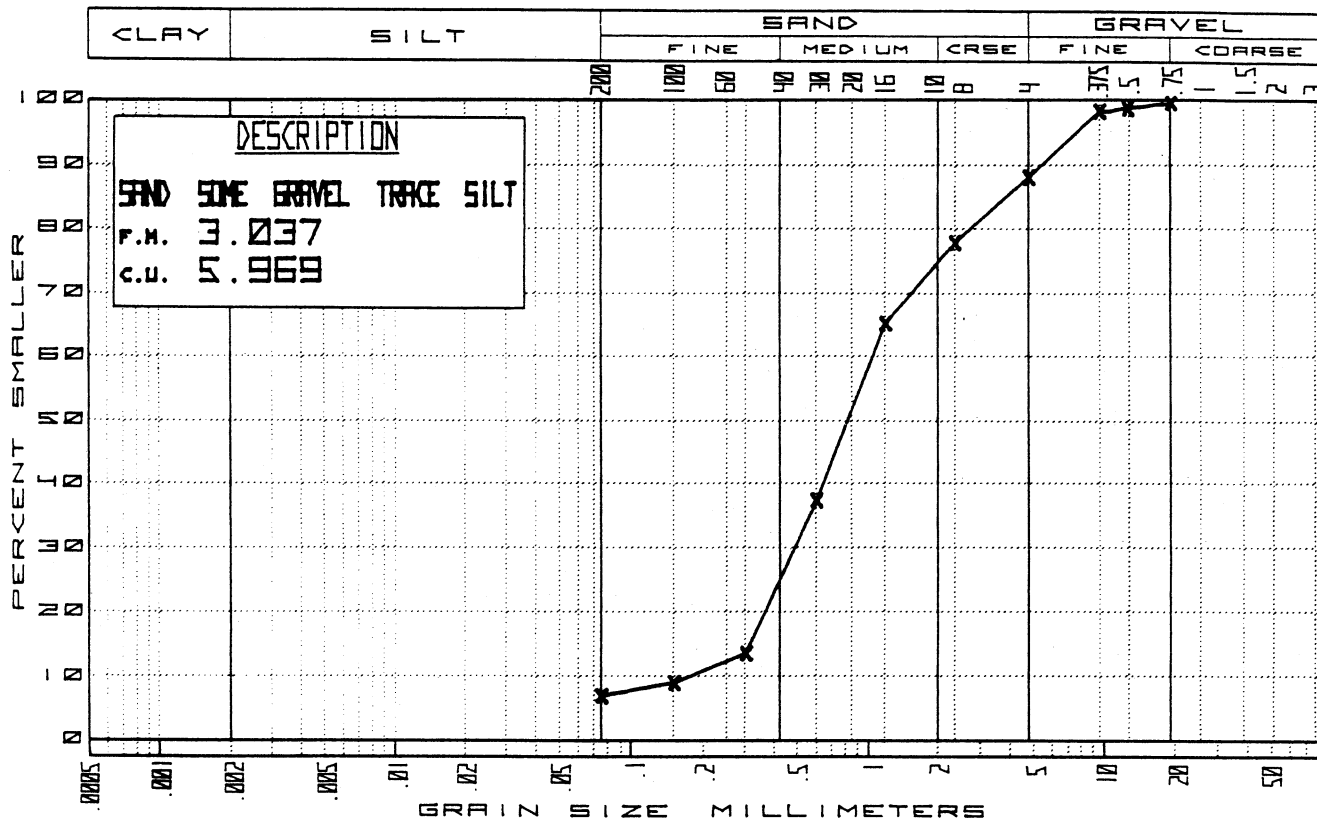
JOB NO. 1-1318 SITE LUCAS POINT SOURCE 303

DATE 2-11-76 BASELINE B STATION 10+00 OFFSET 1+00N DEPTH 30.0



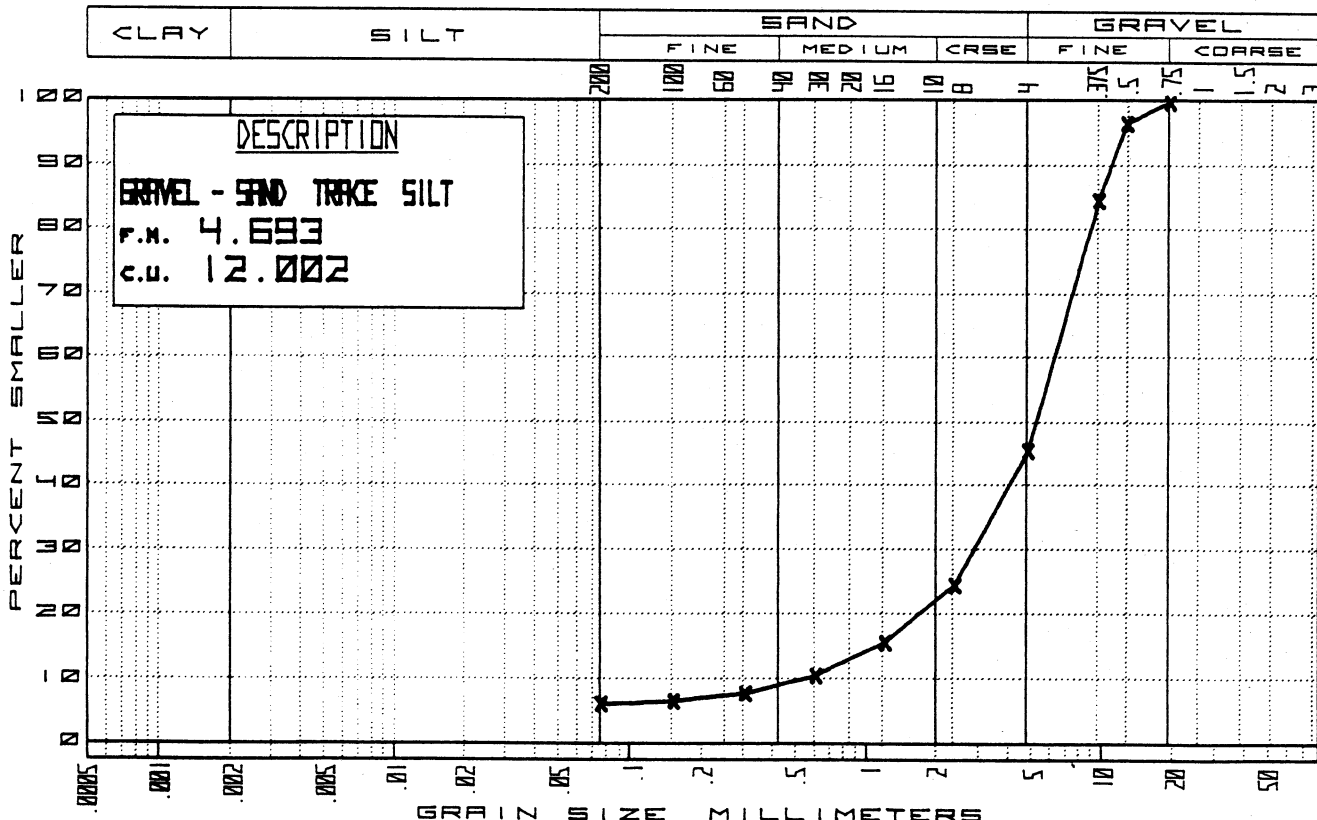
JOB NO. 1-1318 SITE LUKAS POINT SOURCE 303

DATE 2-11-76 BASELINE B STATION 11+00 OFFSET 0+00 DEPTH 20.0



JOB NO. 1-1318 SITE LUKAS POINT SOURCE 303

DATE 2-11-76 BASELINE B STATION 12+00 OFFSET 1+005 DEPTH 10.0

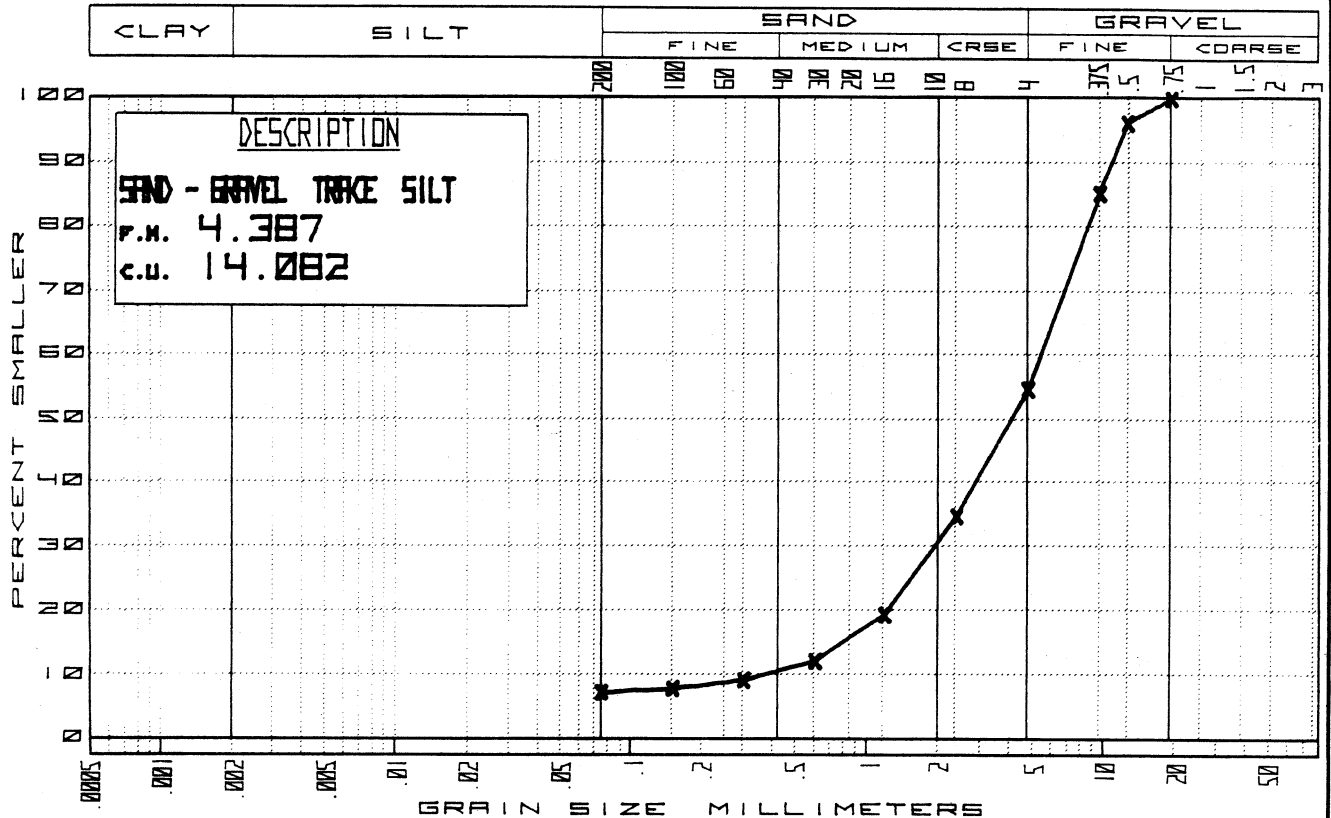


DATE 2-11-76 BASELINE B STATION 12+00 OFFSET 1+005 DEPTH 40.0



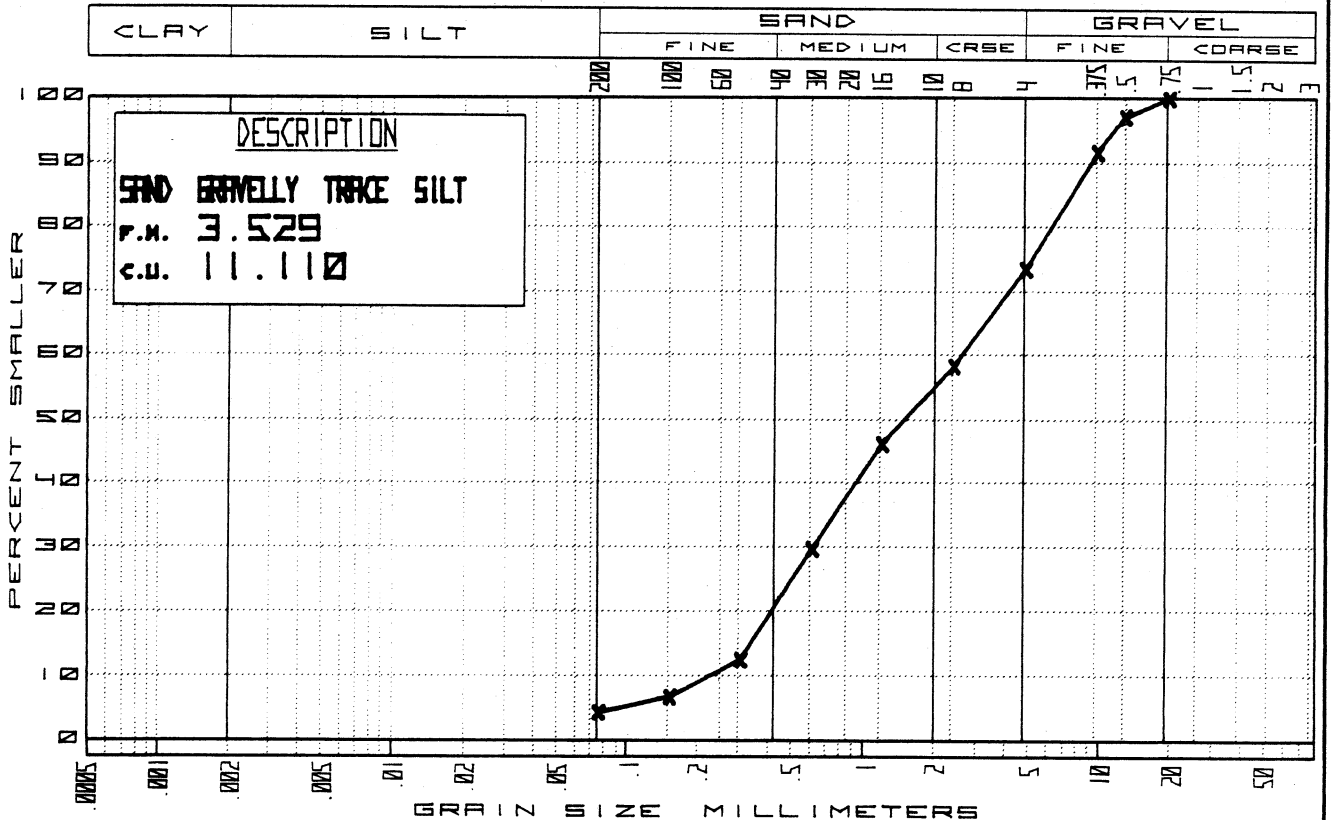
JOB NO. **1-1318** SITE **Lucas Point Source 303**

DATE **2-20-76** BASELINE **C** STATION **0+90** OFFSET **1+105** DEPTH **10.0**



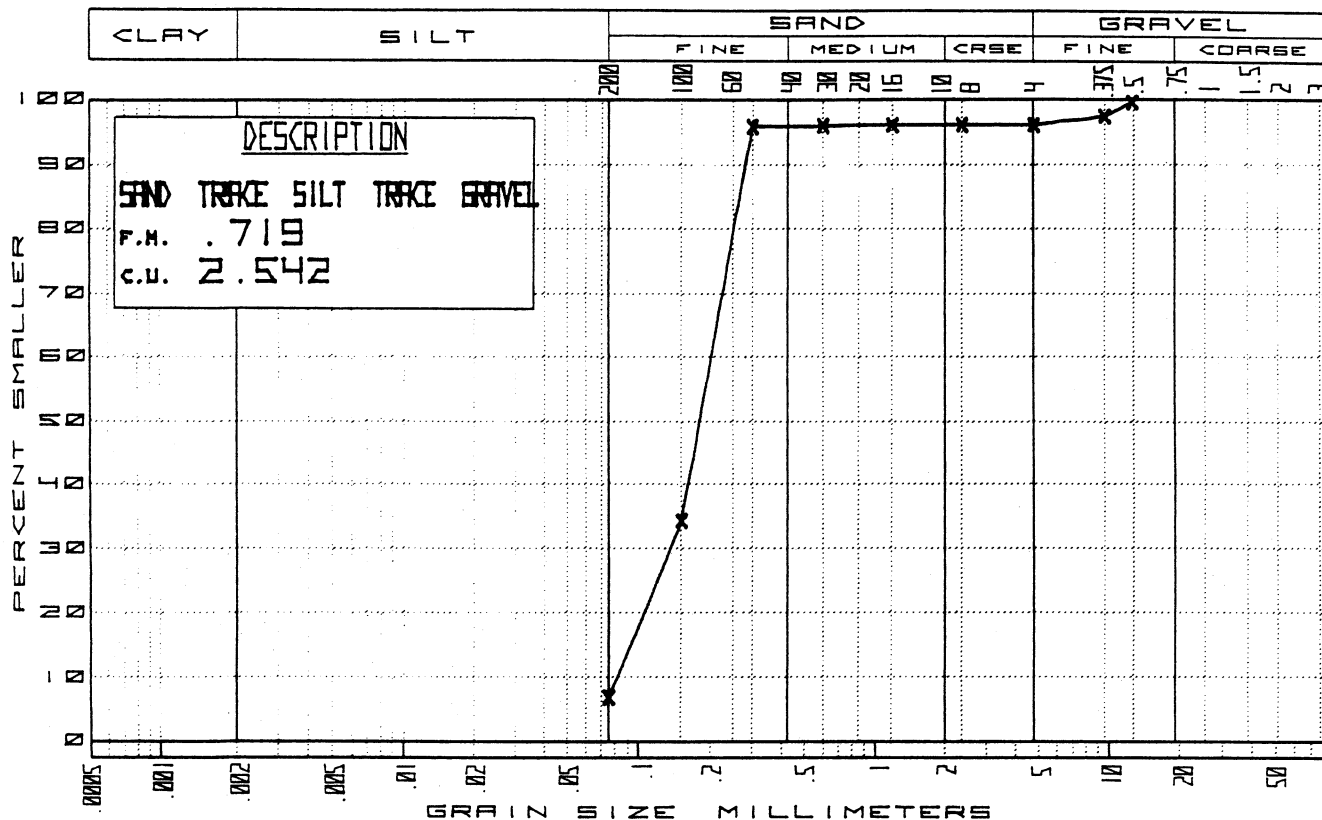
JOB NO. **1-1318** SITE **Lucas Point Source 303**

DATE **2-20-76** BASELINE **C** STATION **2+65** OFFSET **1+505** DEPTH **25.0**



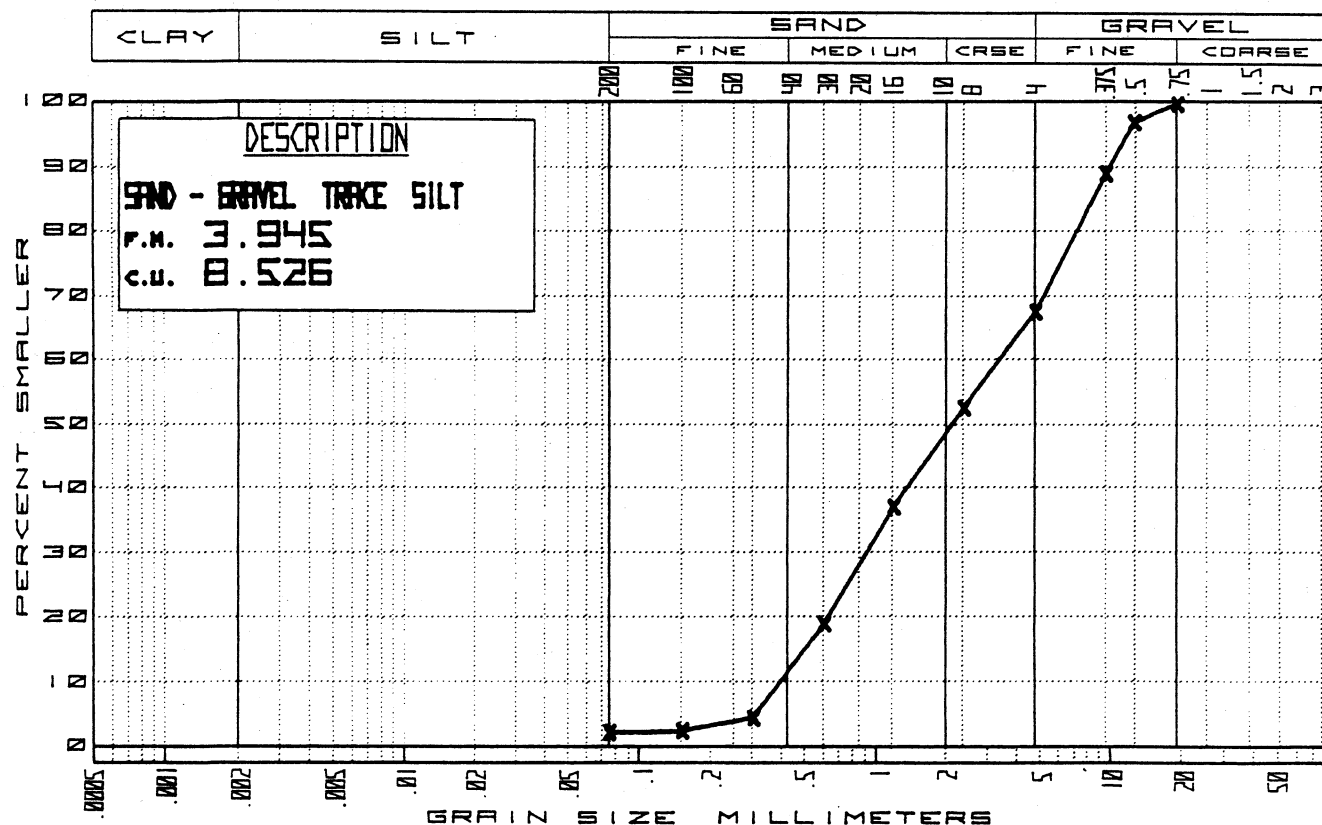
JOB NO. 1-1318 SITE LUCAS POINT SOURCE 303

DATE 2-11-76 BASELINE C STATION 4+00 OFFSET 0+00 DEPTH 20.0



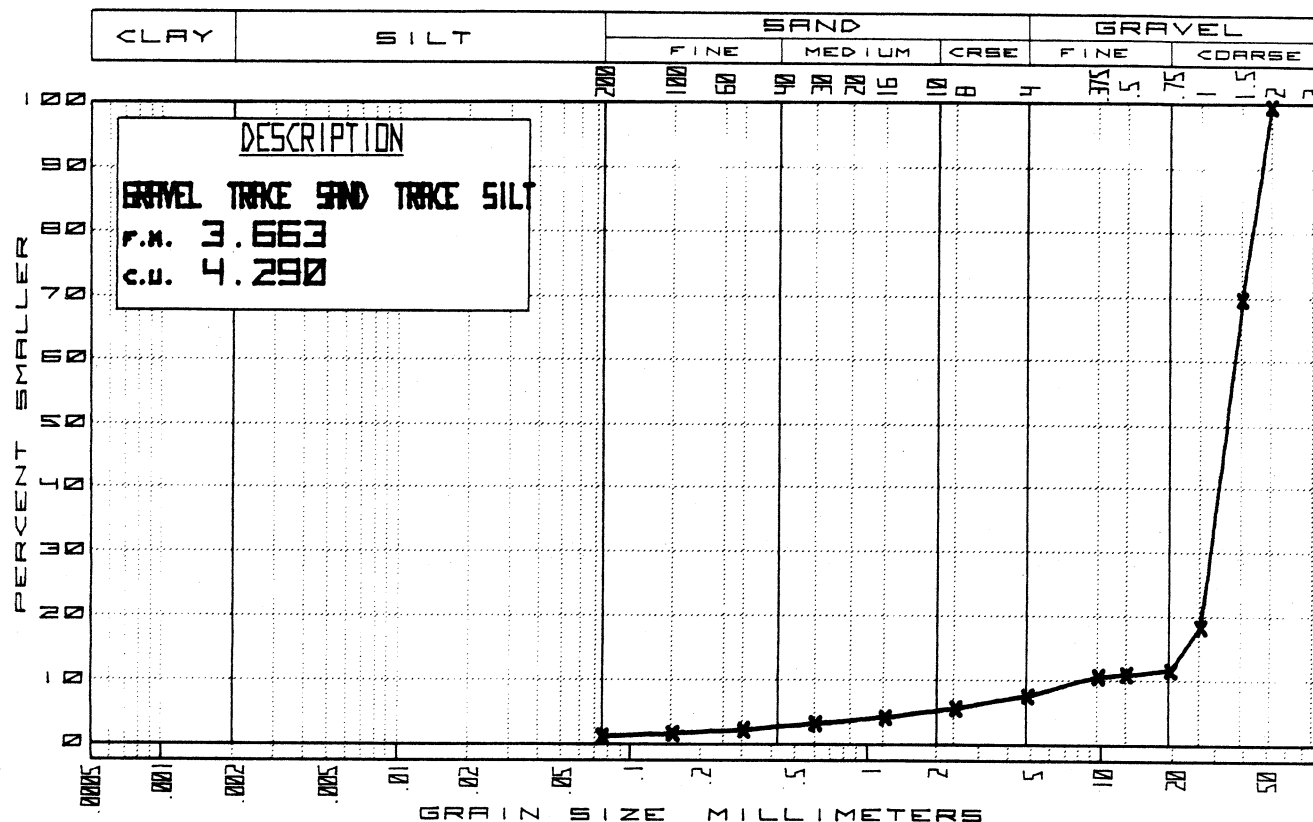
JOB NO. 1-1318 SITE LUCAS POINT SOURCE 303

DATE 2-11-76 BASELINE C STATION 6+00 OFFSET 1+005 DEPTH 10.0

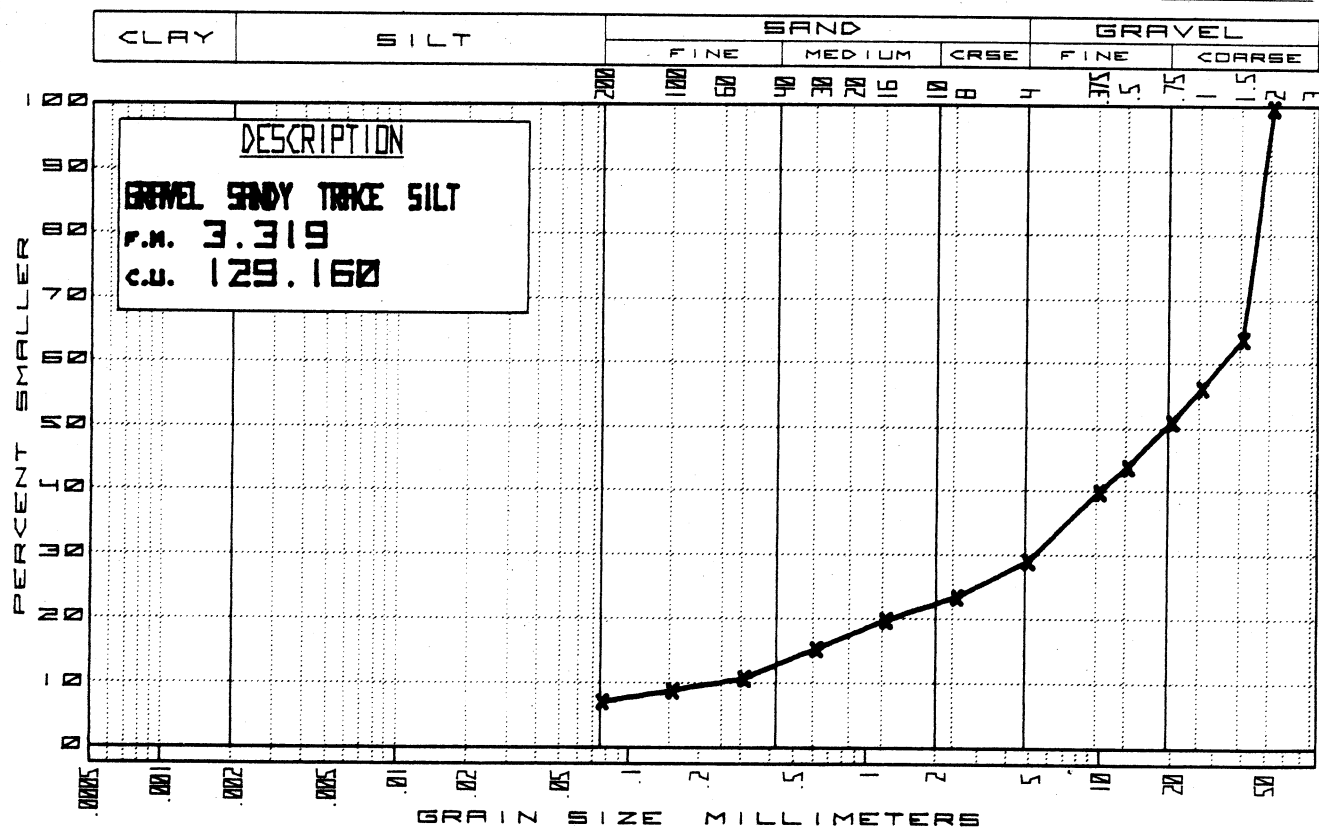


All tests performed in accordance with ASTM & CSA standards.

JOB NO. 1-1318 SITE LUCAS POINT SOURCE 303
 DATE 2-11-76 BASELINE C STATION 6+00 OFFSET 1+00N DEPTH 6.0-10.0



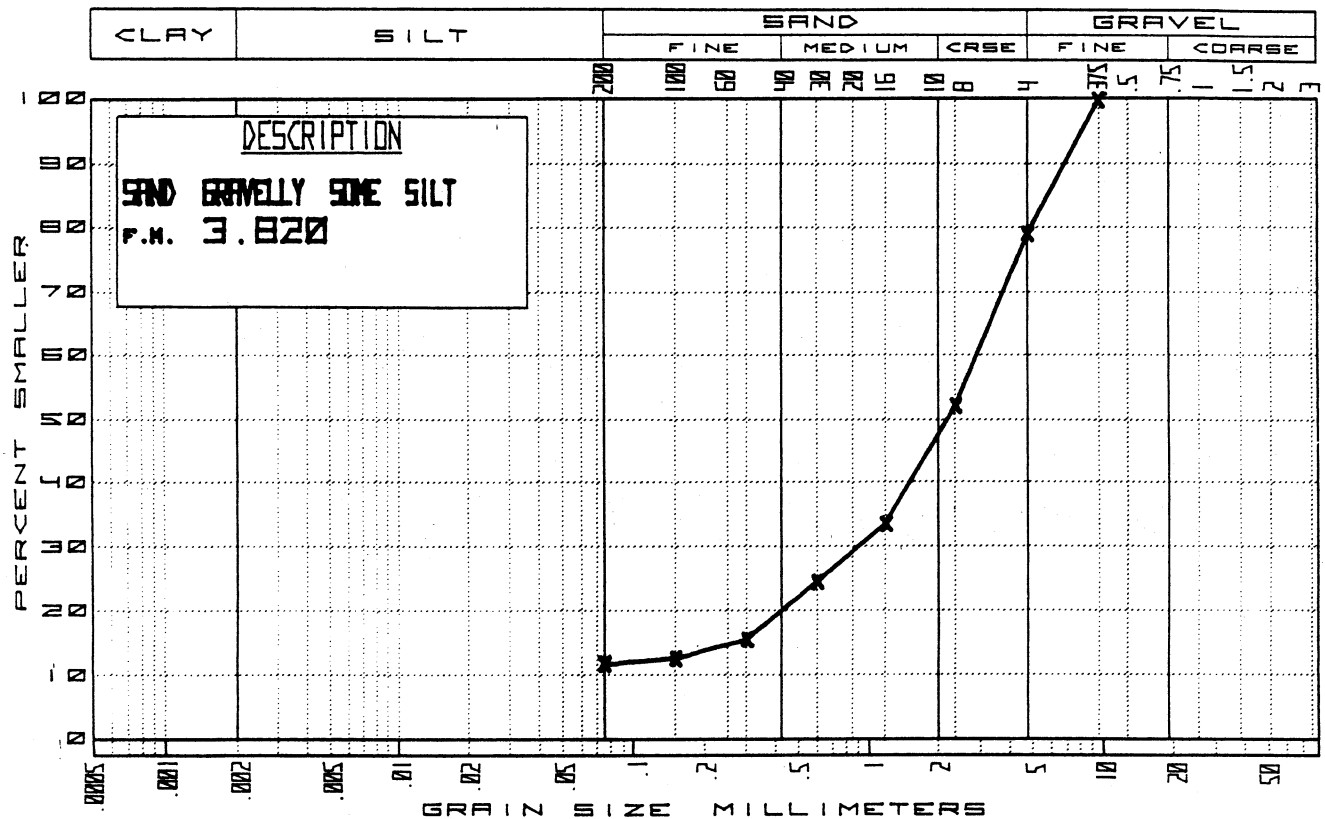
JOB NO. 1-1318 SITE LUCAS POINT SOURCE 303
 DATE 2-13-76 BASELINE C STATION 6+00 OFFSET 2+00N DEPTH 0.0-1.0



All tests performed in accordance with ASTM & CSA standards.

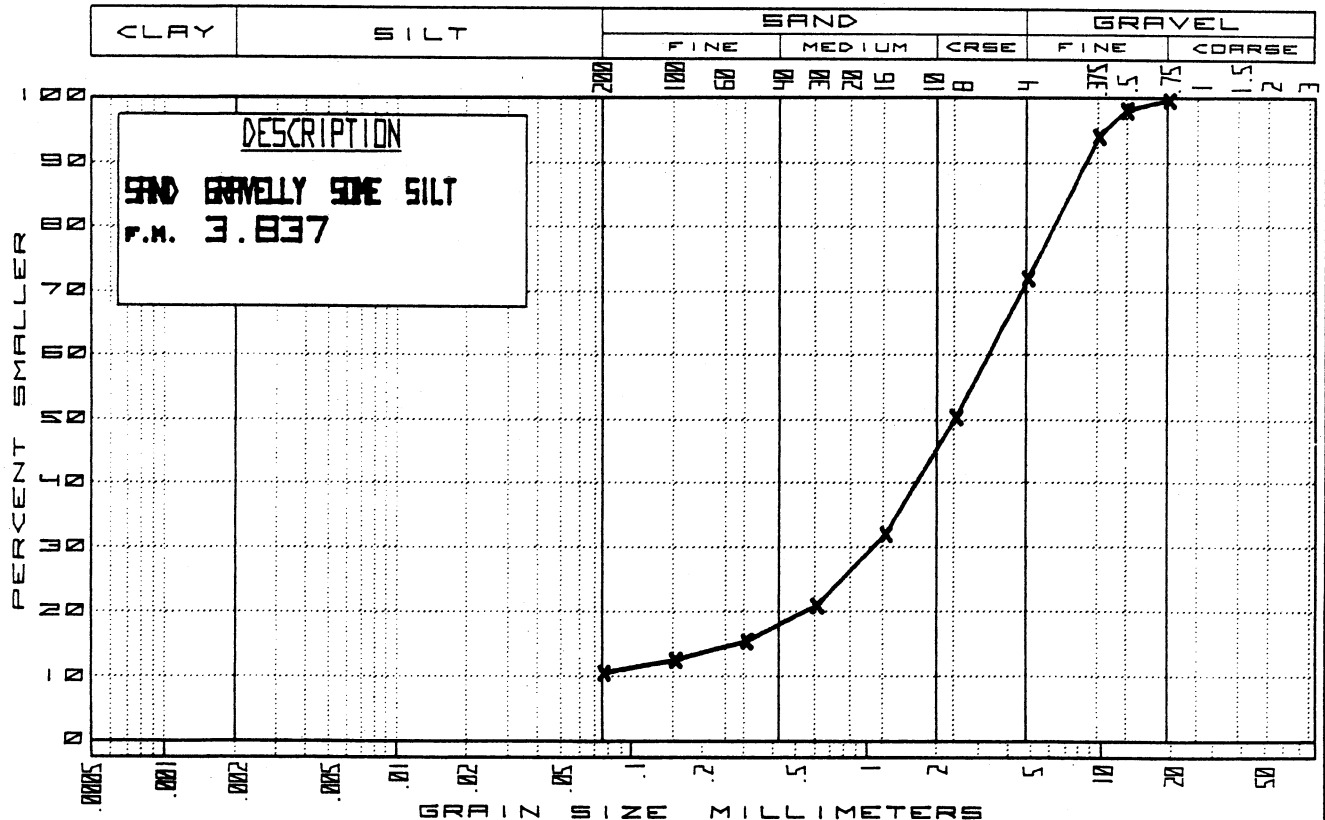
JOB NO. 1-1318 SITE LUCAS POINT SOURCE 303

DATE 2-12-76 BASELINE C STATION 8+00 OFFSET 0+00 DEPTH 13.0-14.0



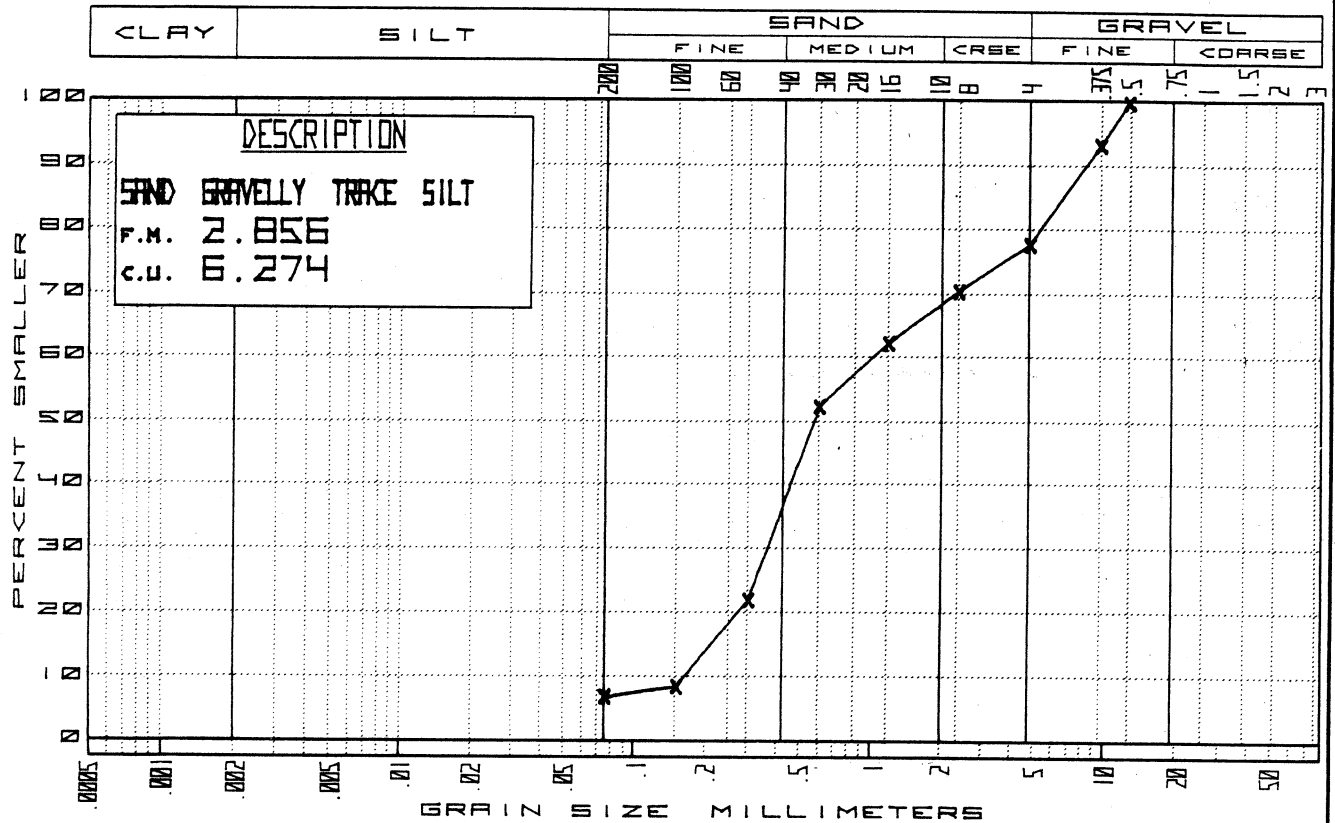
JOB NO. 1-1318 SITE LUCAS POINT SOURCE 303

DATE 2-11-76 BASELINE C STATION 8+00 OFFSET 4+00N DEPTH 6.0-8.0



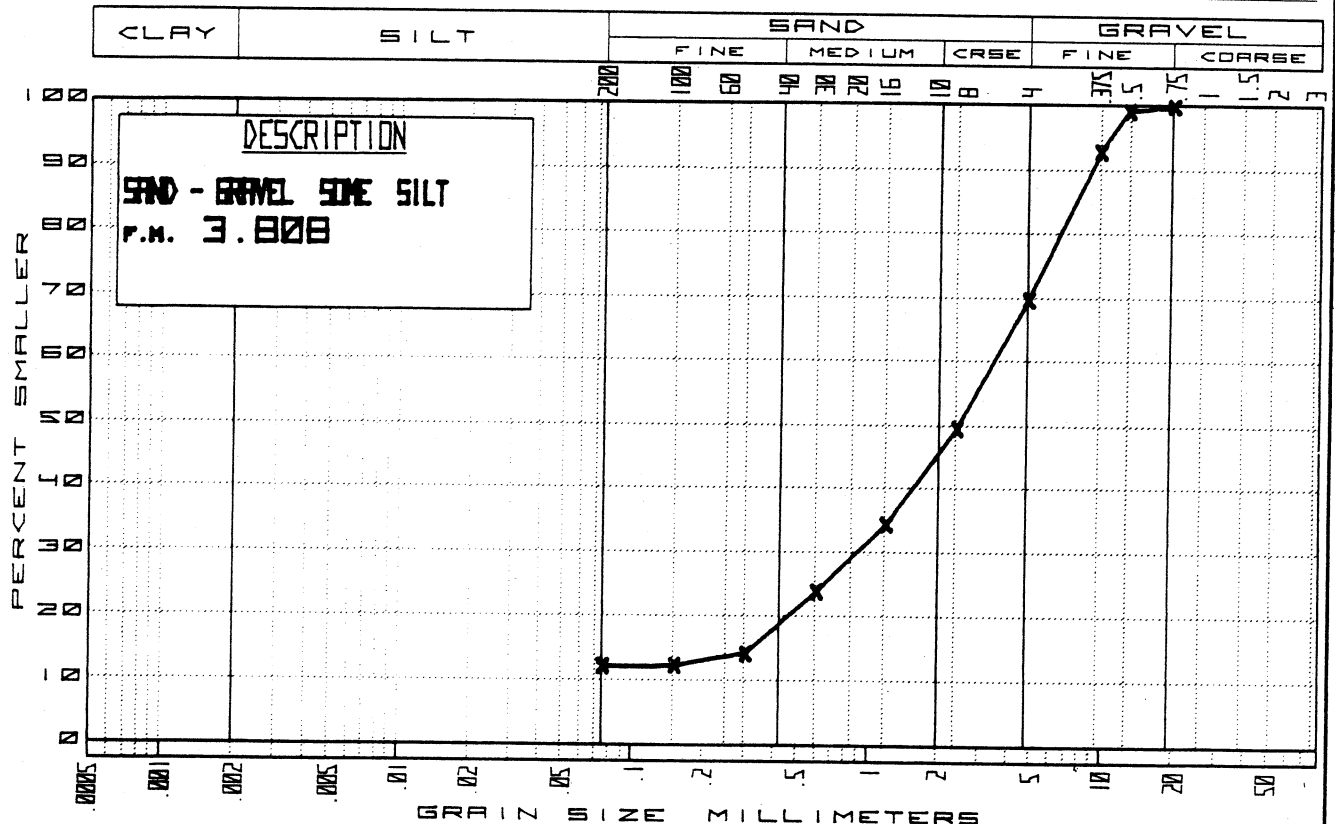
JOB NO. 1-1318 SITE LUCAS POINT SOURCE 303

DATE 2-11-76 BASELINE C STATION 10+00 OFFSET 1+005 DEPTH 5.0



JOB NO. 1-1318 SITE LUCAS POINT SOURCE 303

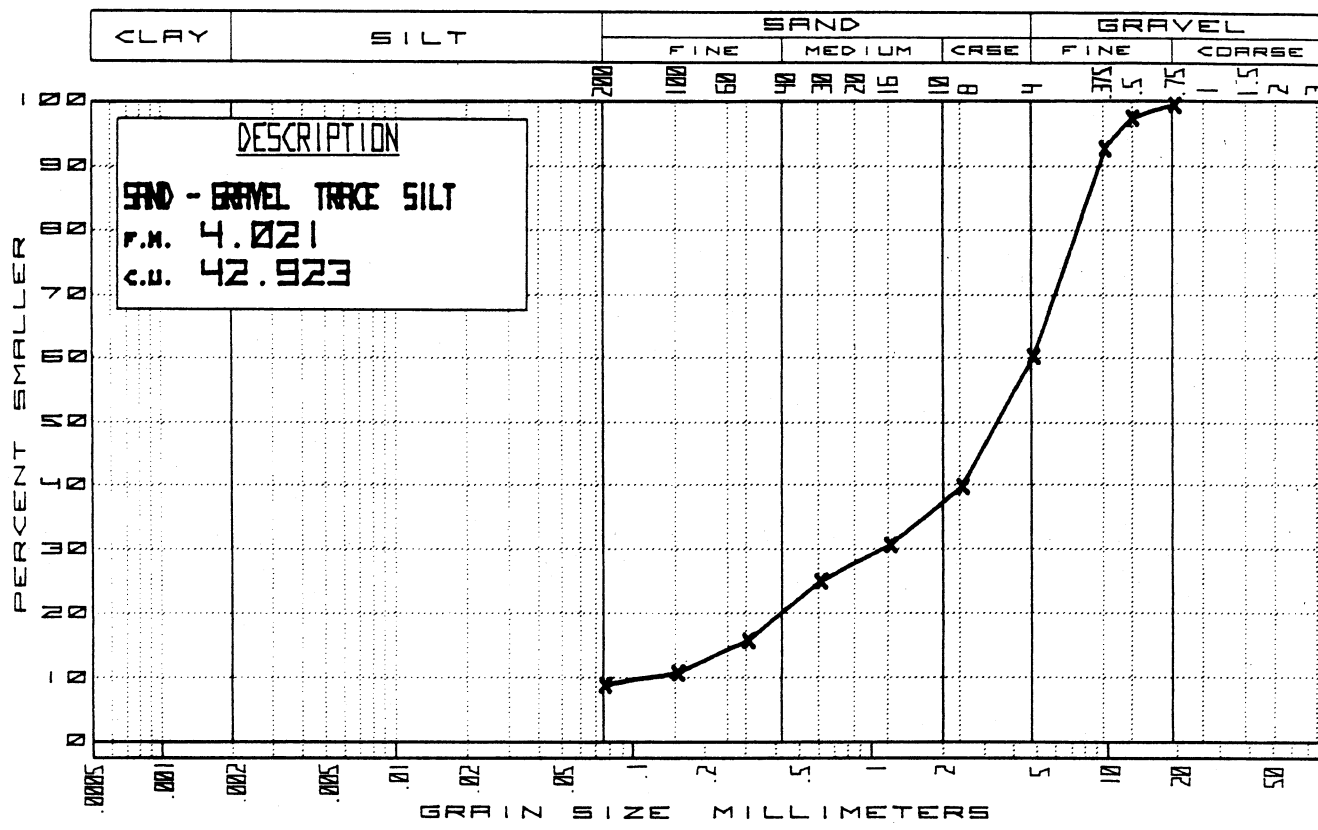
DATE 2-11-76 BASELINE C STATION 10+00 OFFSET 1+000 DEPTH 10.0



All tests performed in accordance with ASTM & CSA standards.

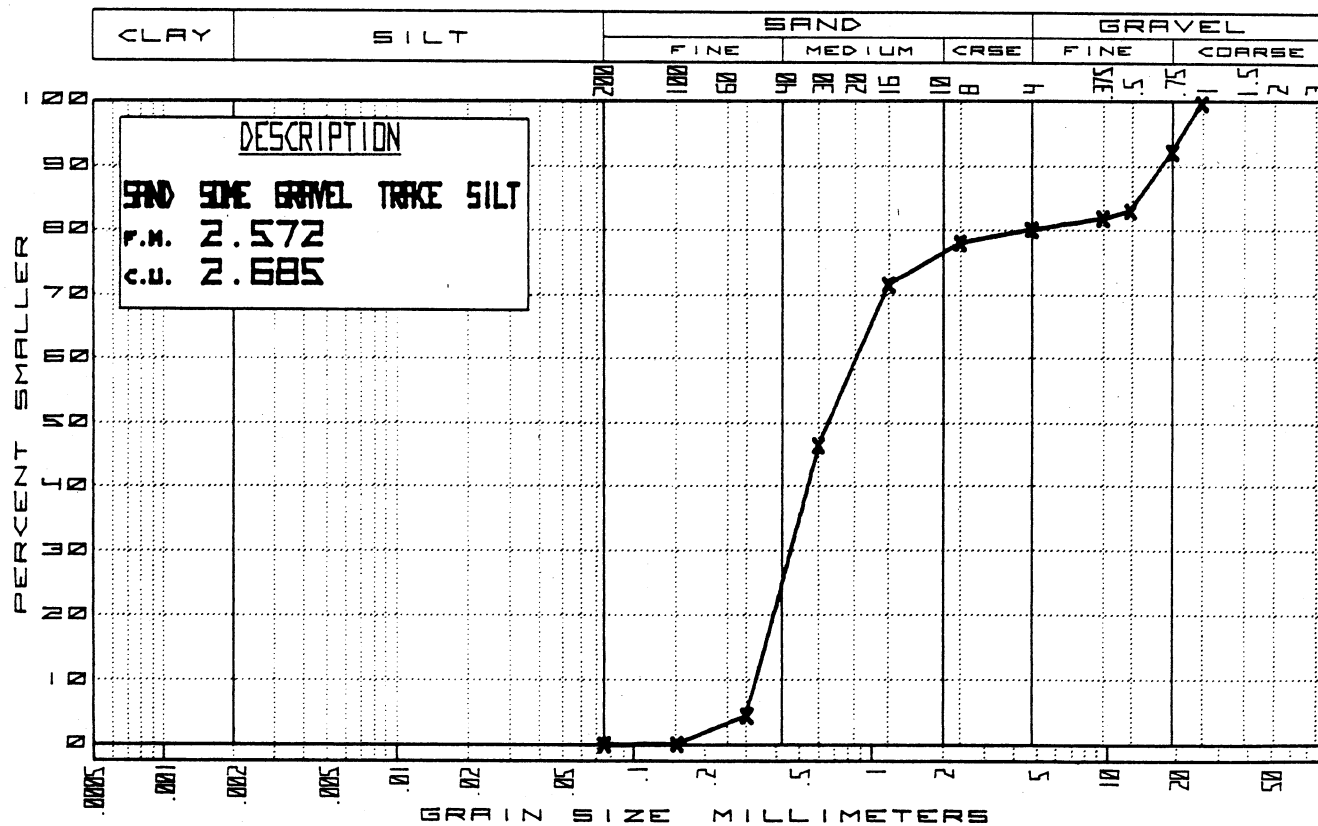
JOB NO. 1-1318 SITE LUCAS POINT SOURCE 303

DATE 2-11-76 BASELINE C STATION 10+00 OFFSET 3+00N DEPTH 5.0

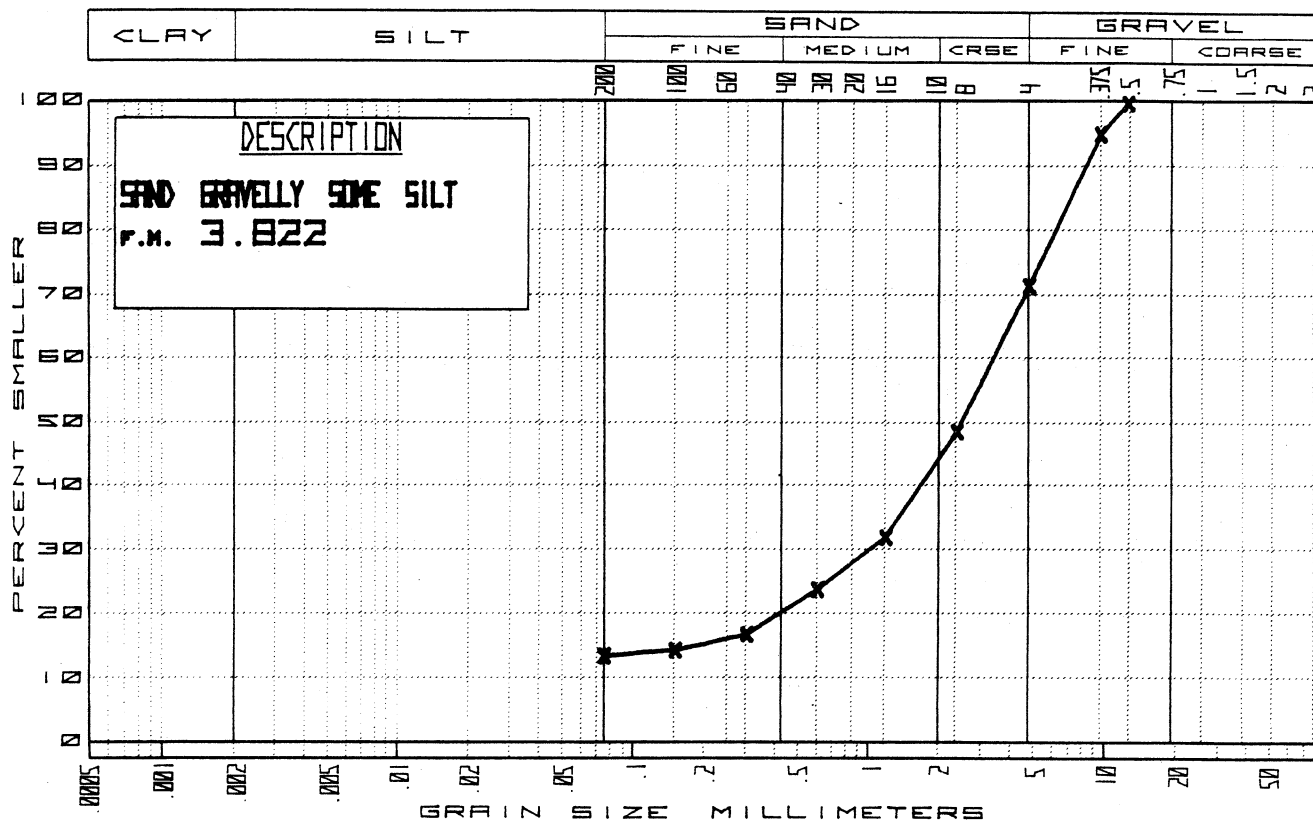


JOB NO. 1-1318 SITE LUCAS POINT SOURCE 303

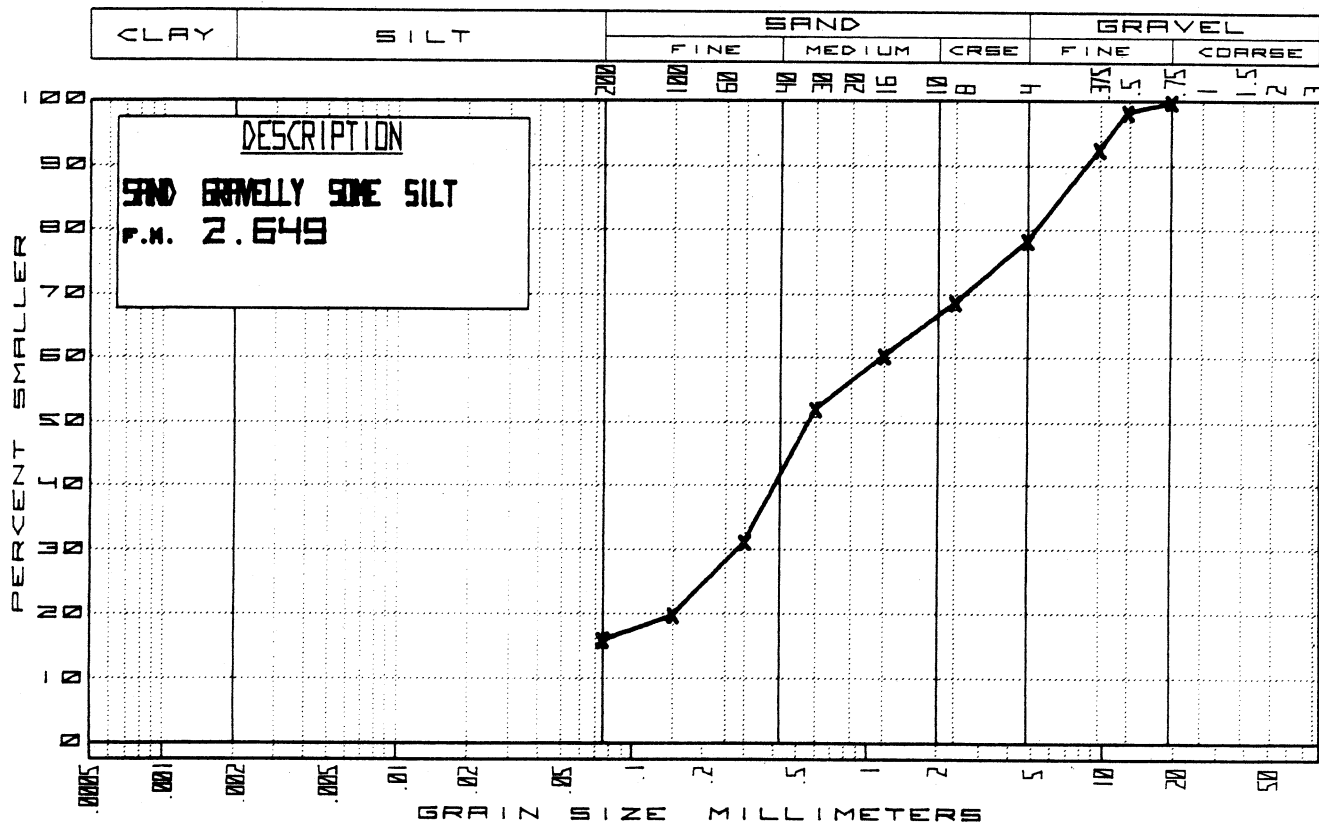
DATE 2-11-76 BASELINE C STATION 10+00 OFFSET 3+00N DEPTH 19.0-20.0



JOB NO. **1-1318** SITE **LUCAS POINT SOURCE 303**
 DATE **2-11-76** BASELINE **C** STATION **10+00** OFFSET **5+00N** DEPTH **9.0-10.0**



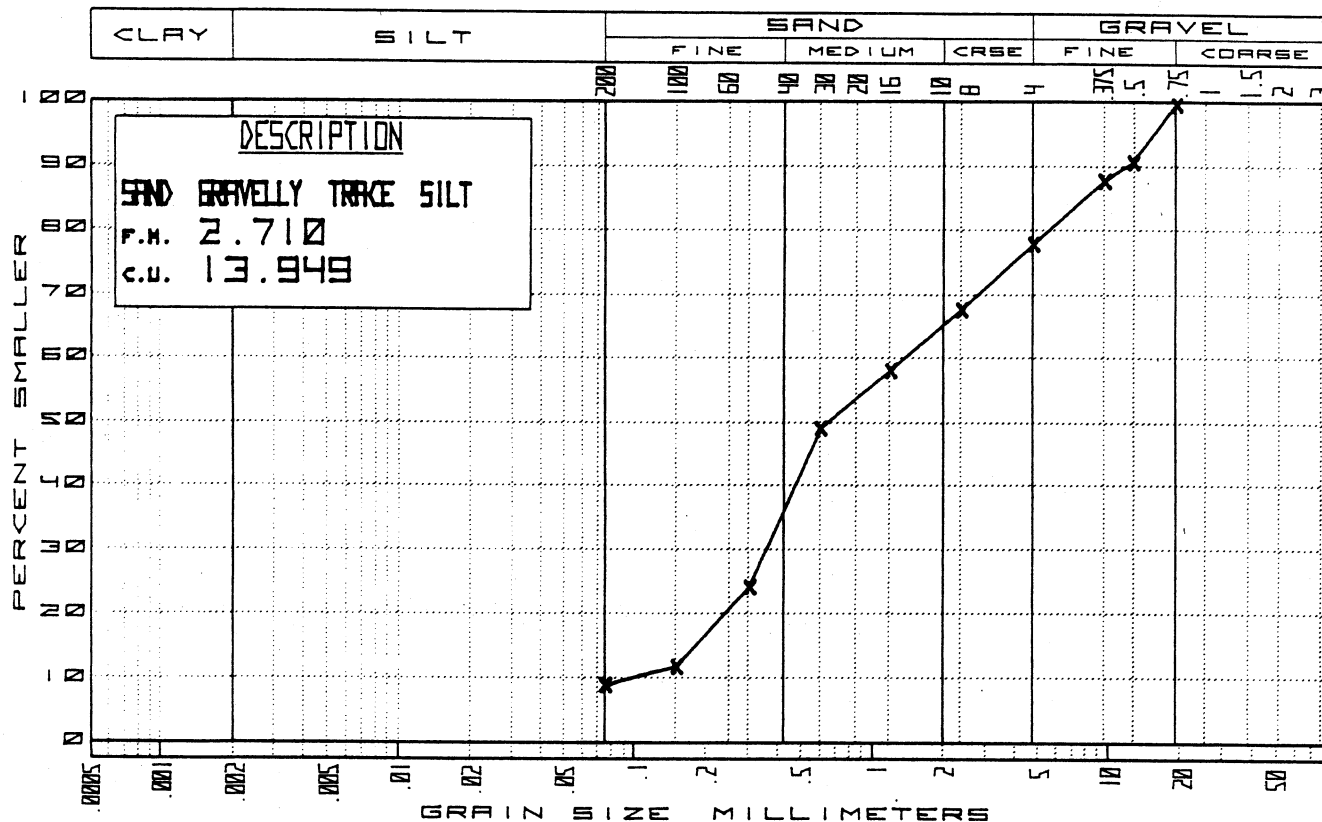
JOB NO. **1-1318** SITE **LUCAS POINT SOURCE 303**
 DATE **2-12-76** BASELINE **C** STATION **12+00** OFFSET **3+00N** DEPTH **15.0**



All tests performed in accordance with ASTM & CSA standards.

JOB NO. 1-1318 SITE LUCAS POINT SOURCE 303

DATE 2-11-76 BASELINE C STATION 12+00 OFFSET 7+75N DEPTH 5.0



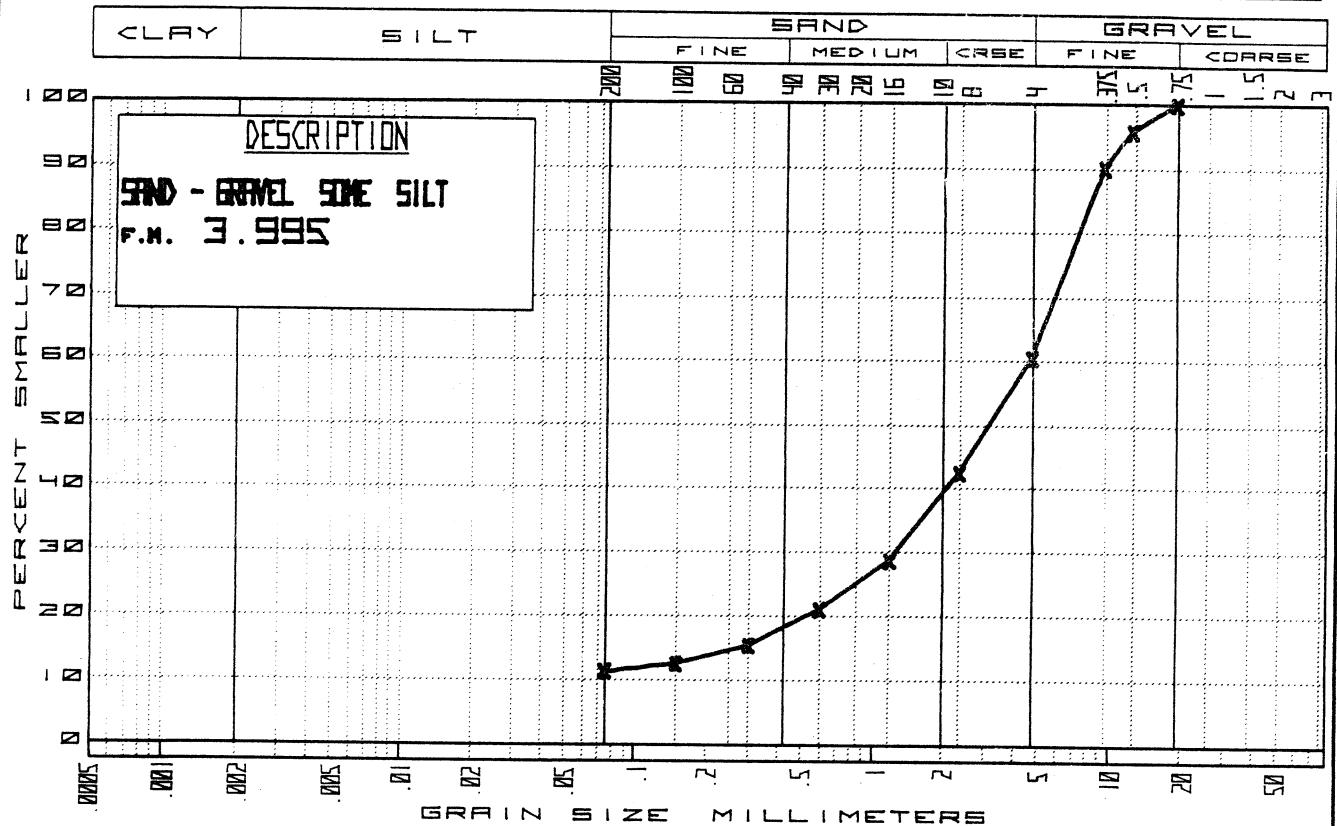
All tests performed in accordance with ASTM & CSA standards.

Swimming Point Source 222

Grain Size Curves

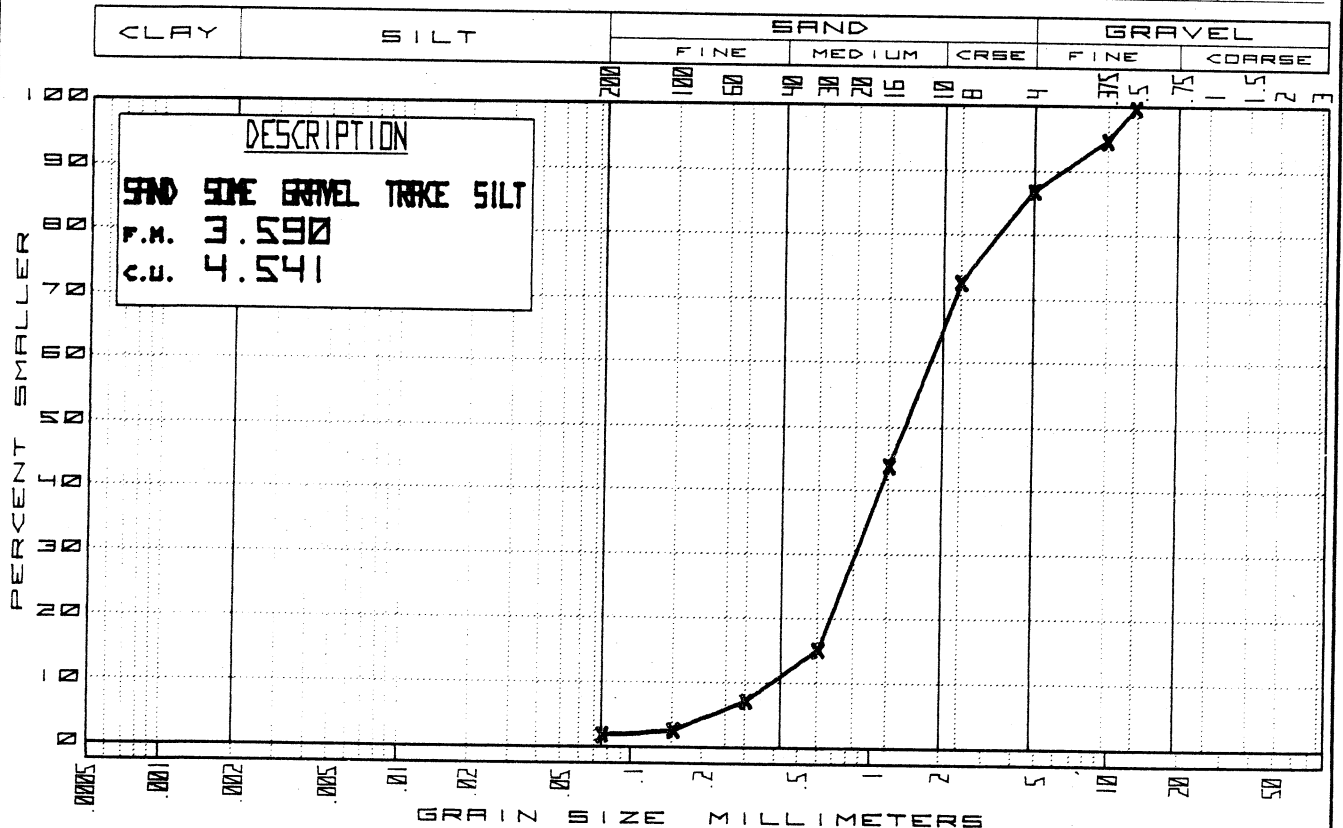
JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

DATE 2-12-76 BASELINE A STATION 1+00 OFFSET 0+00 DEPTH 10.0



JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

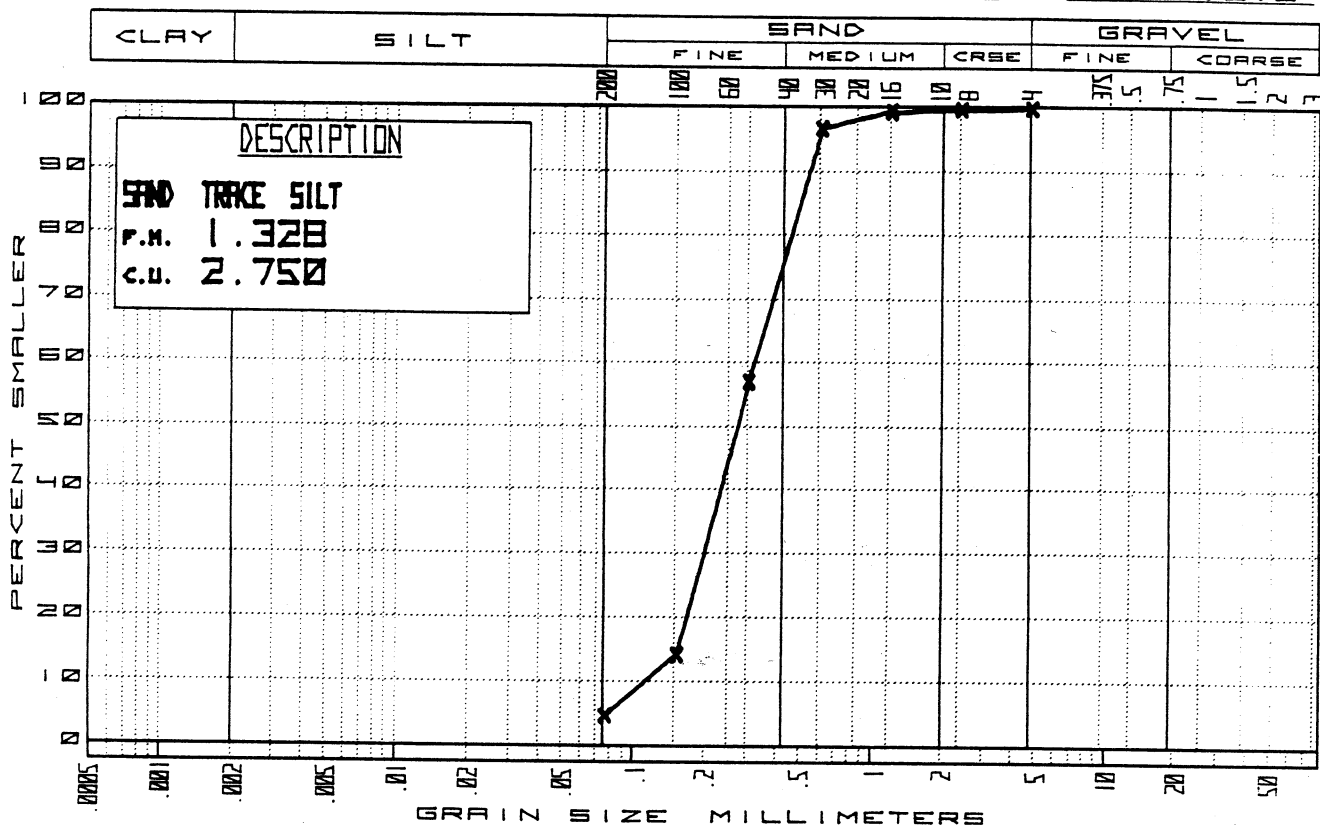
DATE 2-24-76 BASELINE A STATION 2+00 OFFSET 1+00W DEPTH 8.0-9.0



All tests performed in accordance with ASTM & CSA standards.

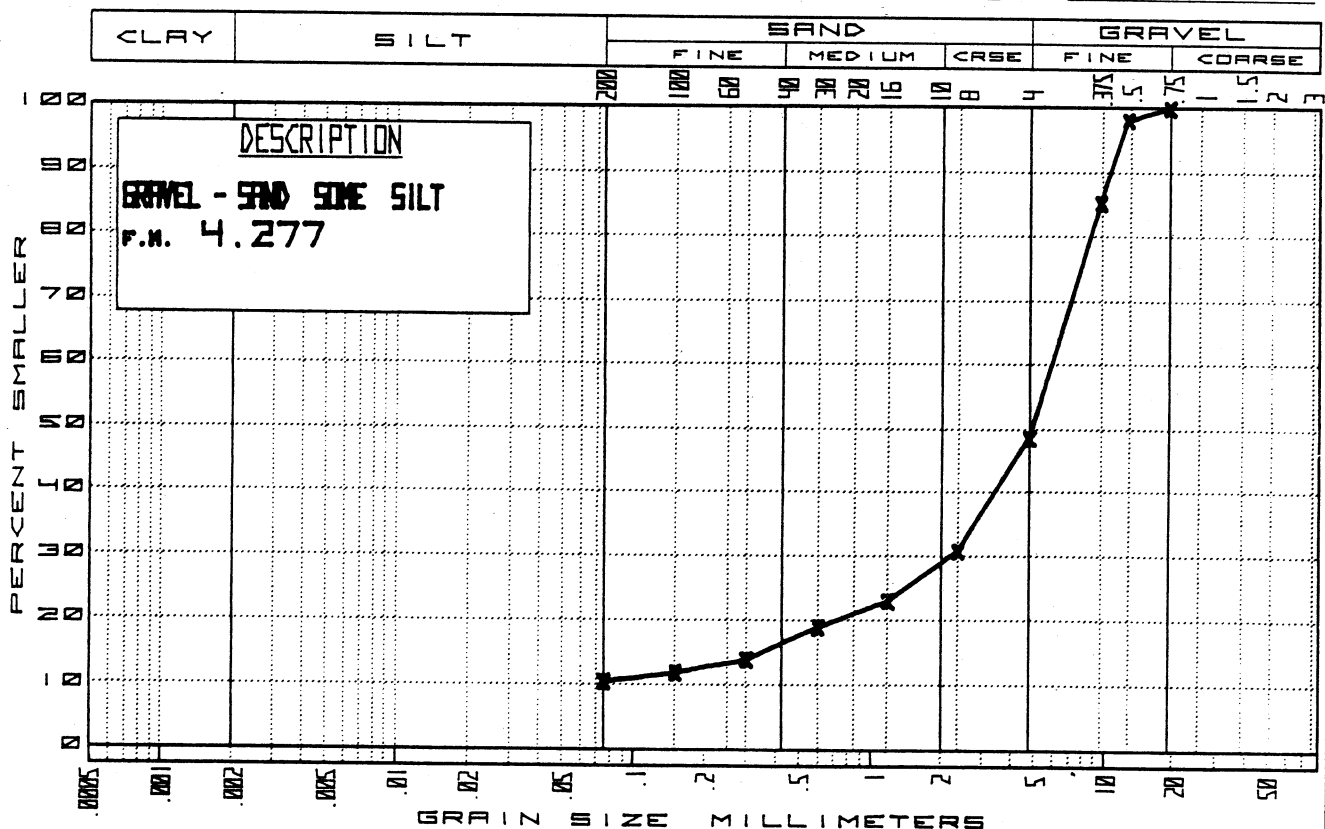
JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

DATE 2-24-76 BASELINE A STATION 2+00 OFFSET 1+00W DEPTH 11.0-12.0



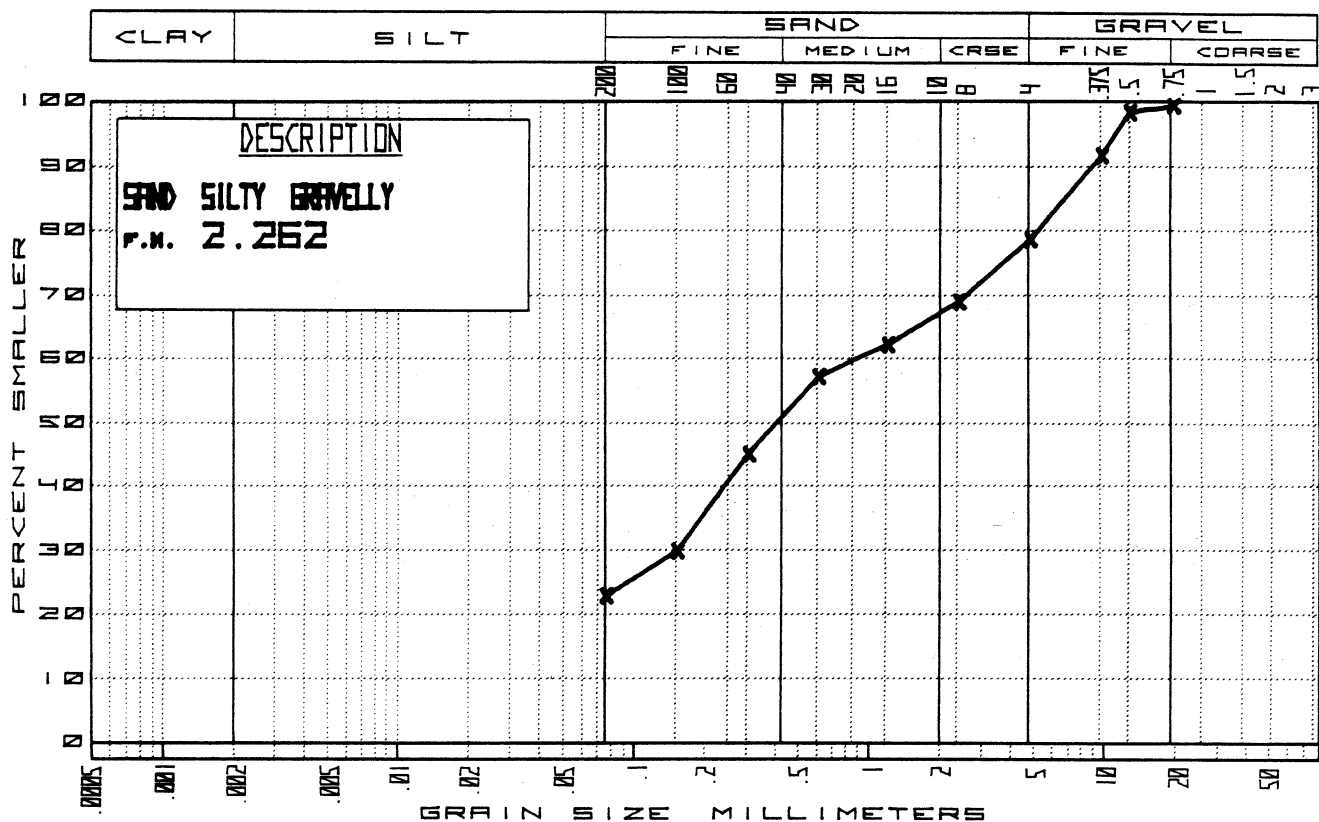
JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

DATE 2-12-76 BASELINE A STATION 2+00 OFFSET 0+00 DEPTH 15.0



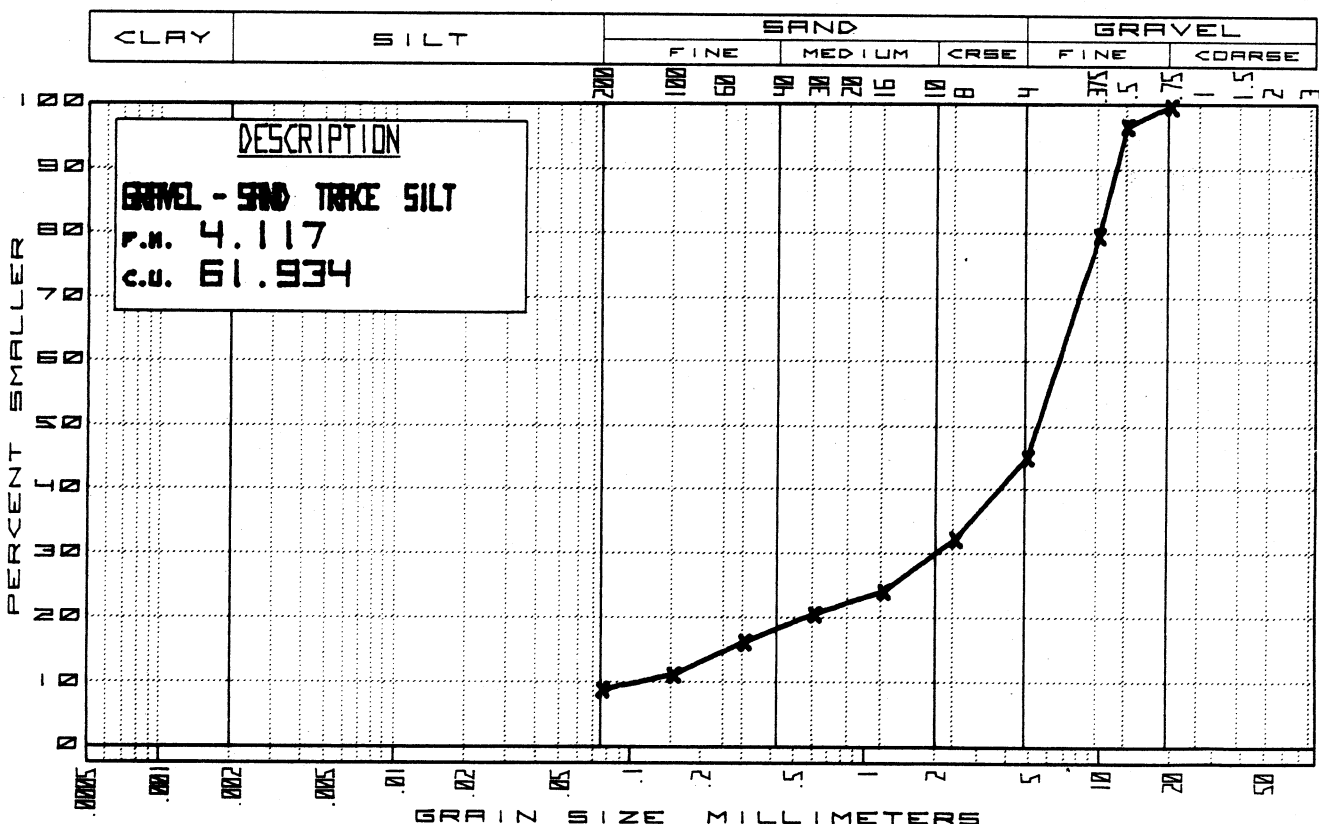
JOB NO. **1-1318** SITE **SWIMMING POINT SOURCE 222**

DATE **2-13-76** BASELINE **A** STATION **2+00** OFFSET **1+00E** DEPTH **25.0**



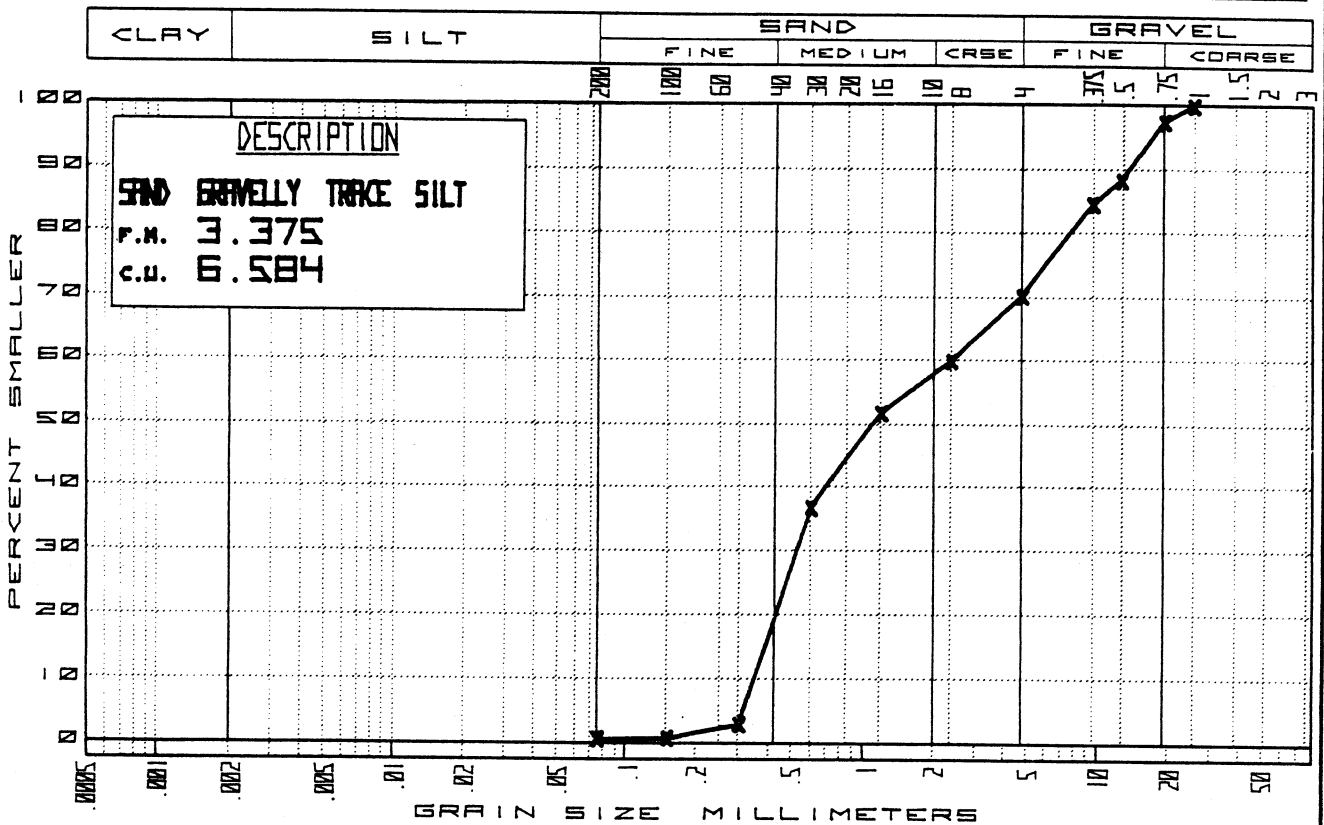
JOB NO. **1-1318** SITE **SWIMMING POINT SOURCE 222**

DATE **2-13-76** BASELINE **A** STATION **4+00** OFFSET **1+00W** DEPTH **16.0-17.0**



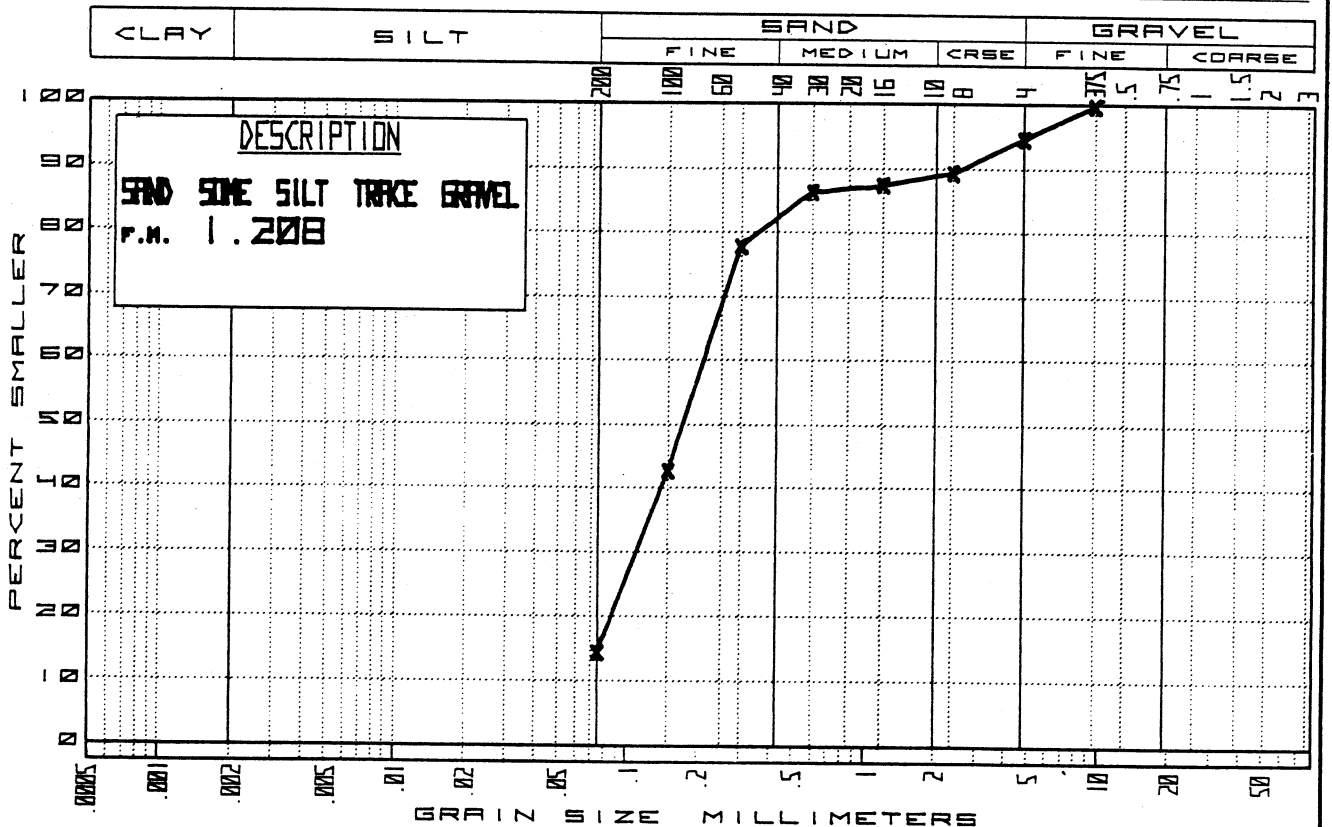
JOB NO. **1-1318** SITE **SWIMMING POINT SOURCE 222**

DATE **2-12-76** BASELINE **A** STATION **4+00** OFFSET **0+00** DEPTH **10.0-11.0**



JOB NO. **1-1318** SITE **SWIMMING POINT SOURCE 222**

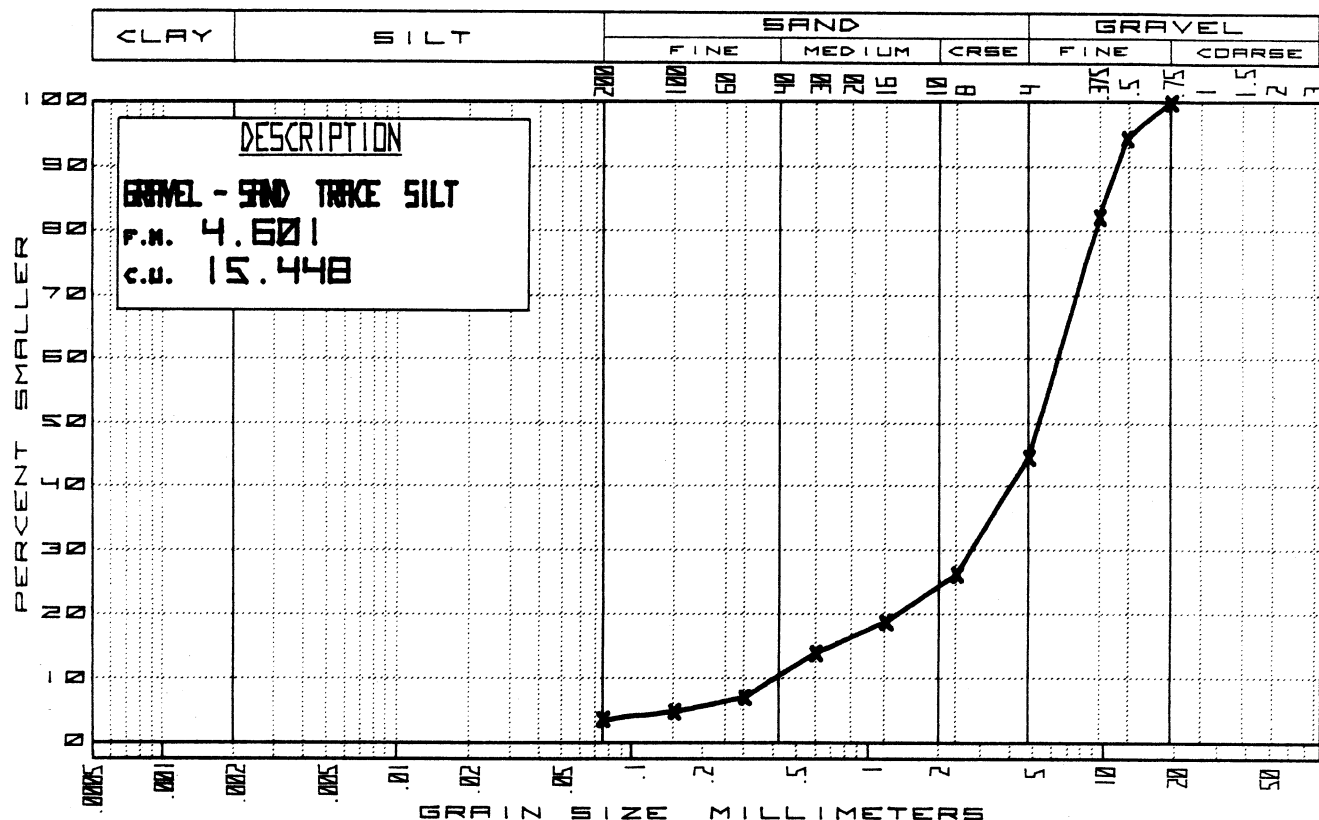
DATE **2-12-76** BASELINE **A** STATION **4+00** OFFSET **0+00** DEPTH **25.0**



All tests performed in accordance with ASTM & CSA standards.

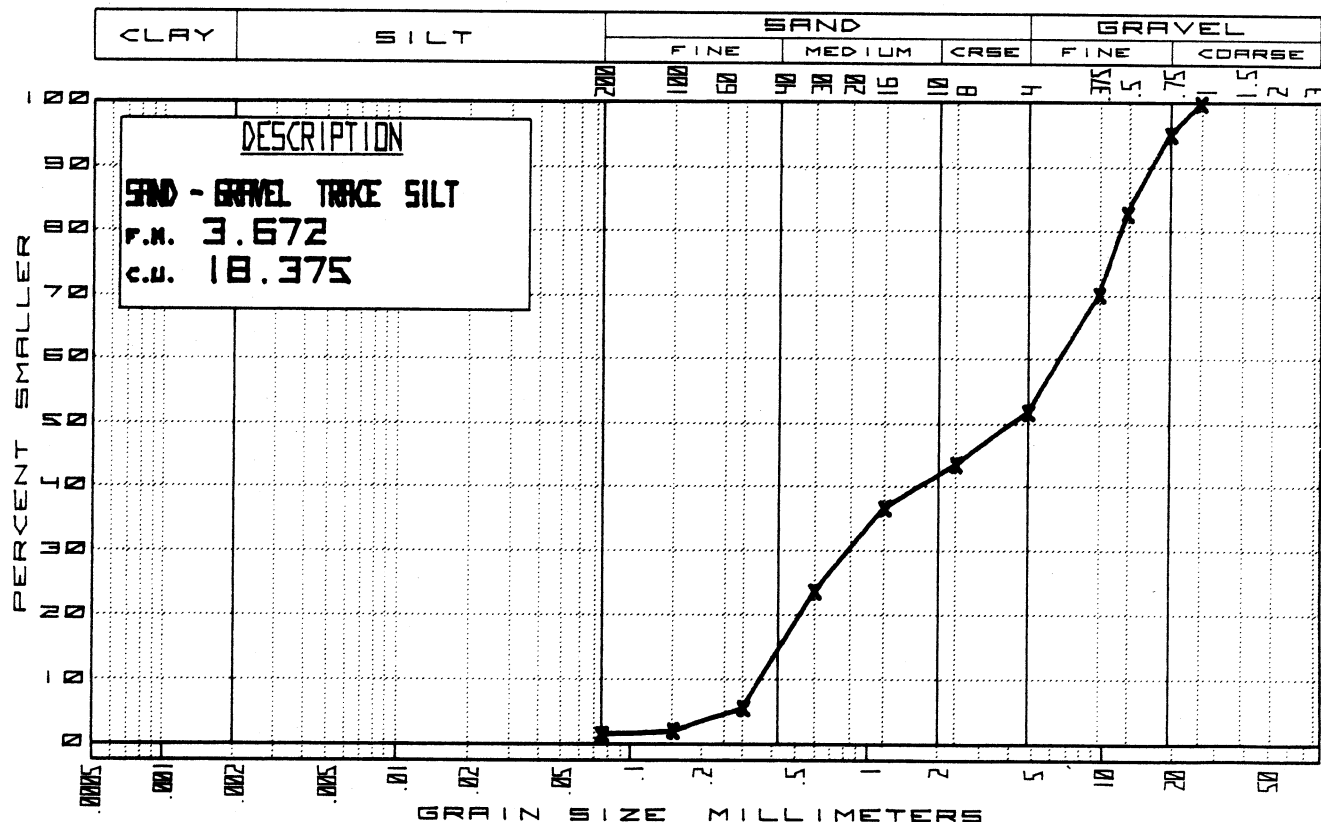
JOB NO. **1-1318** SITE **SWIMMING POINT SOURCE 222**

DATE **2-12-76** BASELINE **A** STATION **6+00** OFFSET **0+00** DEPTH **10.0**

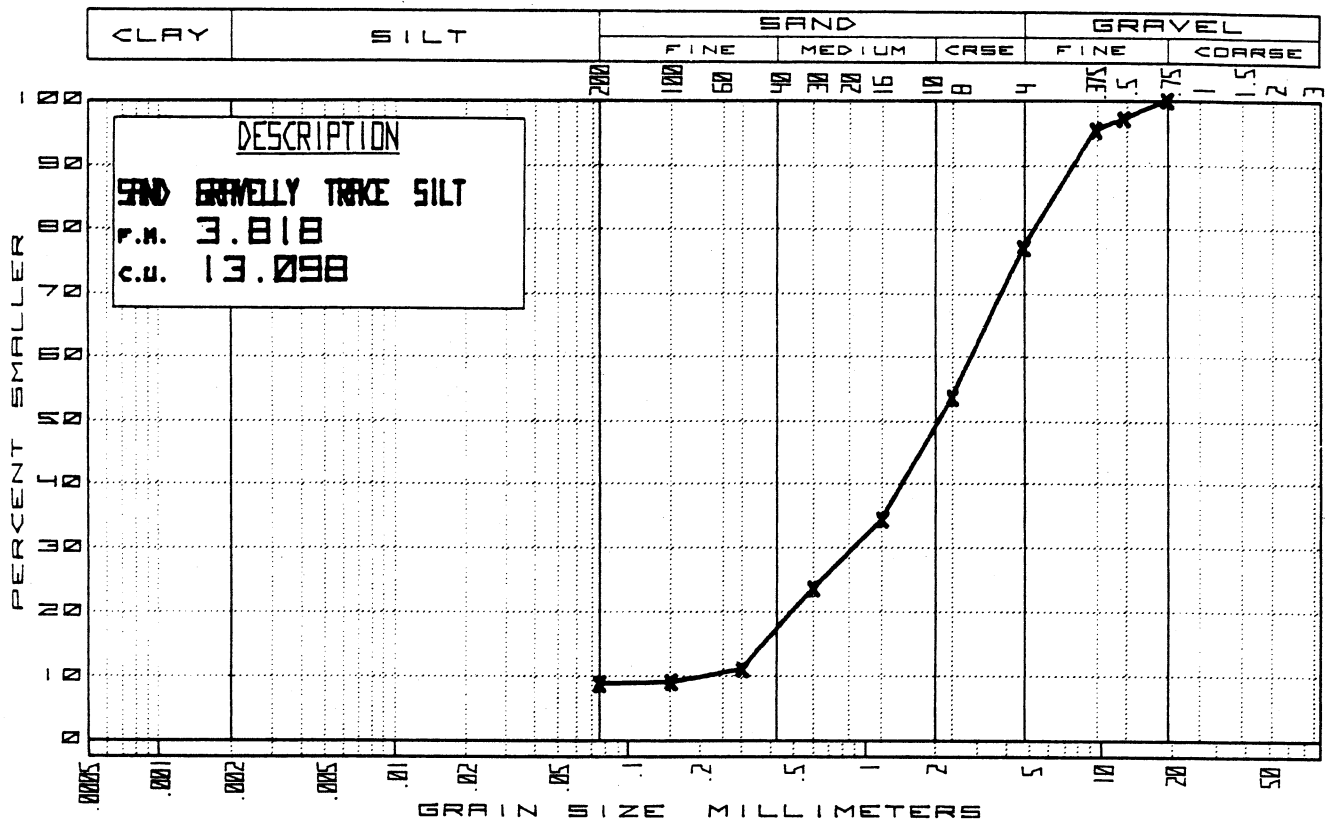


JOB NO. **1-1318** SITE **SWIMMING POINT SOURCE 222**

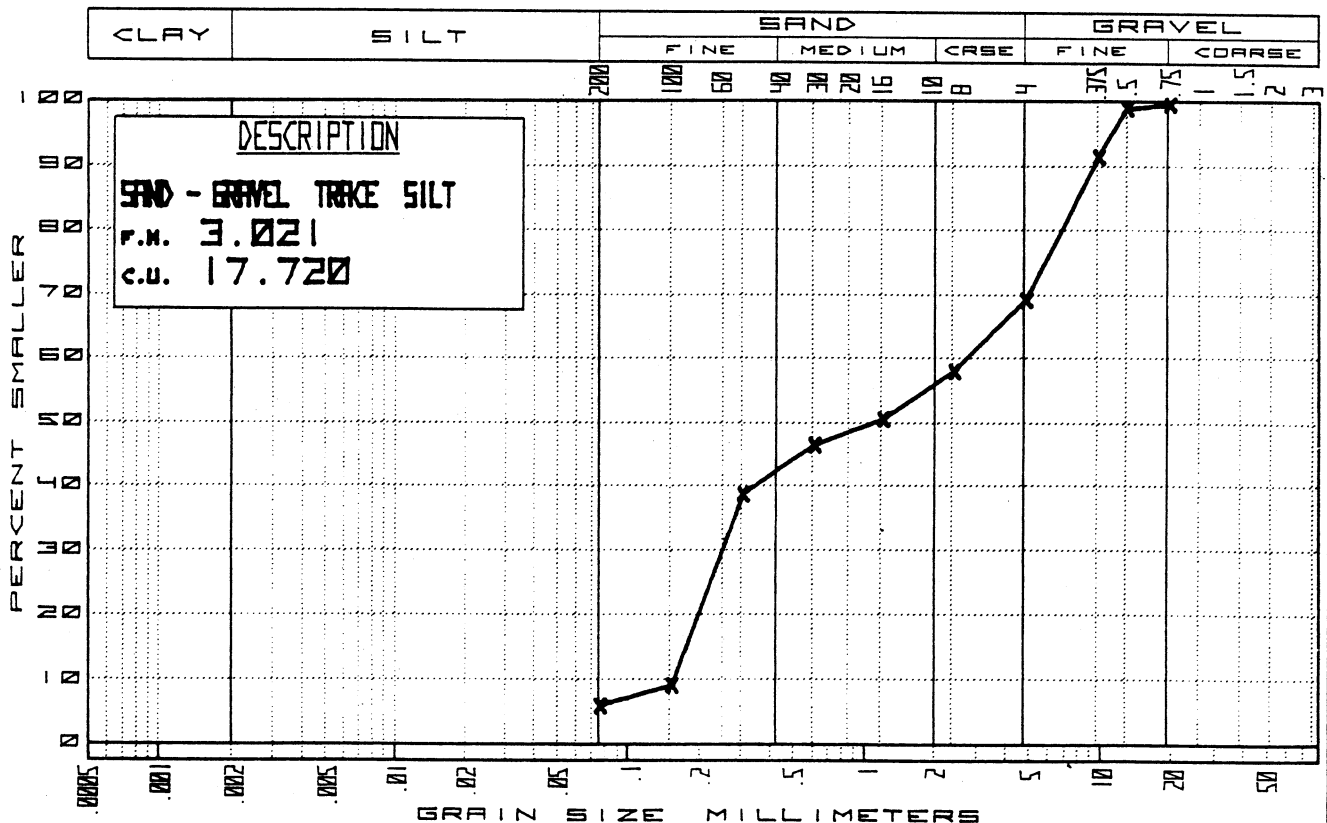
DATE **2-12-76** BASELINE **A** STATION **6+00** OFFSET **1+00E** DEPTH **5.0-7.0**



JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222
 DATE 2-12-76 BASELINE A STATION 6+00 OFFSET 1+00E DEPTH 10.0-14.0



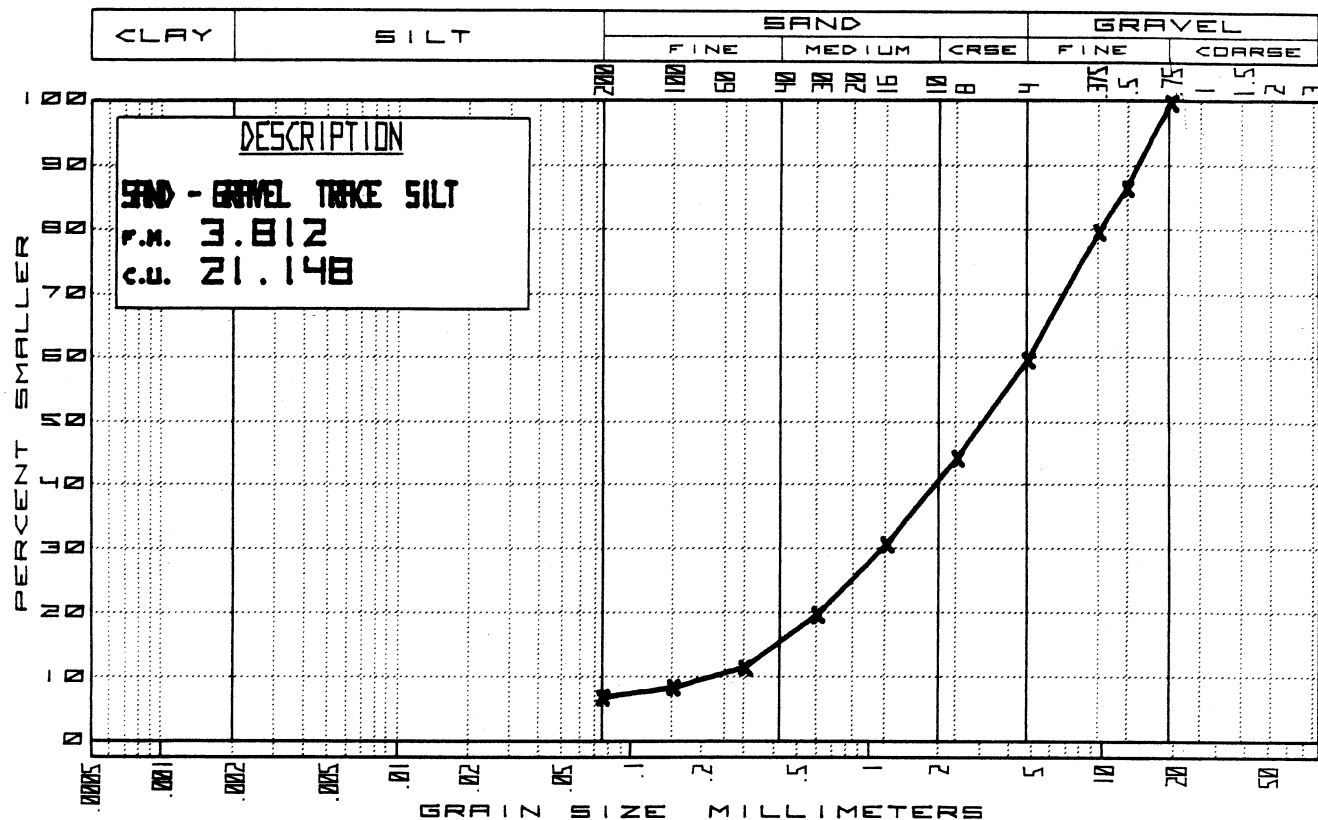
JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222
 DATE 2-13-76 BASELINE A STATION 6+00 OFFSET 6+50E DEPTH 10.0



All tests performed in accordance with ASTM & CSA standards.

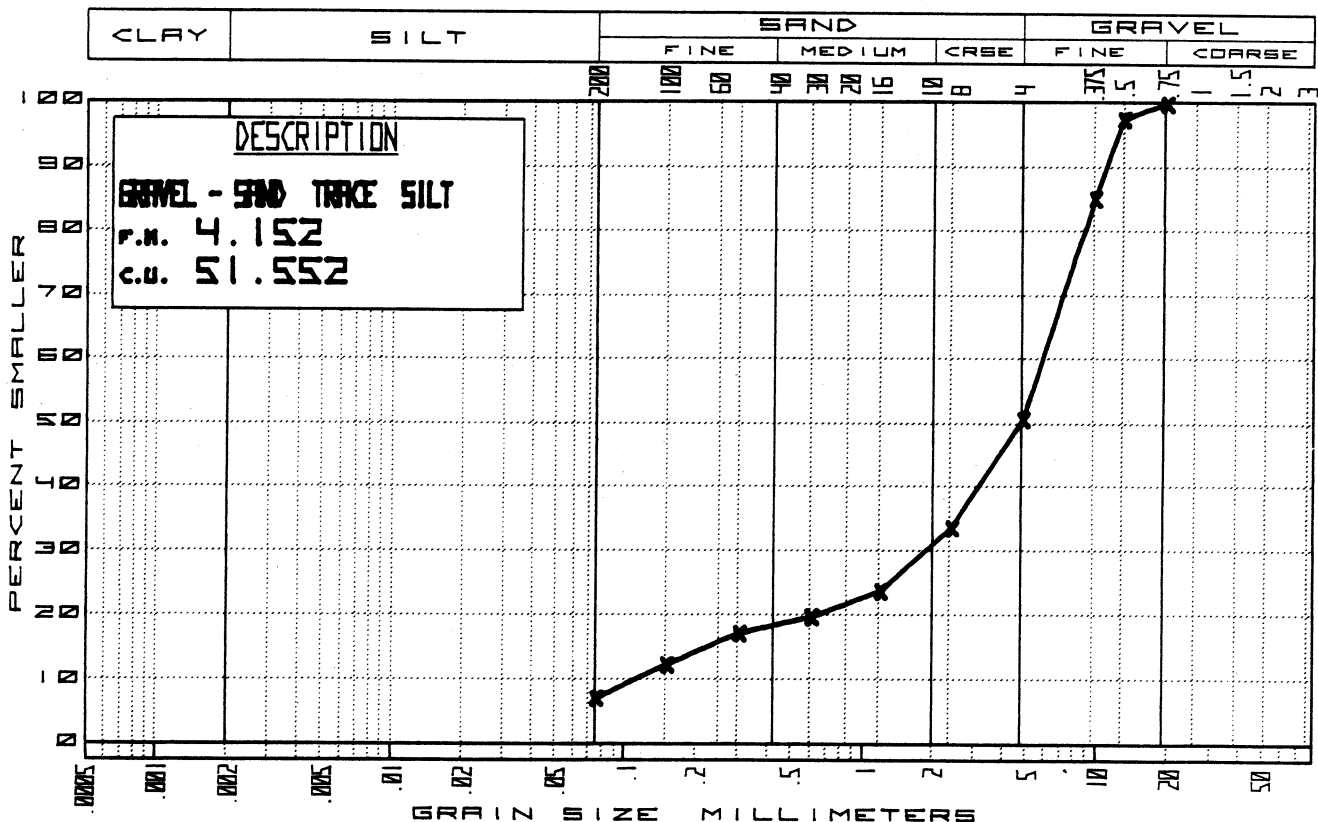
JOB NO. **1-1318** SITE **SWIMMING POINT SOURCE 222**

DATE **2-13-76** BASELINE **A** STATION **7+00** OFFSET **5+50W** DEPTH **5.0**



JOB NO. **1-1318** SITE **SWIMMING POINT SOURCE 222**

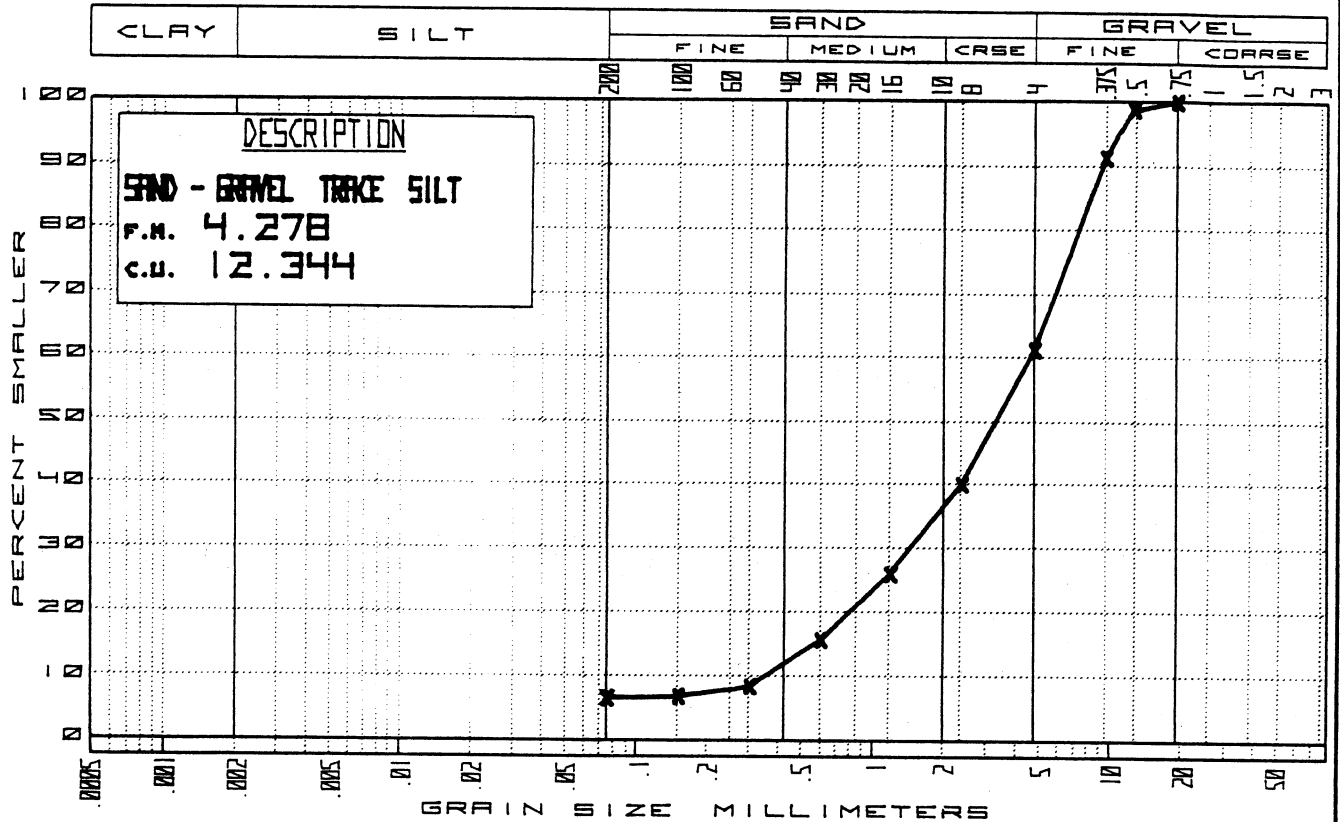
DATE **2-13-76** BASELINE **A** STATION **7+00** OFFSET **5+50W** DEPTH **10.0**



All tests performed in accordance with ASTM & CSA standards.

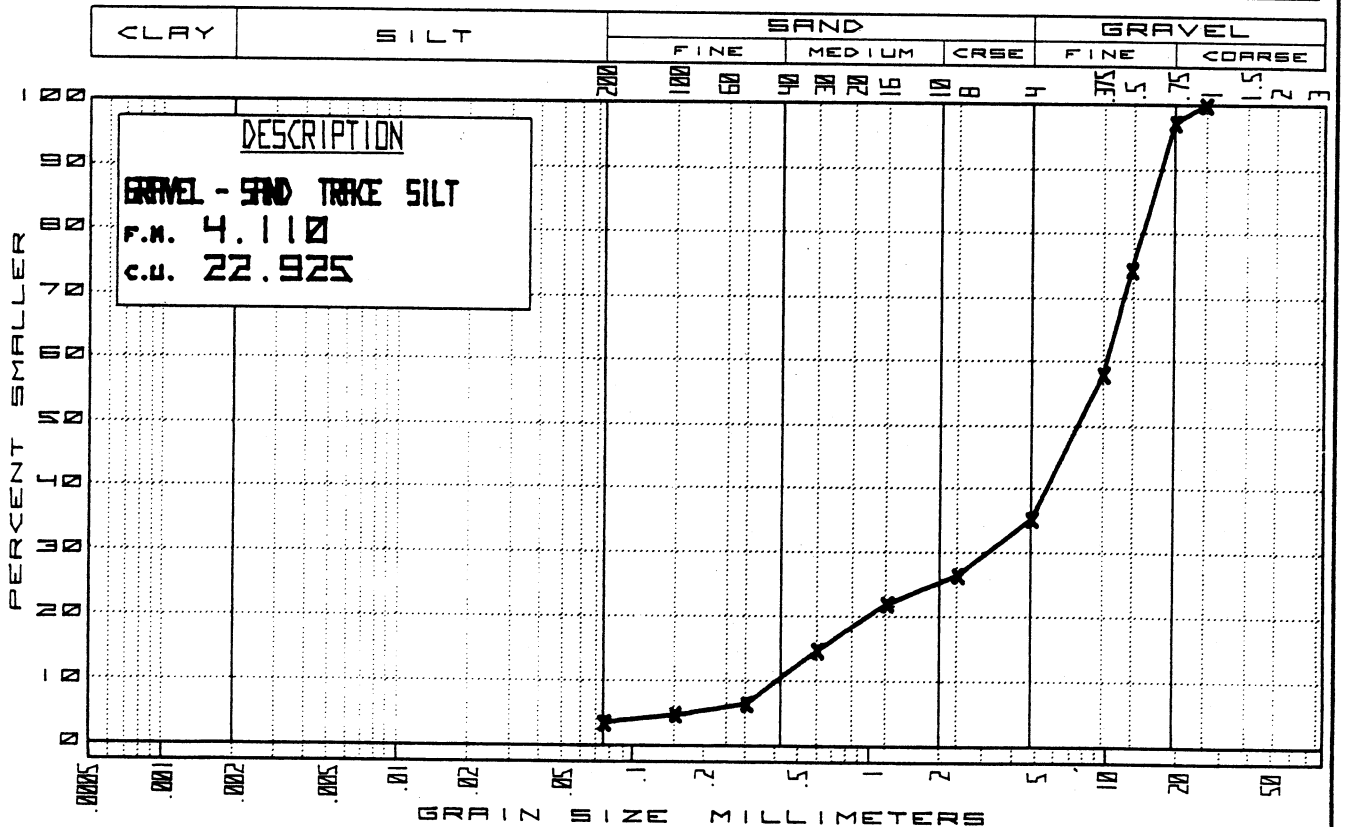
JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

DATE 2-12-76 BASELINE A STATION 8+00 OFFSET 1+00E DEPTH 15.0



JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

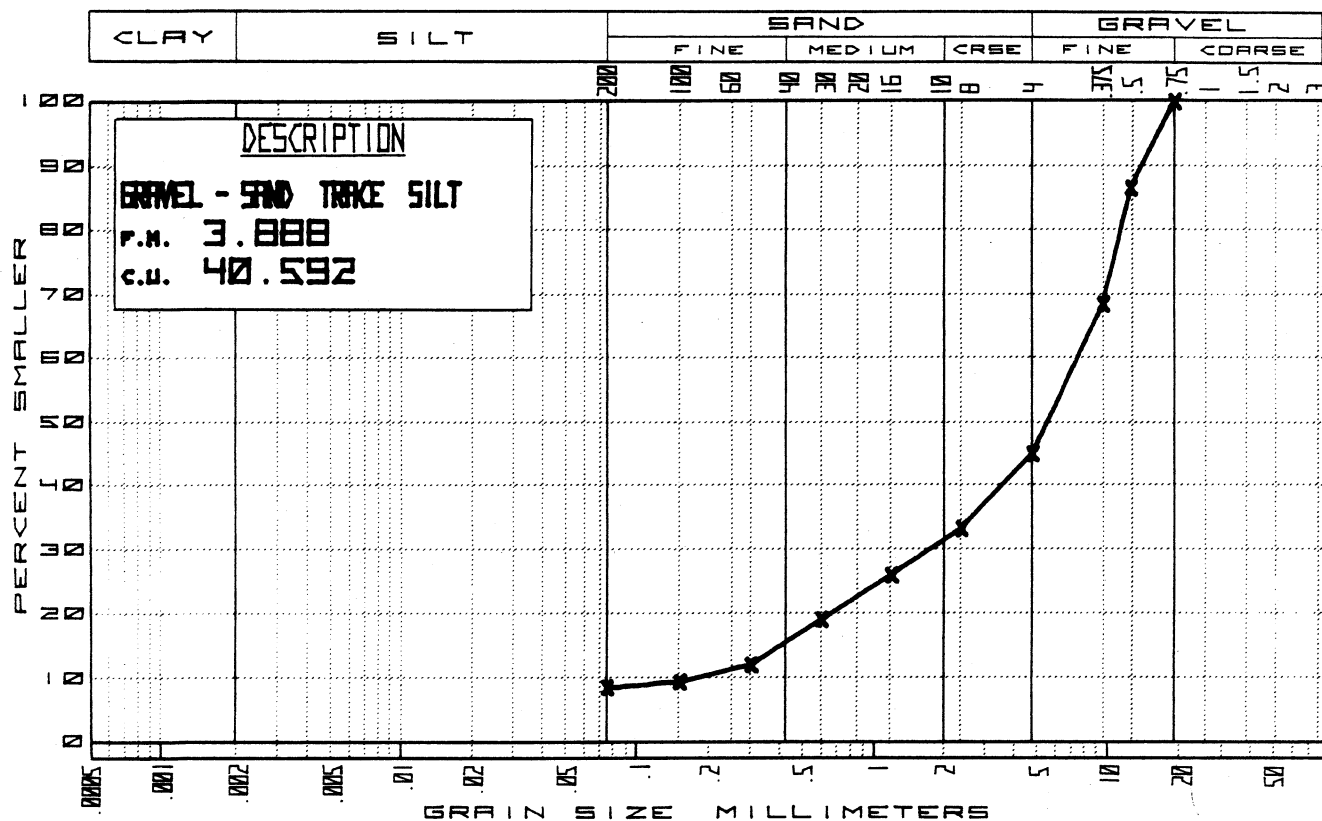
DATE 2-12-76 BASELINE A STATION 8+00 OFFSET 2+00E DEPTH 5.0



All tests performed in accordance with ASTM & CSA standards.

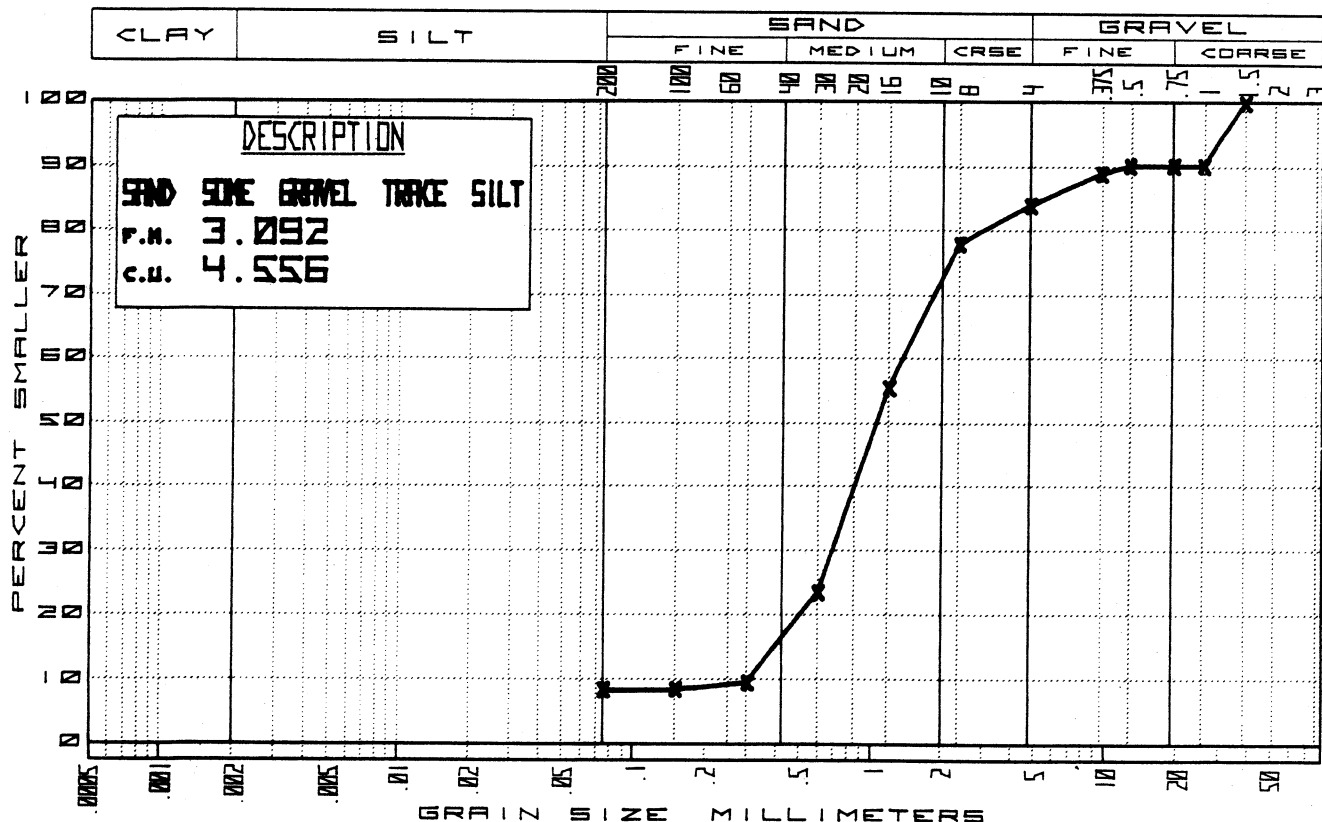
JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

DATE 2-12-76 BASELINE A STATION 8+00 OFFSET 2+00E DEPTH 10.0



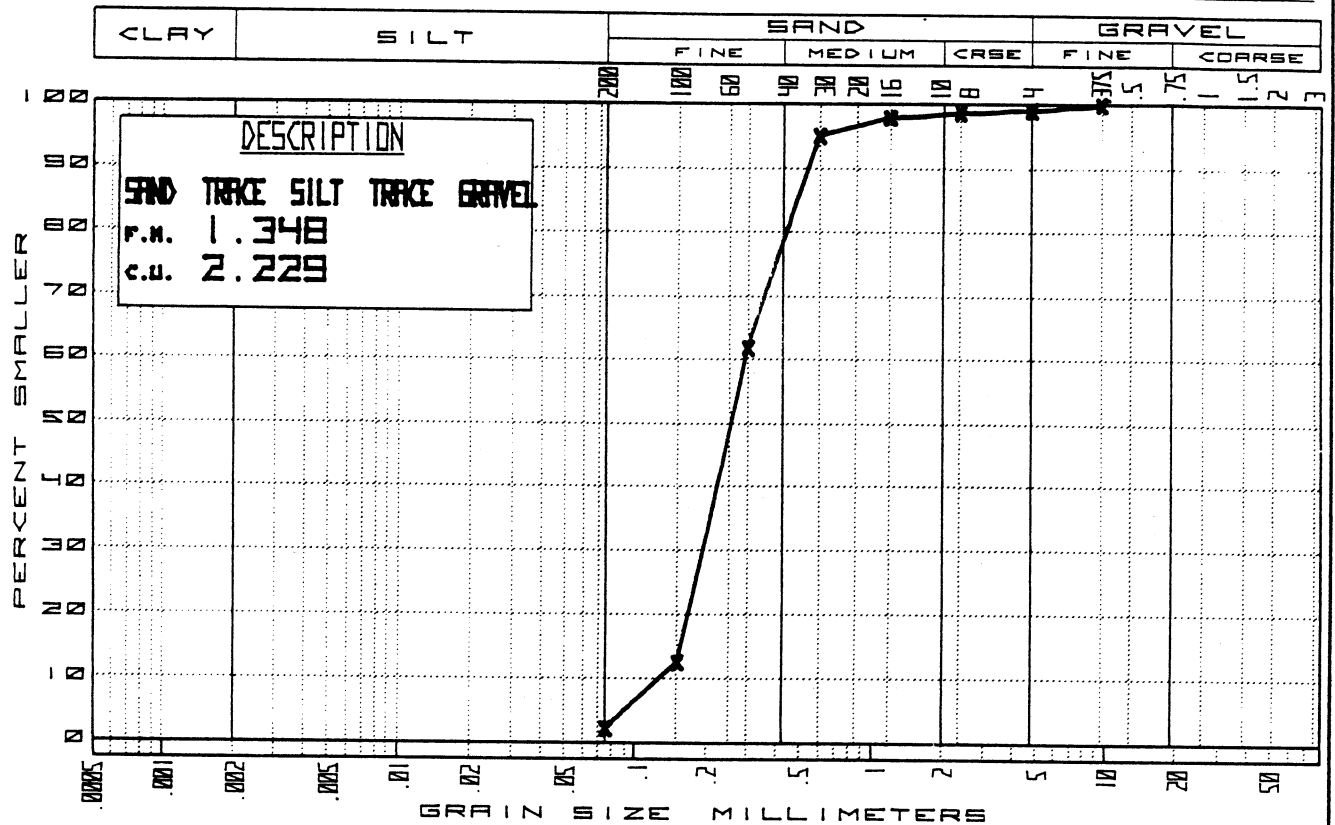
JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

DATE 2-12-76 BASELINE A STATION 8+00 OFFSET 6+50E DEPTH 10.0-11.0



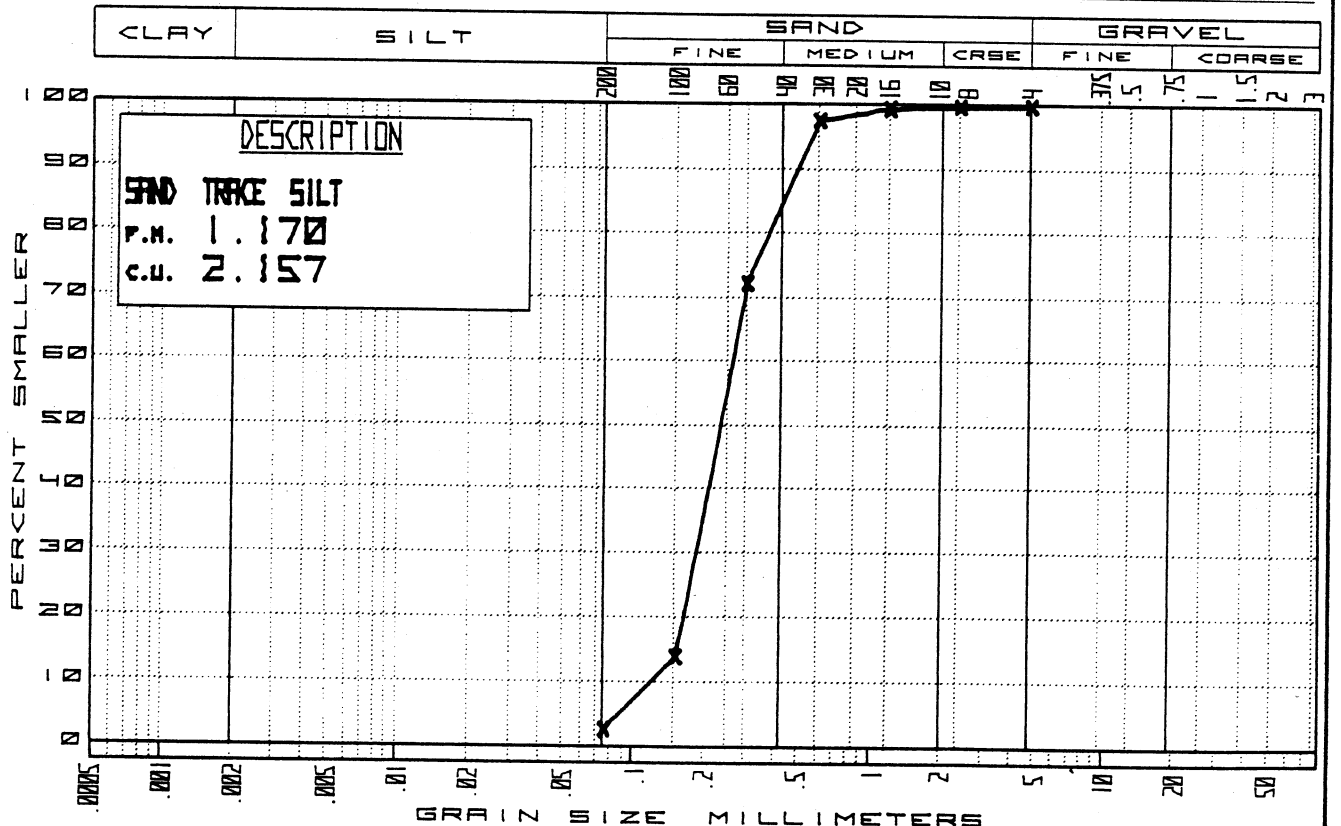
JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

DATE 2-12-76 BASELINE A STATION 8+00 OFFSET 6+50E DEPTH 13.0-14.0



JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

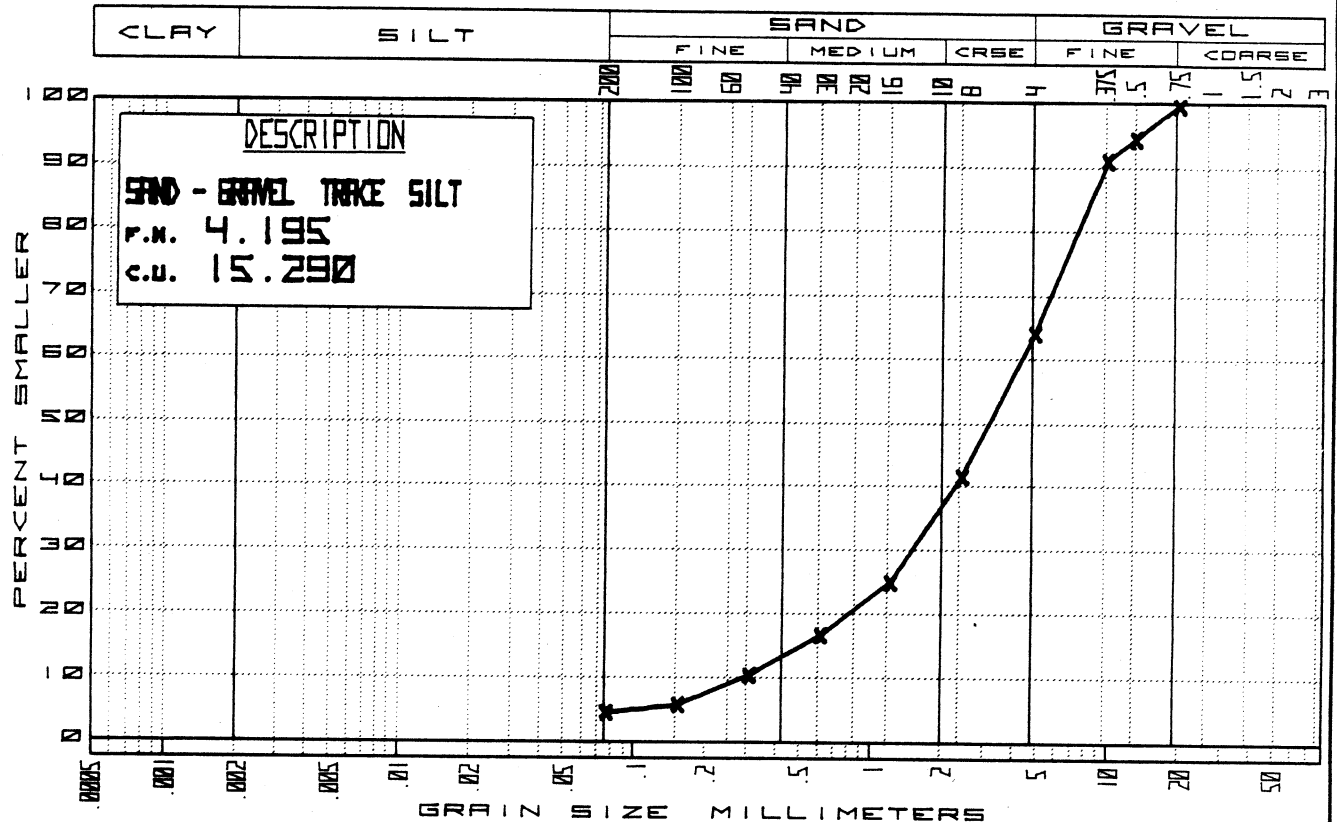
DATE 2-24-76 BASELINE A STATION 8+00 OFFSET 6+50E DEPTH 16.0-18.0



All tests performed in accordance with ASTM & CSA standards.

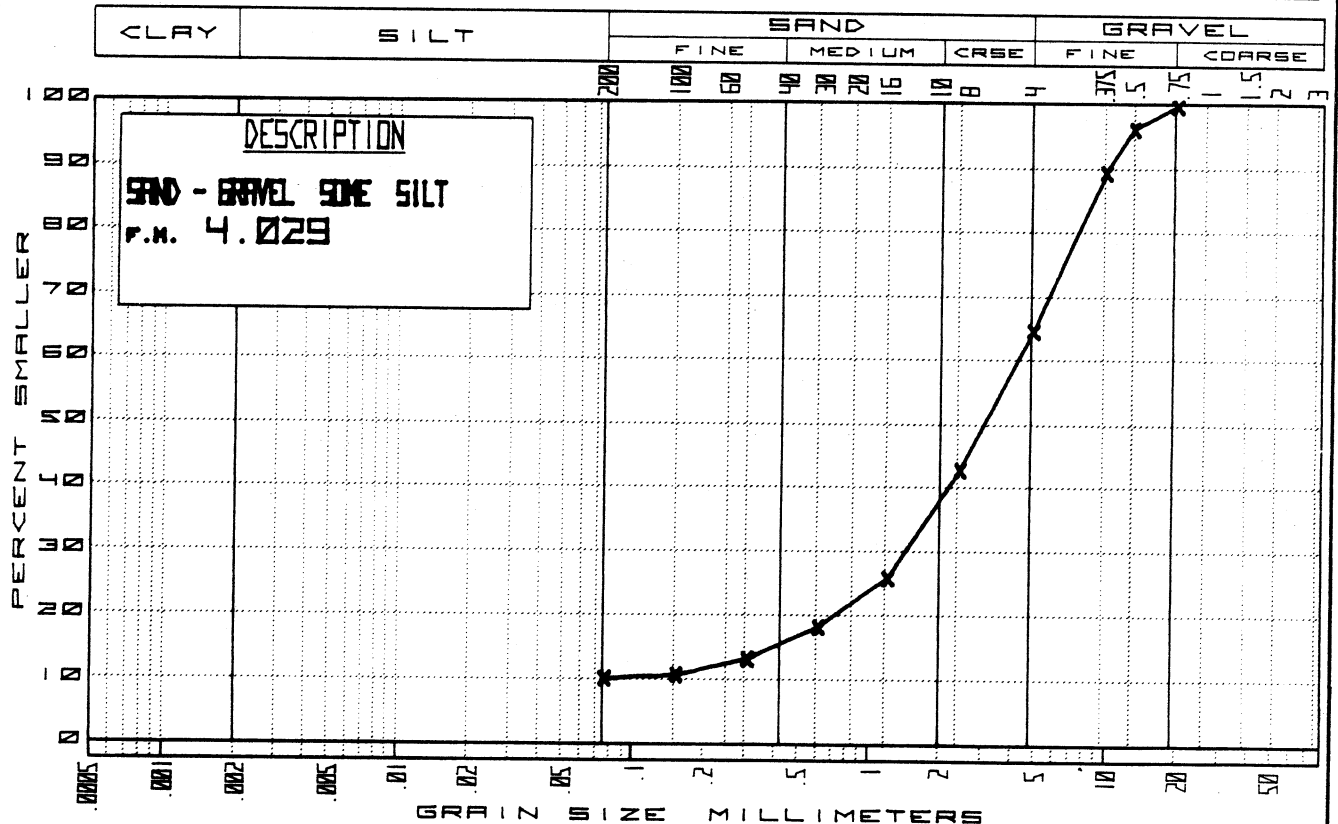
JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

DATE 2-13-76 BASELINE A STATION 10+00 OFFSET 8+20W DEPTH 5.0



JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

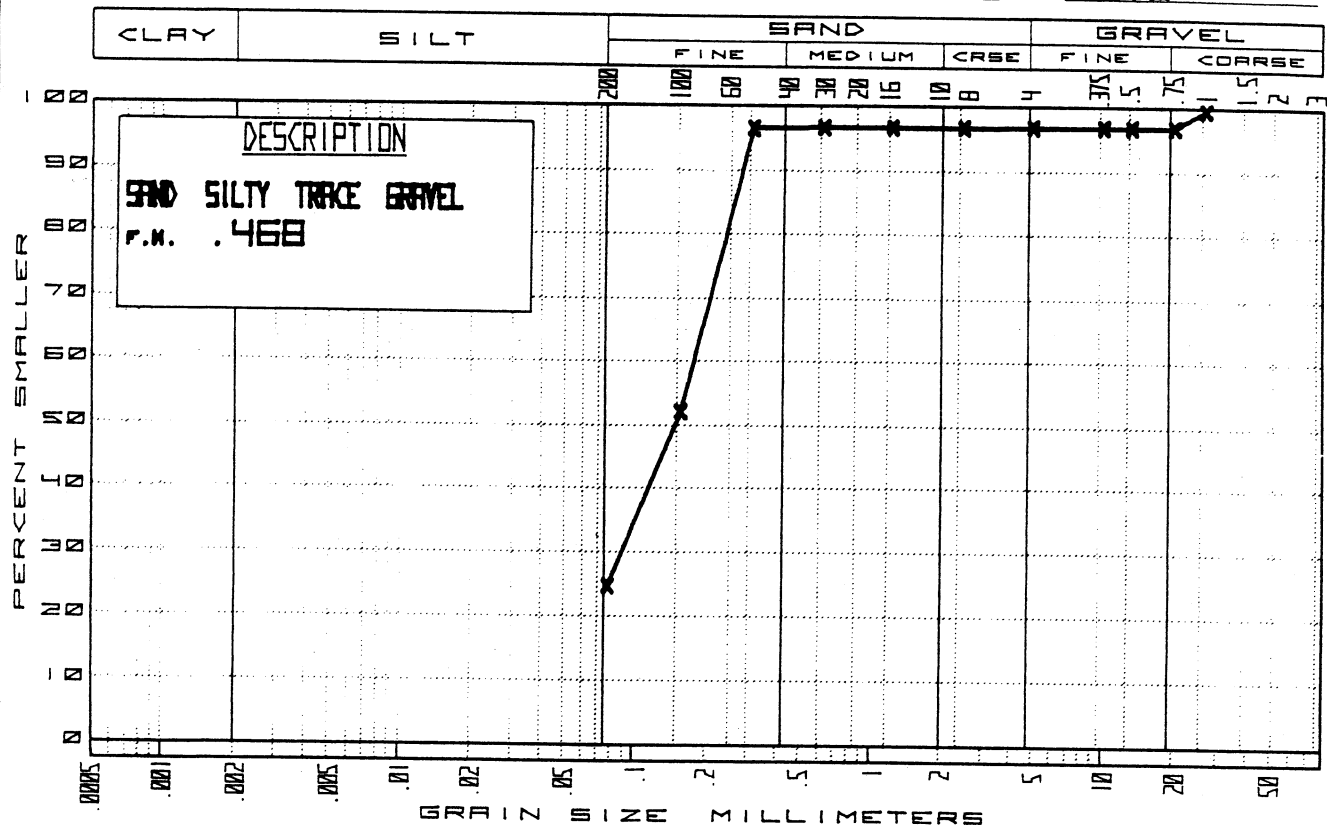
DATE 2-13-76 BASELINE A STATION 10+00 OFFSET 6+50W DEPTH 10.0



All tests performed in accordance with ASTM & CSA standards.

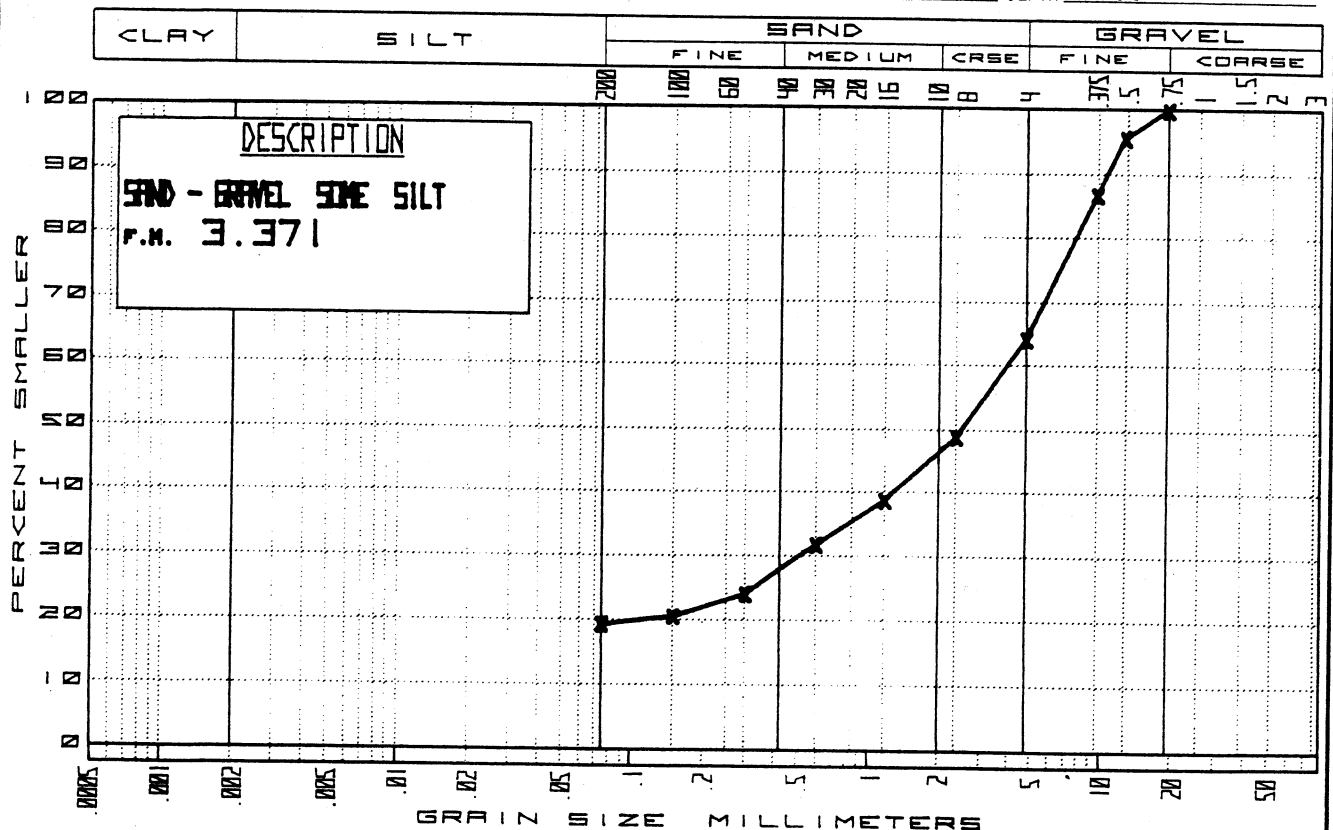
JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

DATE 2-13-76 BASELINE A STATION 10+00 OFFSET 5+50W DEPTH 15.0



JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

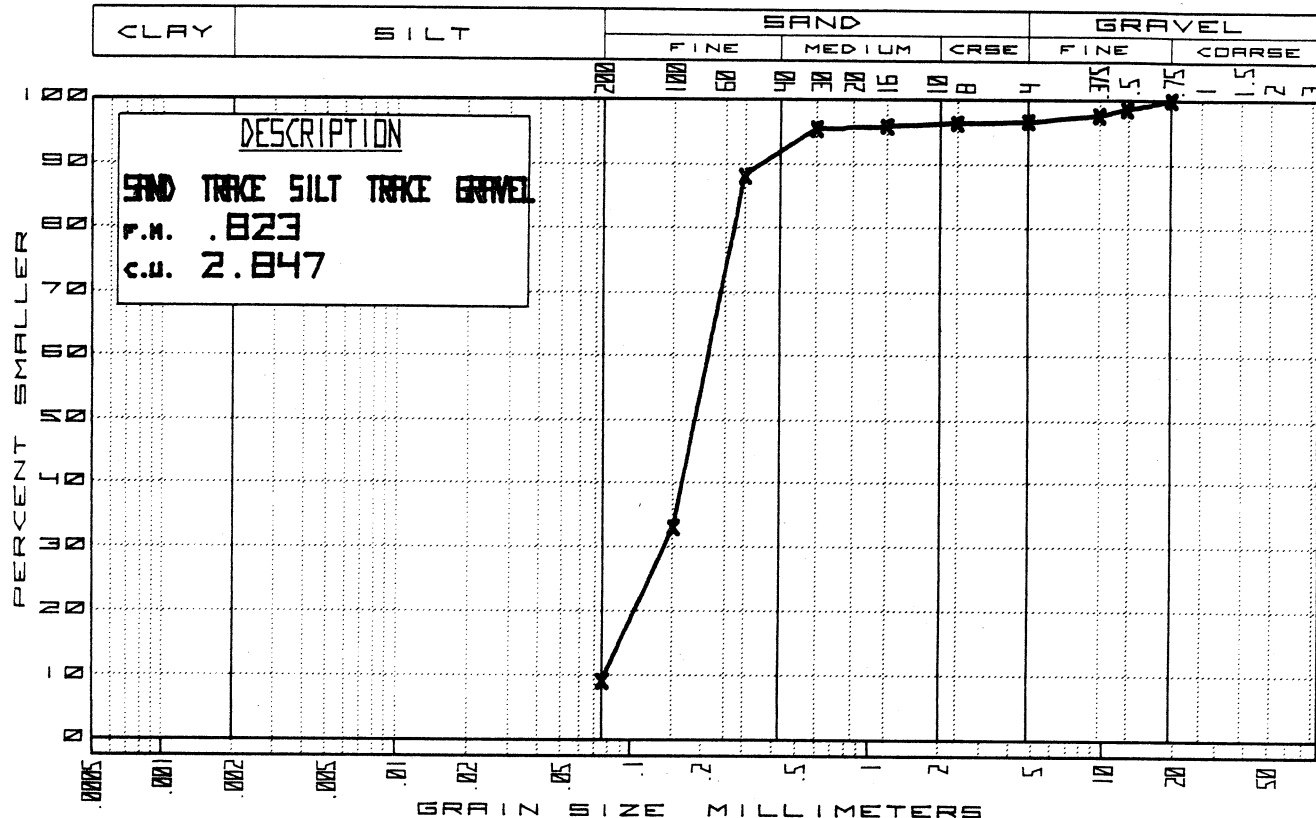
DATE 2-12-76 BASELINE A STATION 10+00 OFFSET 2+00E DEPTH 4.0



All tests performed in accordance with ASTM & CSA standards.

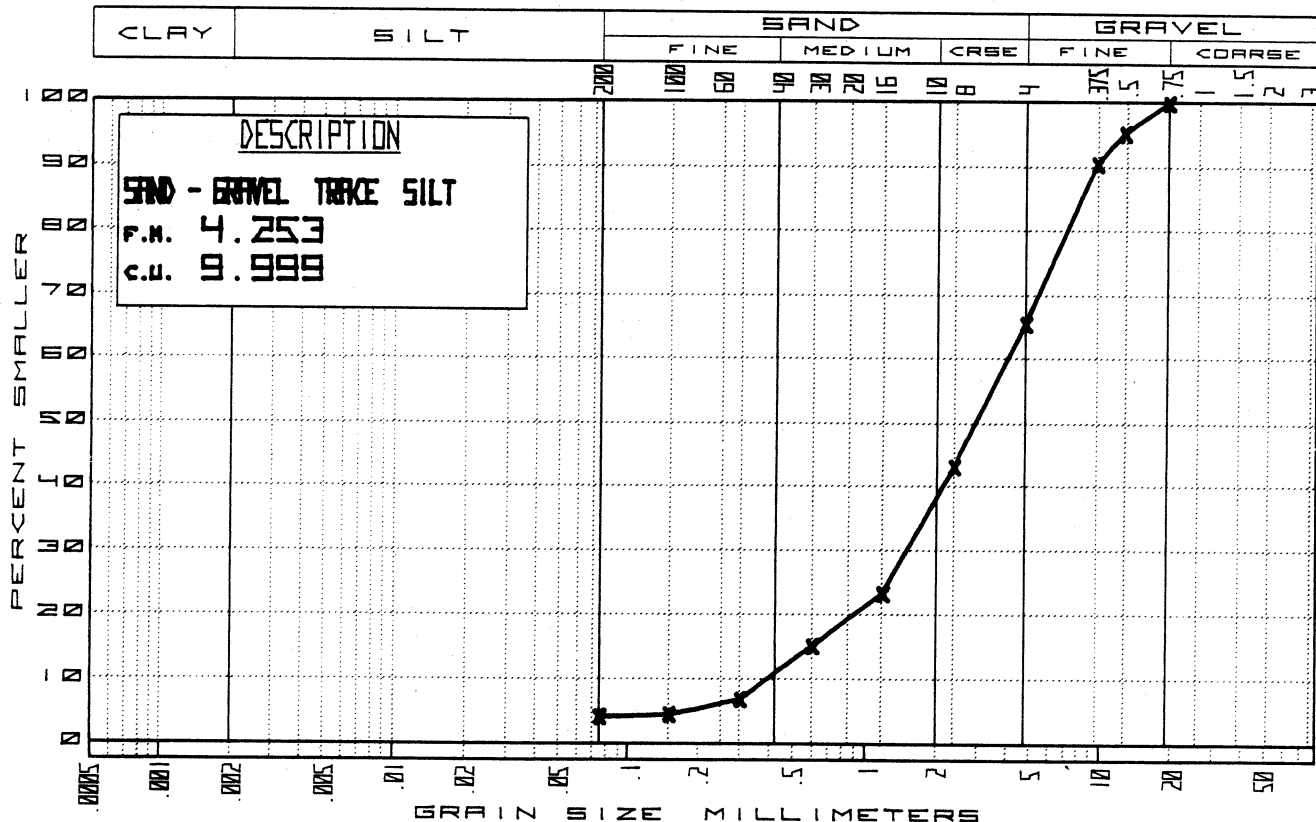
JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

DATE 2-12-76 BASELINE A STATION 10+00 OFFSET 6+50E DEPTH 15.0



JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

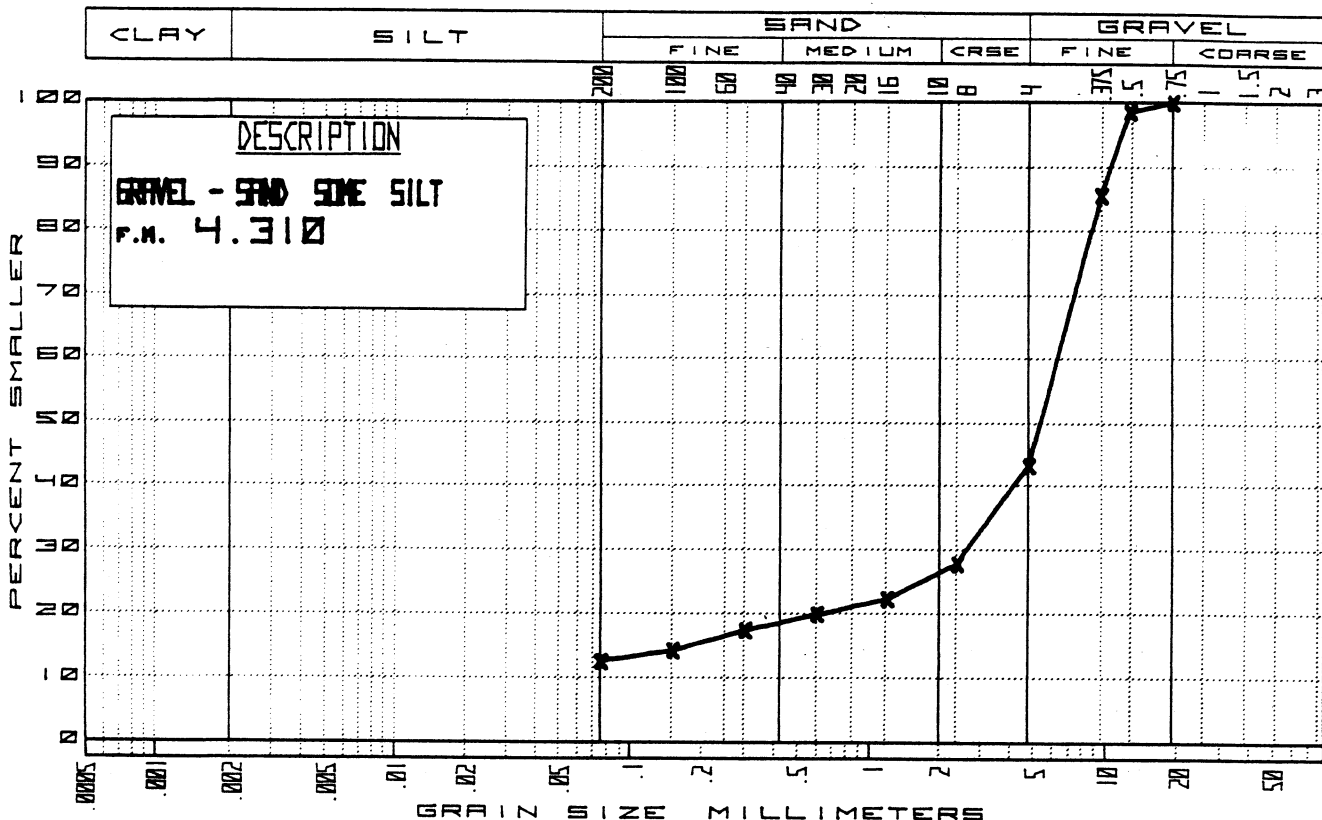
DATE 2-12-76 BASELINE A STATION 10+00 OFFSET 8+50E DEPTH 5.0



All tests performed in accordance with ASTM & CSA standards.

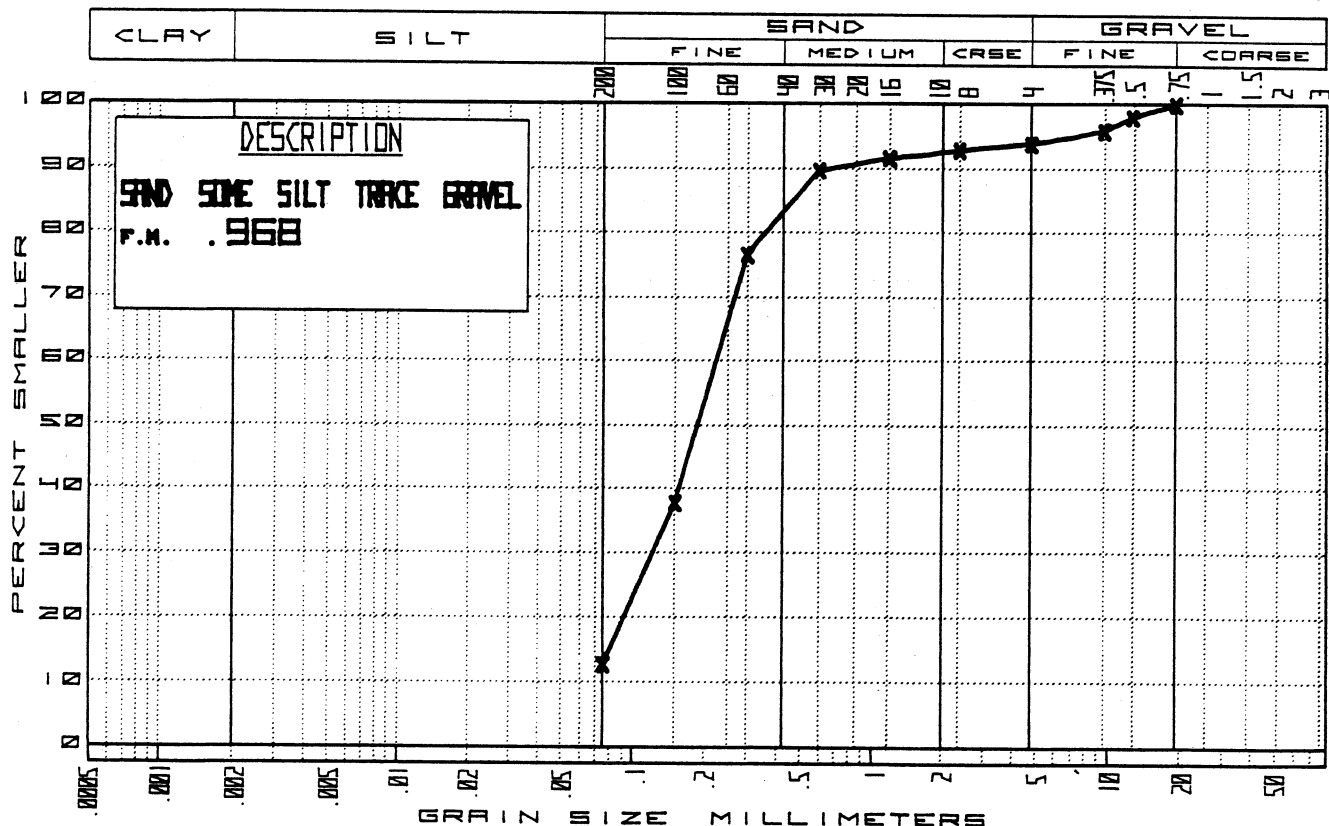
JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

DATE 2-12-76 BASELINE A STATION 10+00 OFFSET B+50E DEPTH 25.0

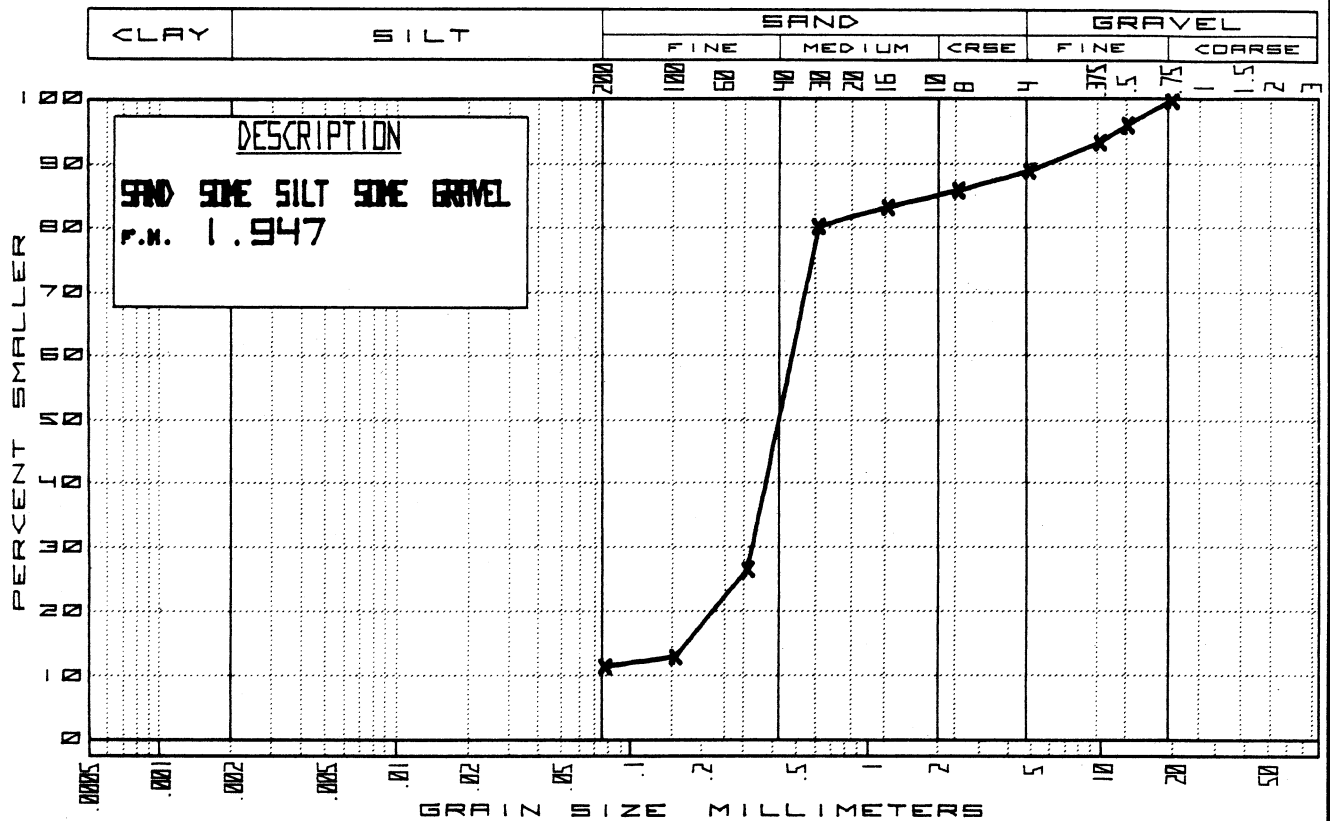


JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

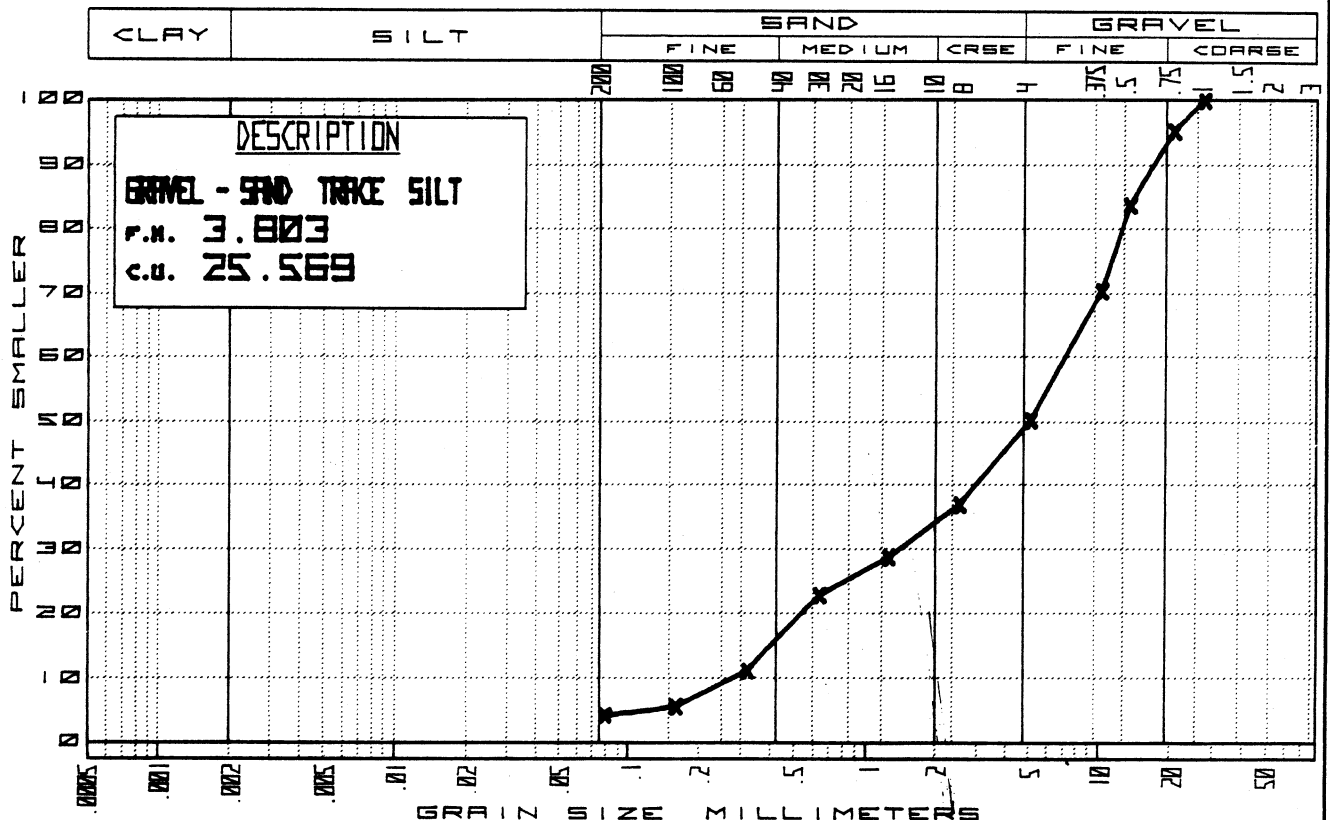
DATE 2-12-76 BASELINE A STATION 12+00 OFFSET B+50E DEPTH 15.0



JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222
 DATE 2-13-76 BASELINE A STATION 14+00 OFFSET 9+50W DEPTH 10.0-11.0

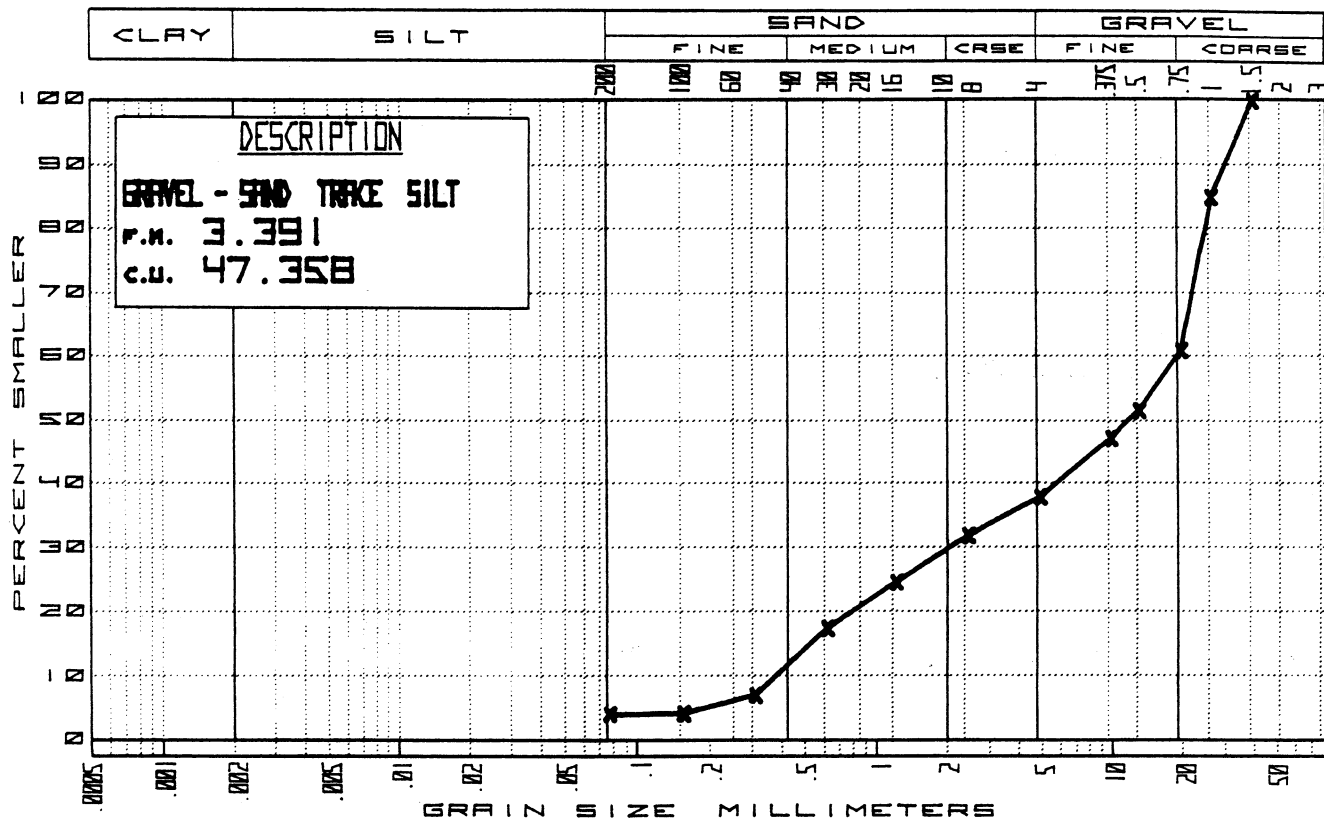


JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222
 DATE 2-13-76 BASELINE A STATION 14+00 OFFSET 7+50W DEPTH 15.0



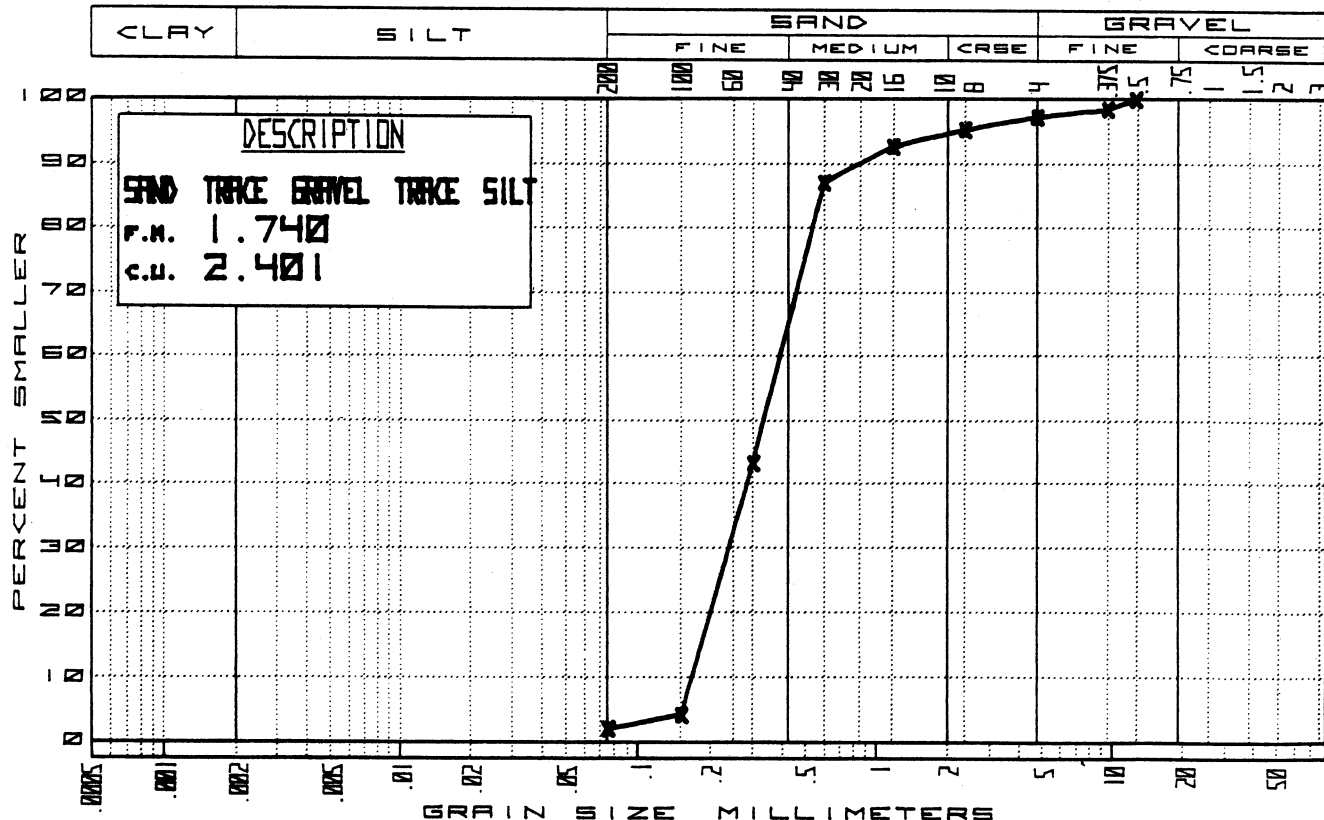
JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

DATE 2-13-76 BASELINE A STATION 14+00 OFFSET 7+50E DEPTH 8.0-12.0



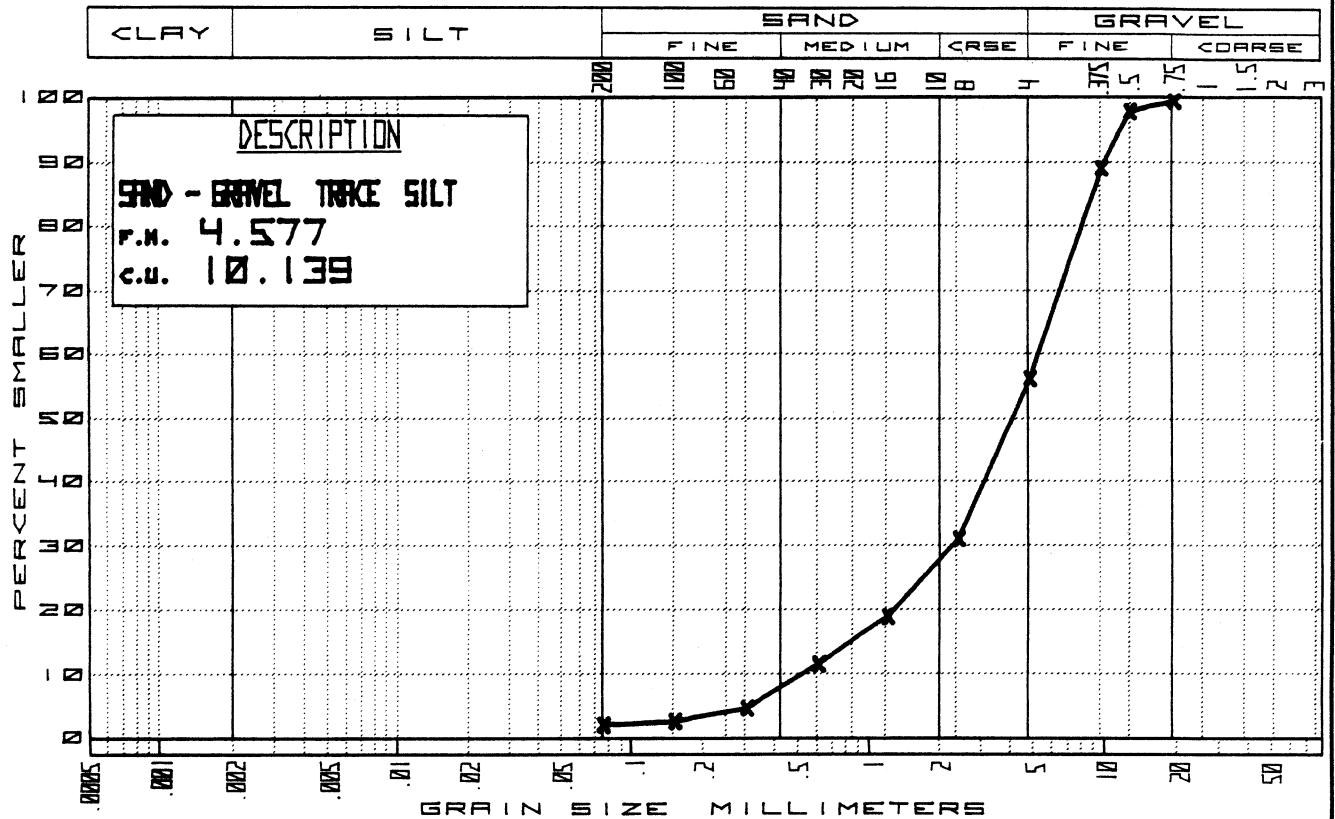
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DATE 2-12-76 BASELINE A STATION 14+00 OFFSET 7+50E DEPTH 14.0-15.0



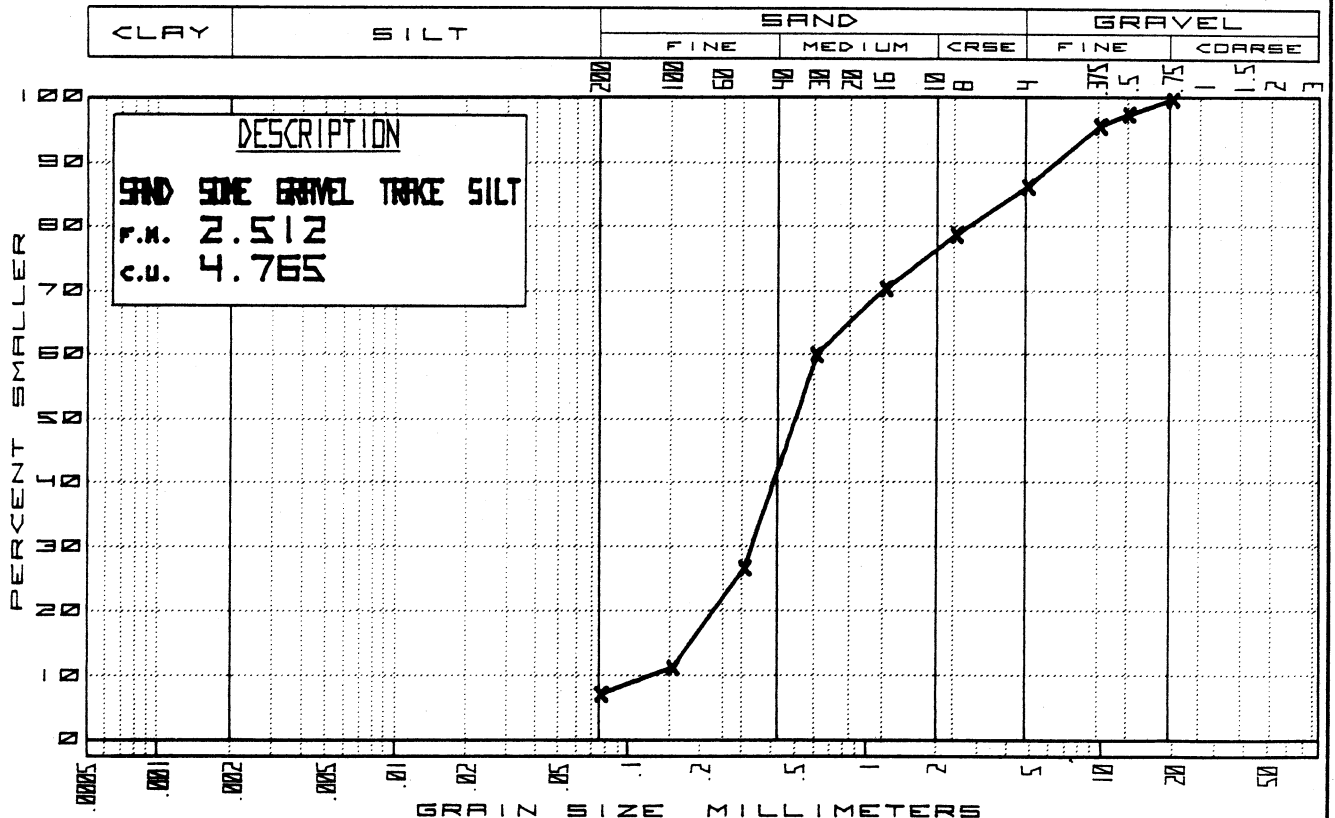
JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

DATE 2-13-76 BASELINE A STATION 14+00 OFFSET 9+50E DEPTH 10.0



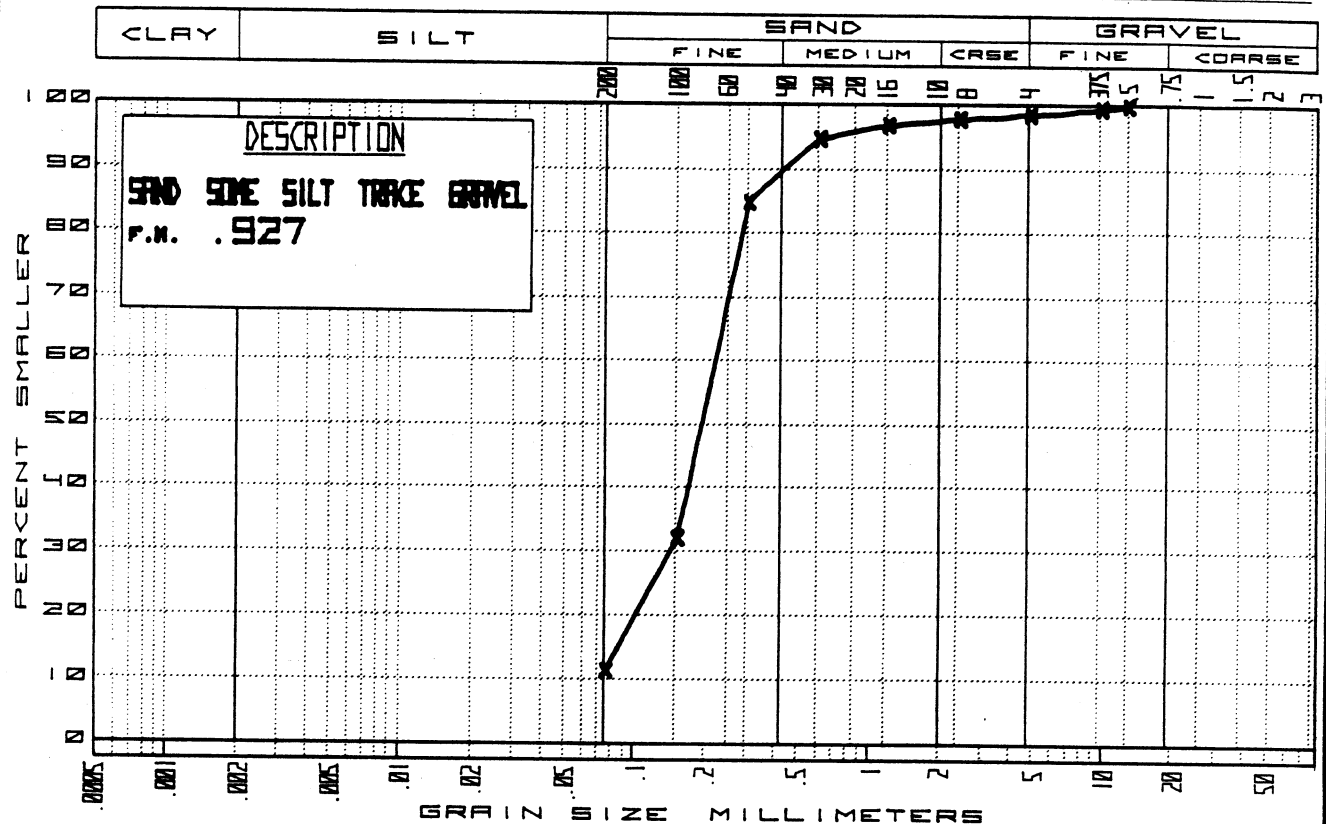
JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

DATE 2-13-76 BASELINE A STATION 16+00 OFFSET 8+50W DEPTH 5.0



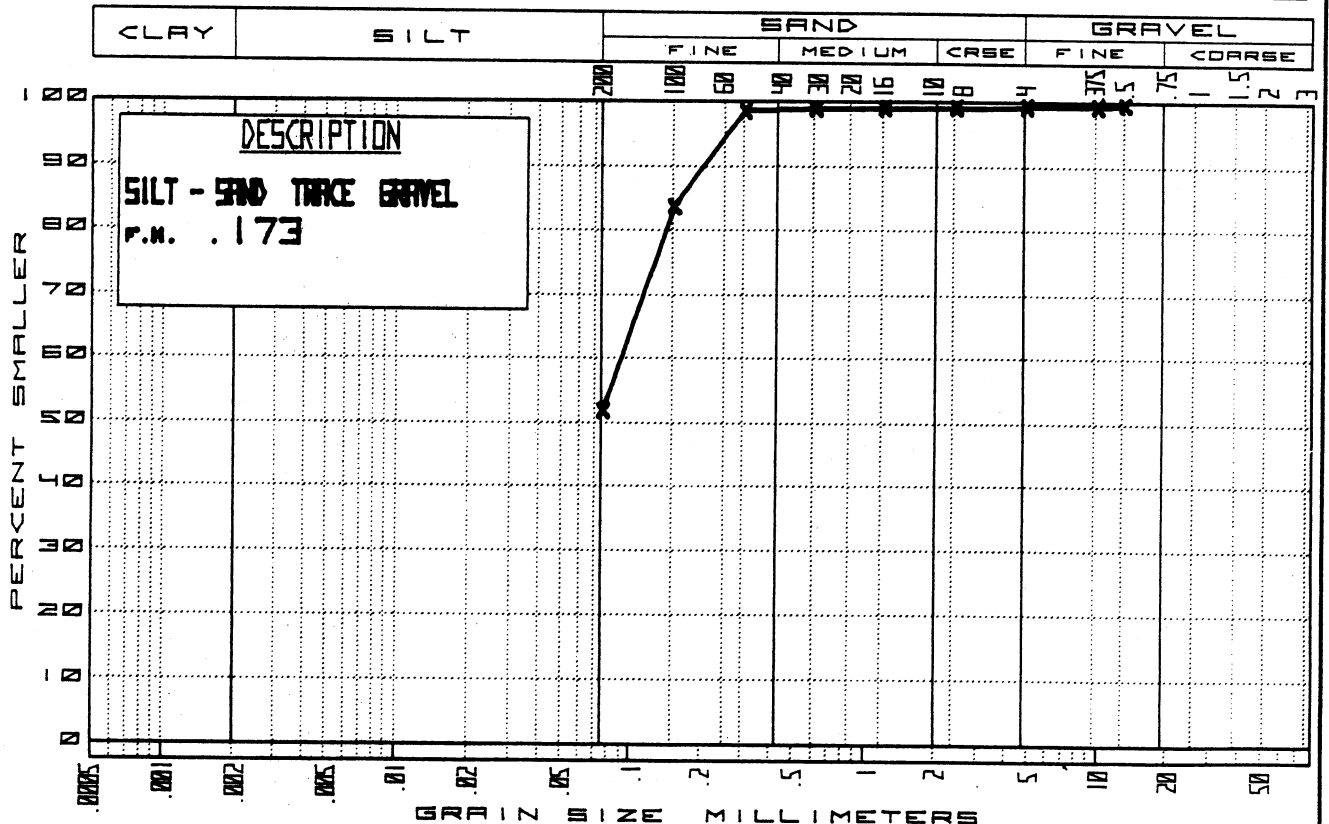
JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

DATE 2-13-76 BASELINE A STATION 16+00 OFFSET 8+50E DEPTH 10.0



JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

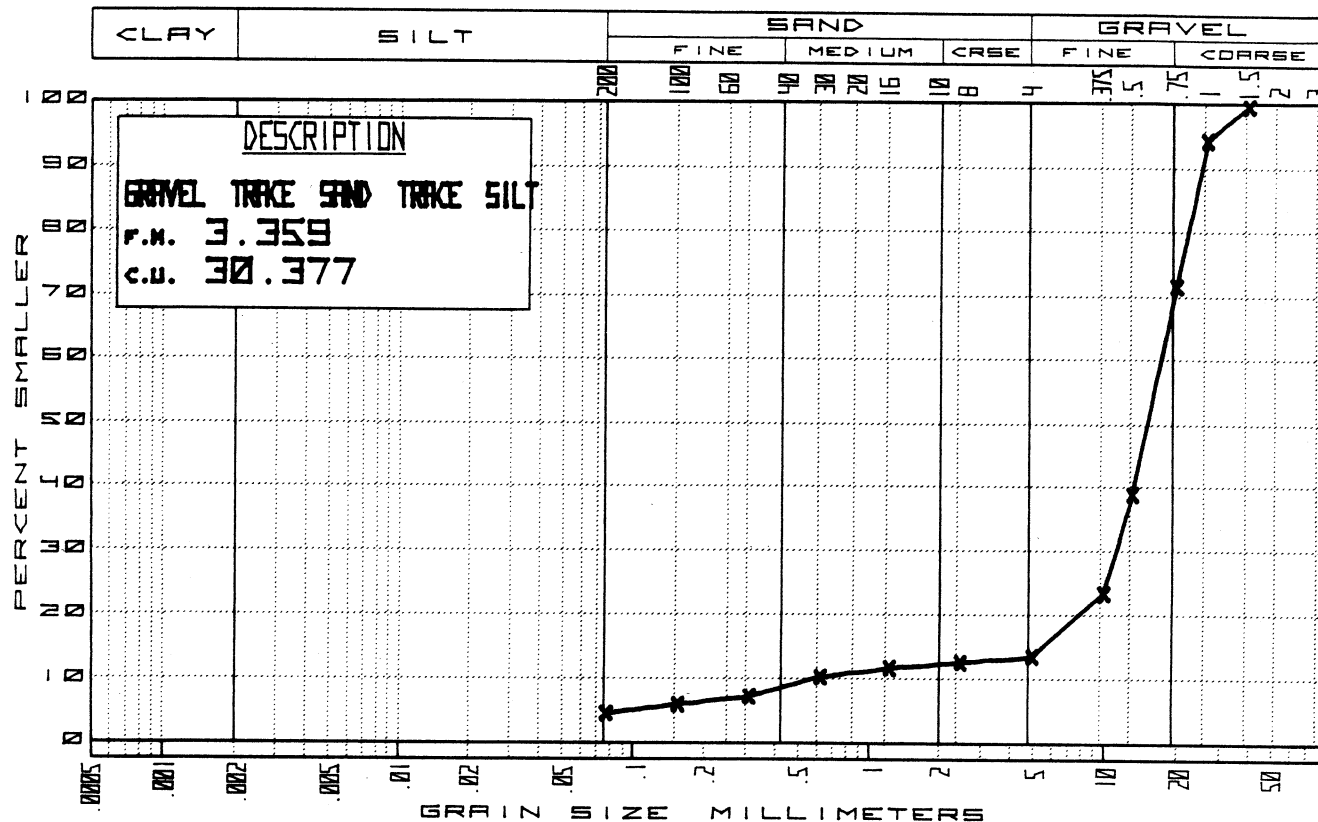
DATE 2-13-76 BASELINE A STATION 18+00 OFFSET 8+50W DEPTH 10.0



All tests performed in accordance with ASTM & CSA standards.

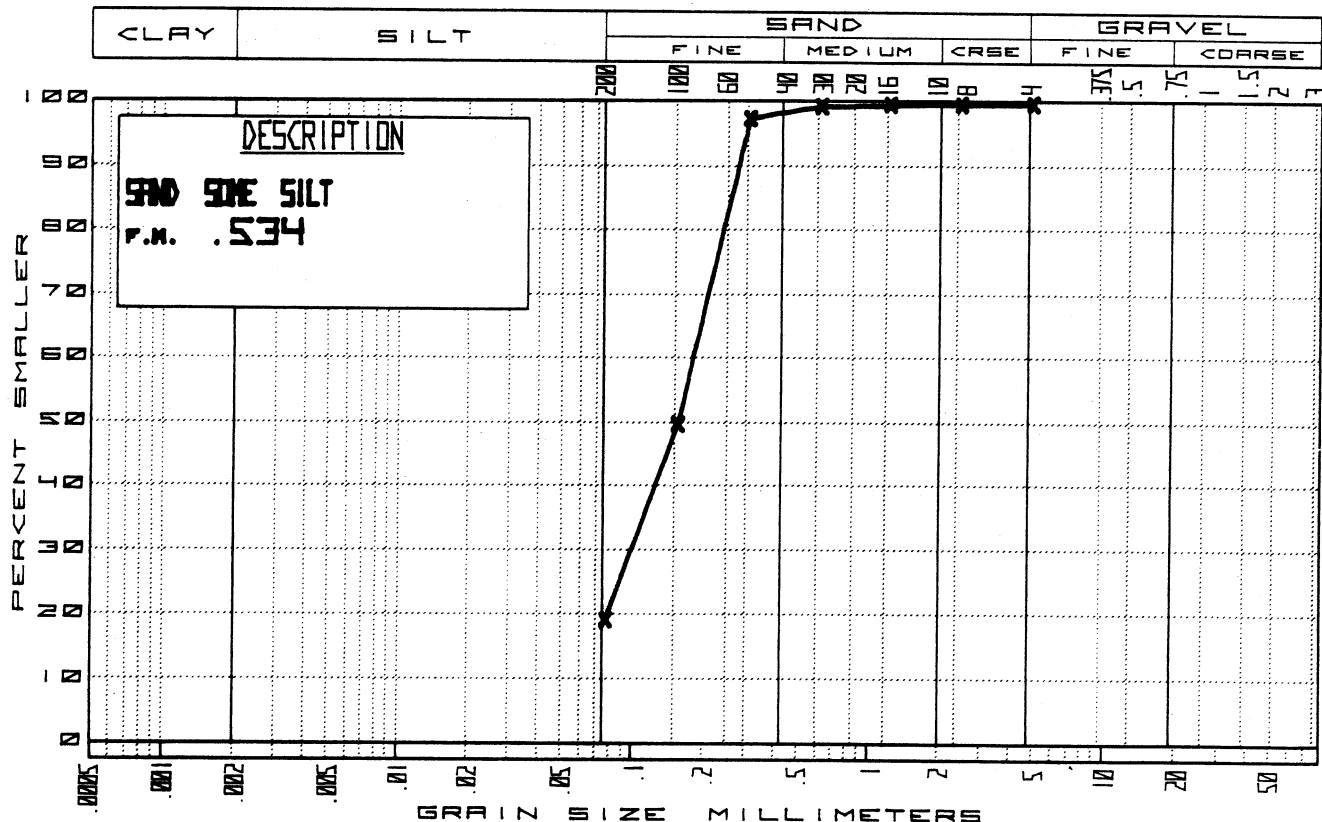
JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

DATE 2-13-76 BASELINE A STATION 18+00 OFFSET 8+50E DEPTH 6.0-7.0



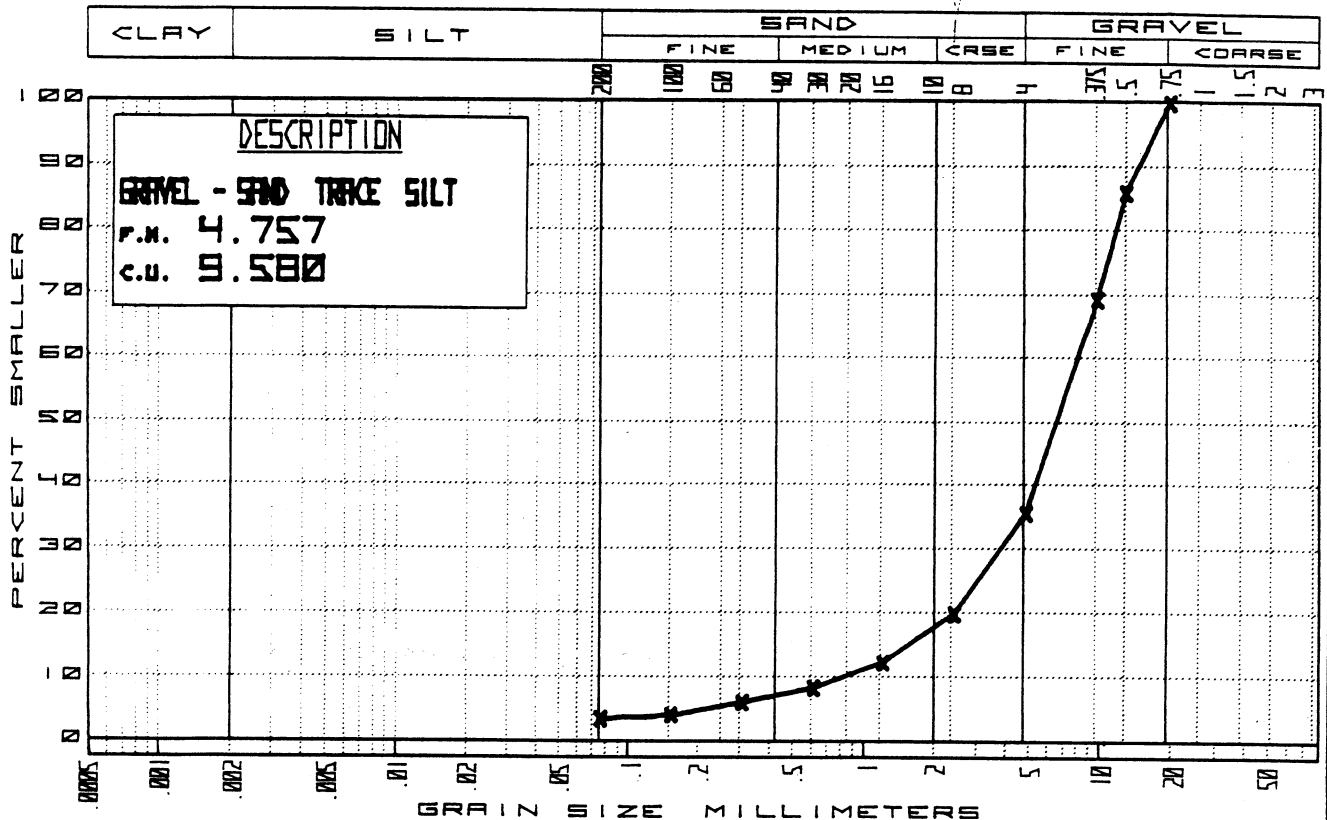
JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

DATE 2-13-76 BASELINE A STATION 18+00 OFFSET 10+50E DEPTH 20.0



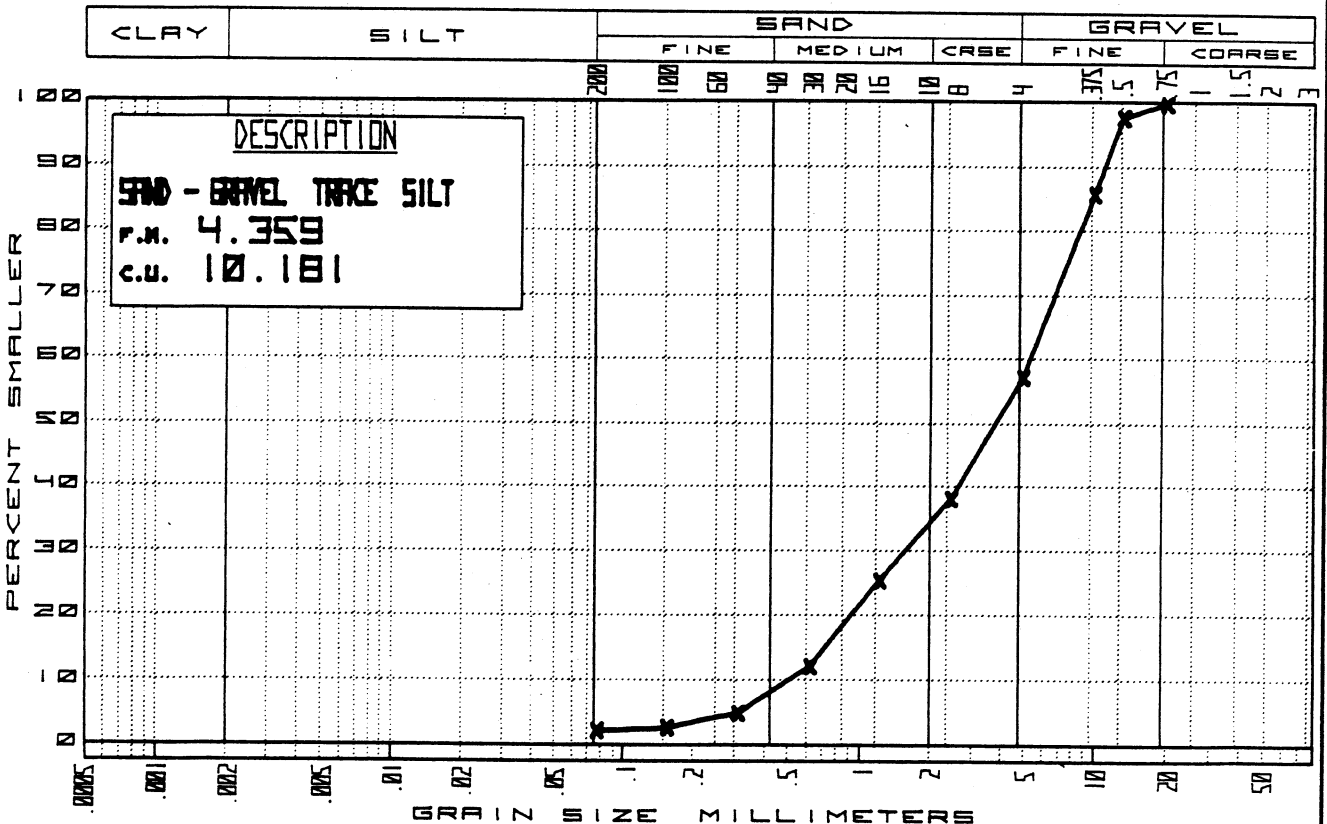
JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

DATE 2-13-76 BASELINE A STATION 22+00 OFFSET 5+00W DEPTH 10.0

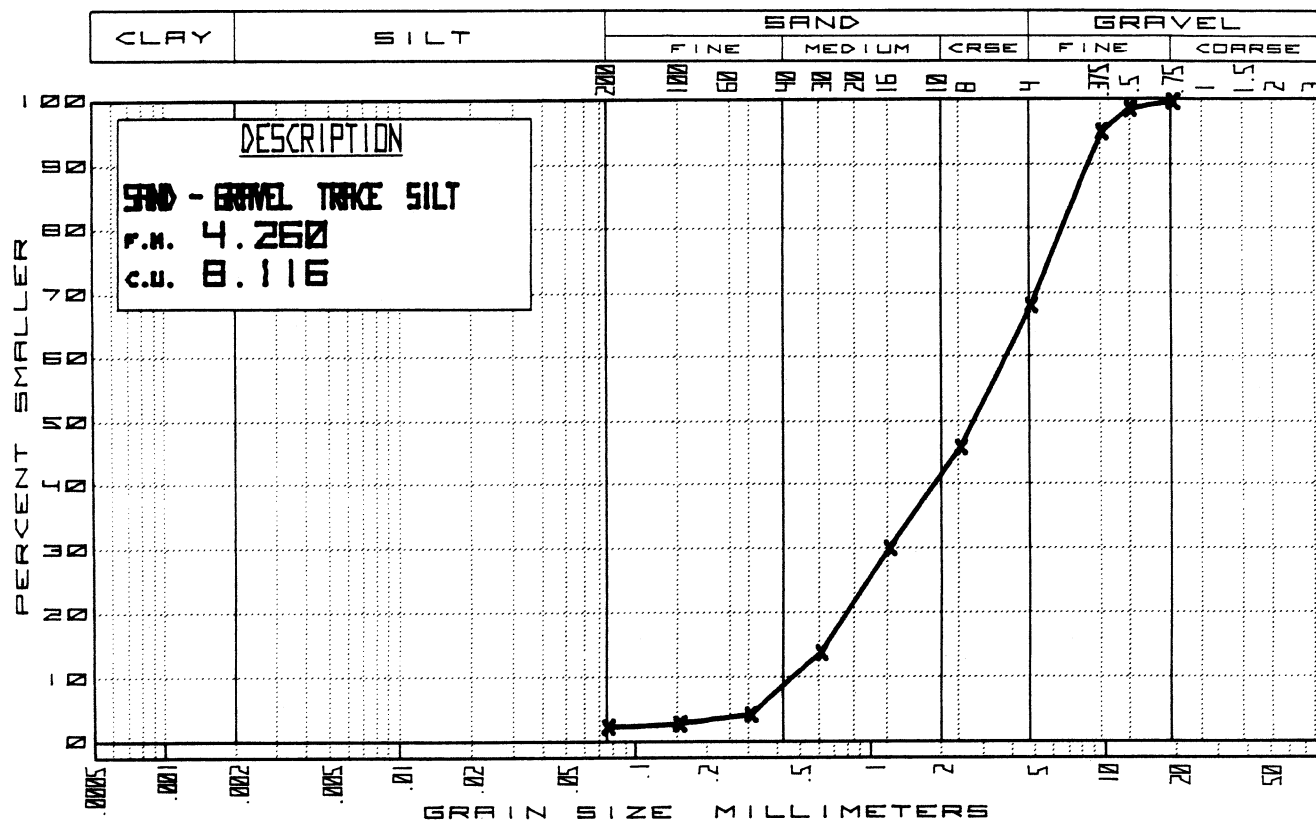


JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

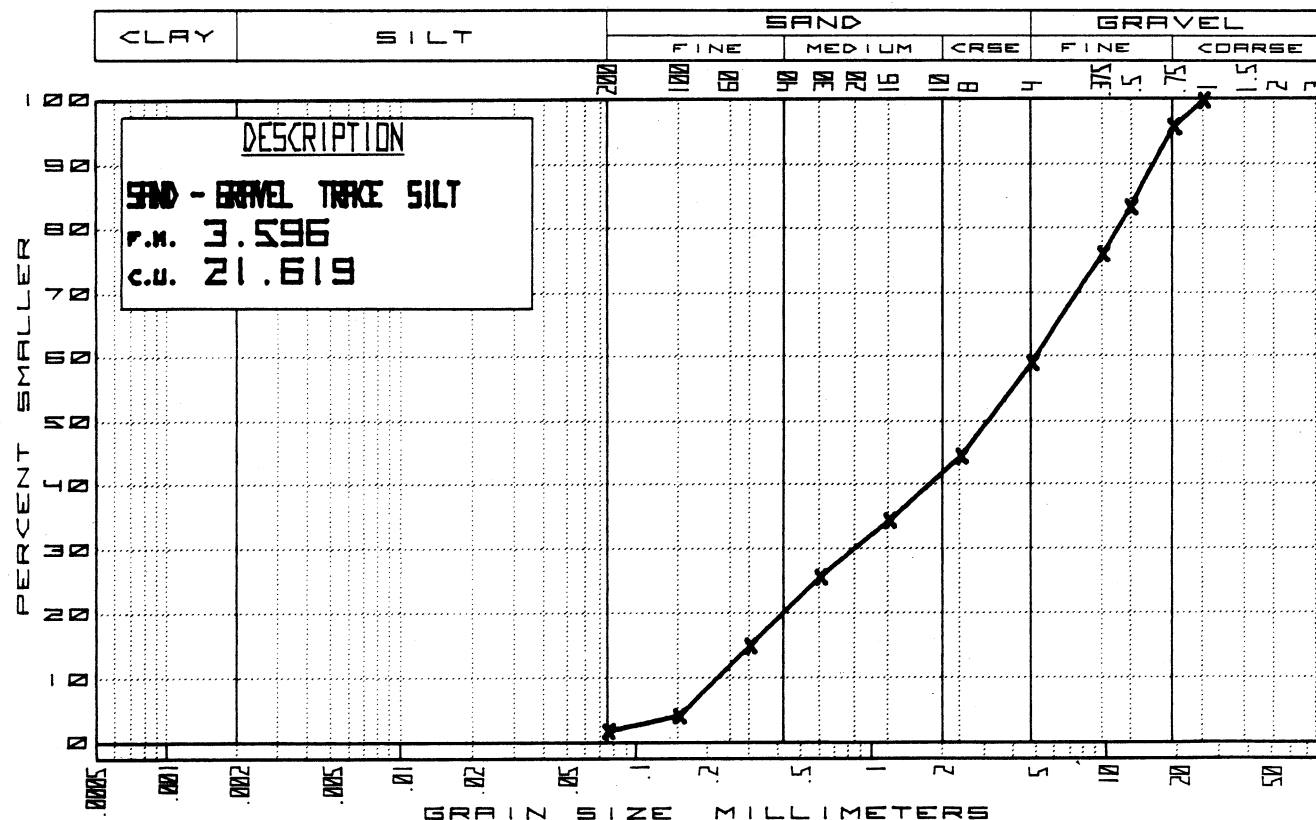
DATE 2-13-76 BASELINE A STATION 22+00 OFFSET 5+00W DEPTH 20.0



JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222
 DATE 2-16-76 BASELINE A STATION 22+00 OFFSET 5+00W DEPTH 30.0

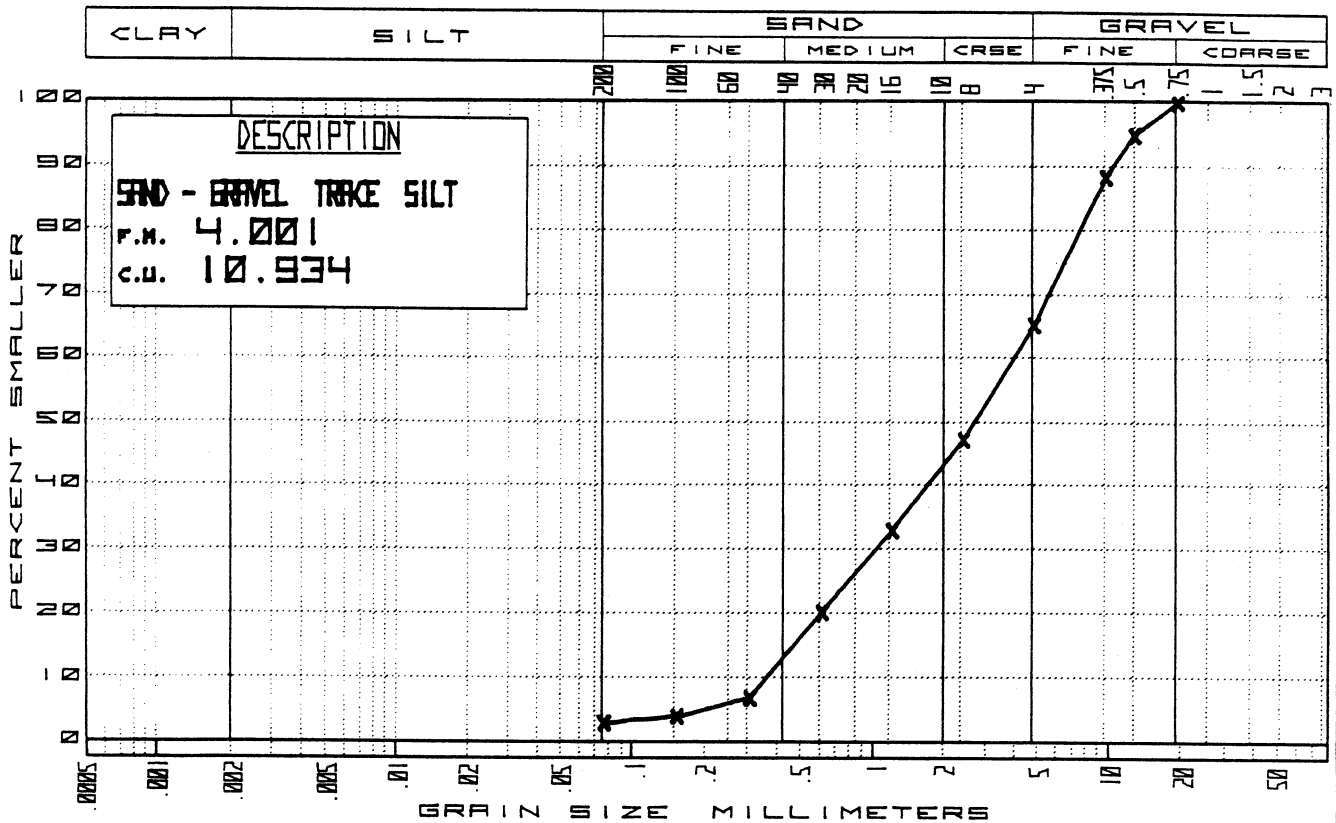


JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222
 DATE 2-13-76 BASELINE A STATION 22+00 OFFSET 4+00W DEPTH 7.0-11.0



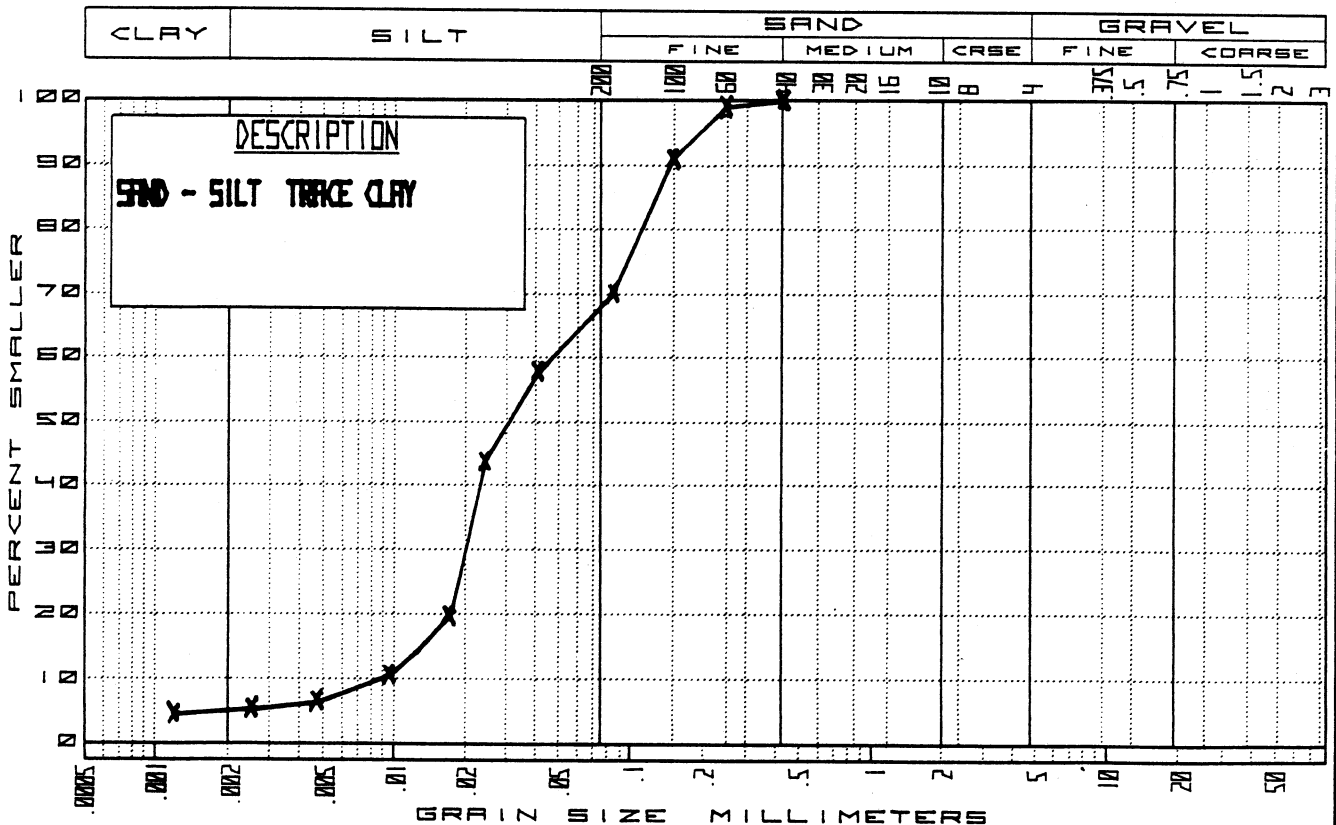
JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

DATE 2-13-76 BASELINE A STATION 22+00 OFFSET 3+00W DEPTH 20.0



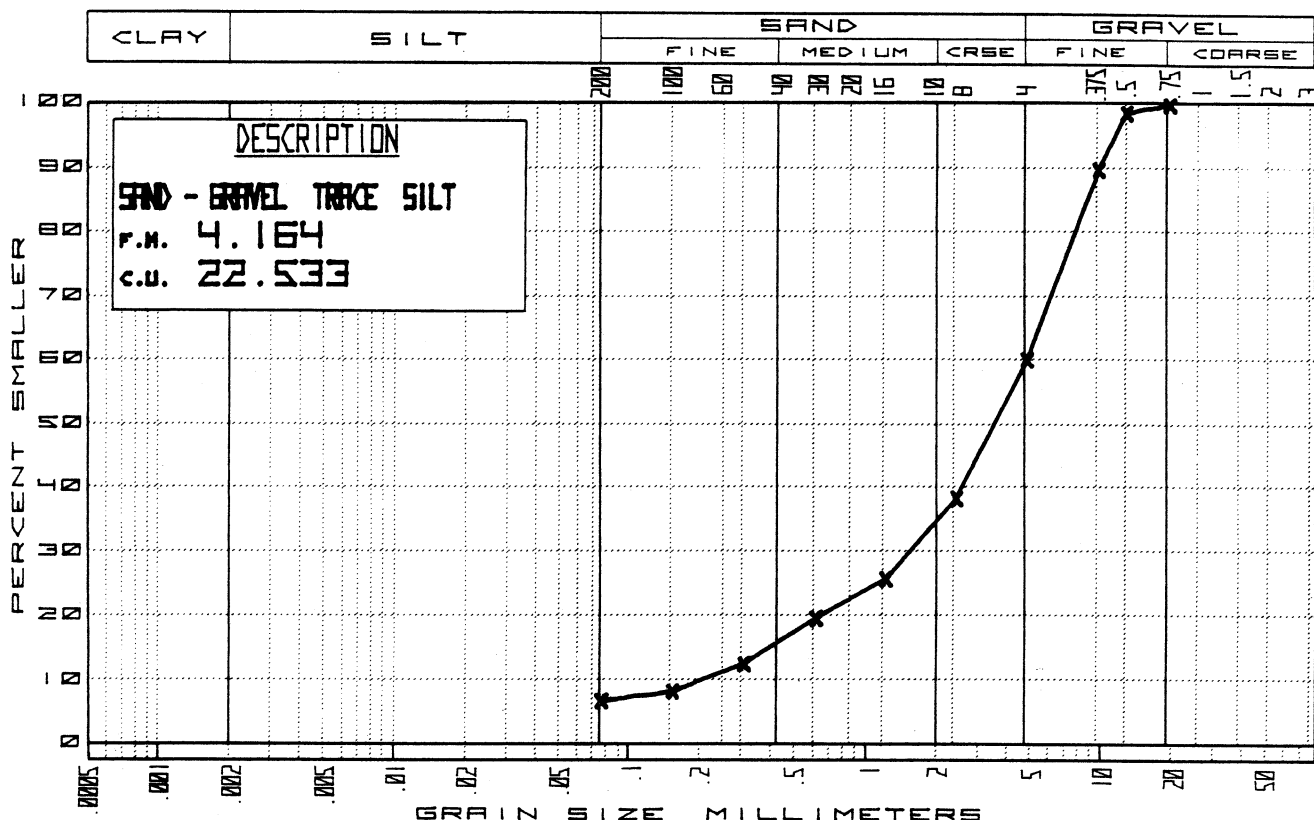
JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

DATE 2-16-76 BASELINE A STATION 22+00 OFFSET 2+00W DEPTH 10.0



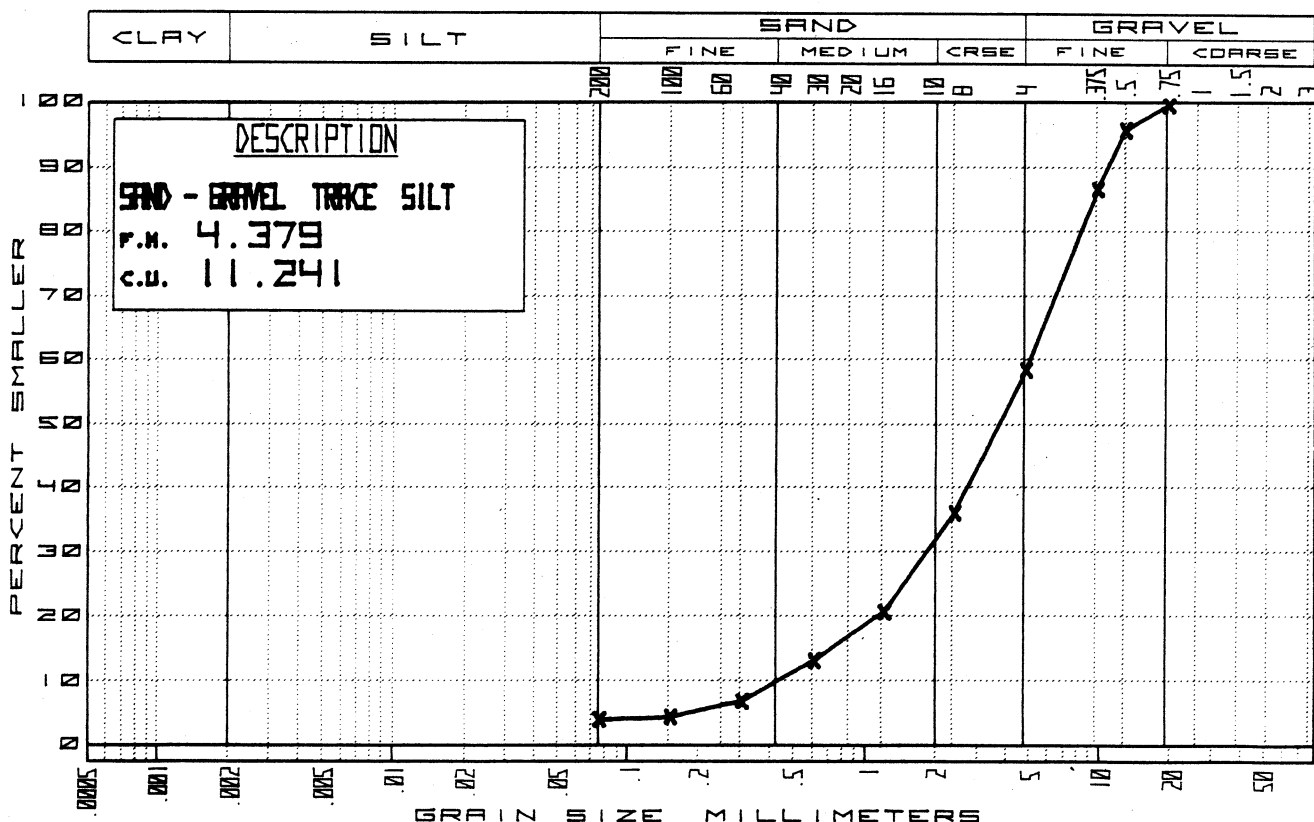
JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

DATE 2-13-76 BASELINE A STATION 22+00 OFFSET 0+00 DEPTH 5.0



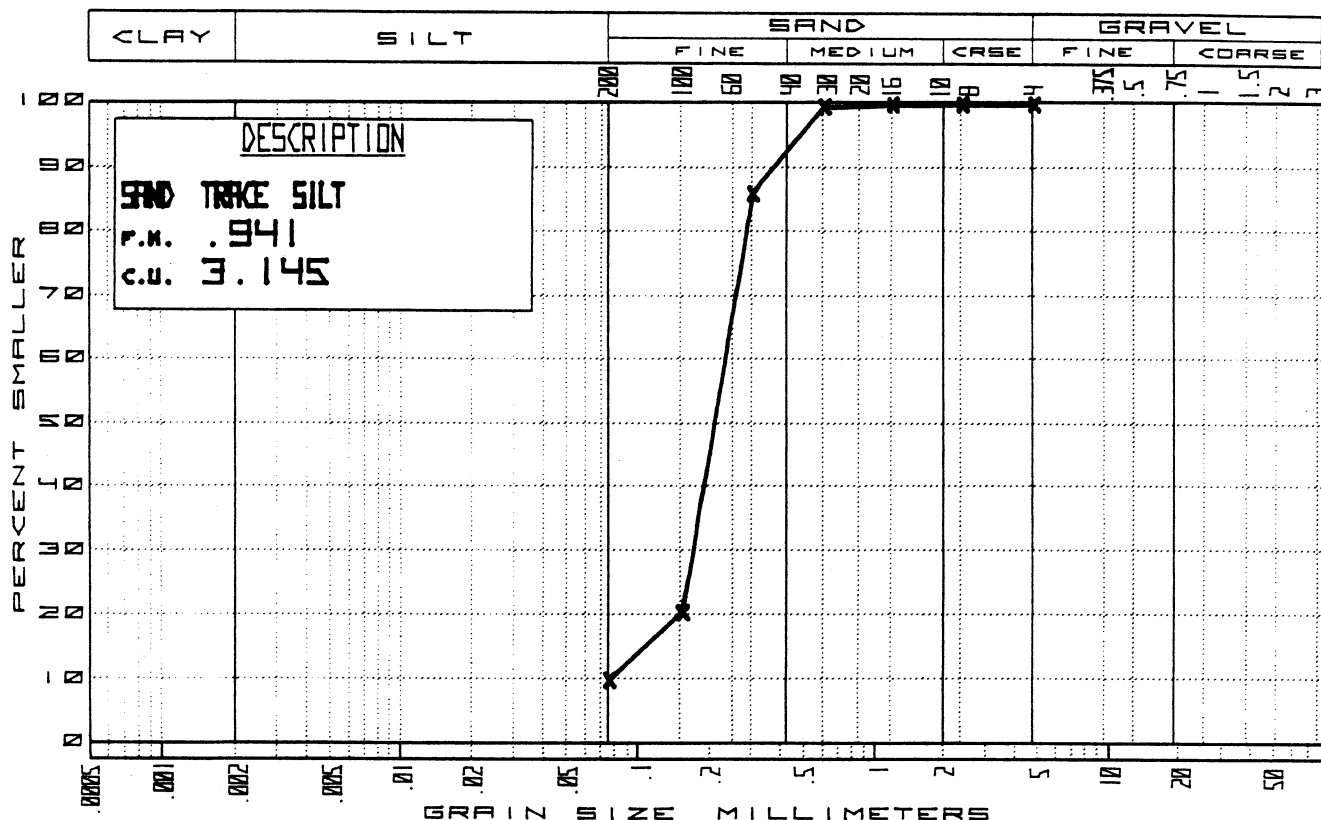
JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

DATE 2-13-76 BASELINE A STATION 22+00 OFFSET 0+00 DEPTH 20.0



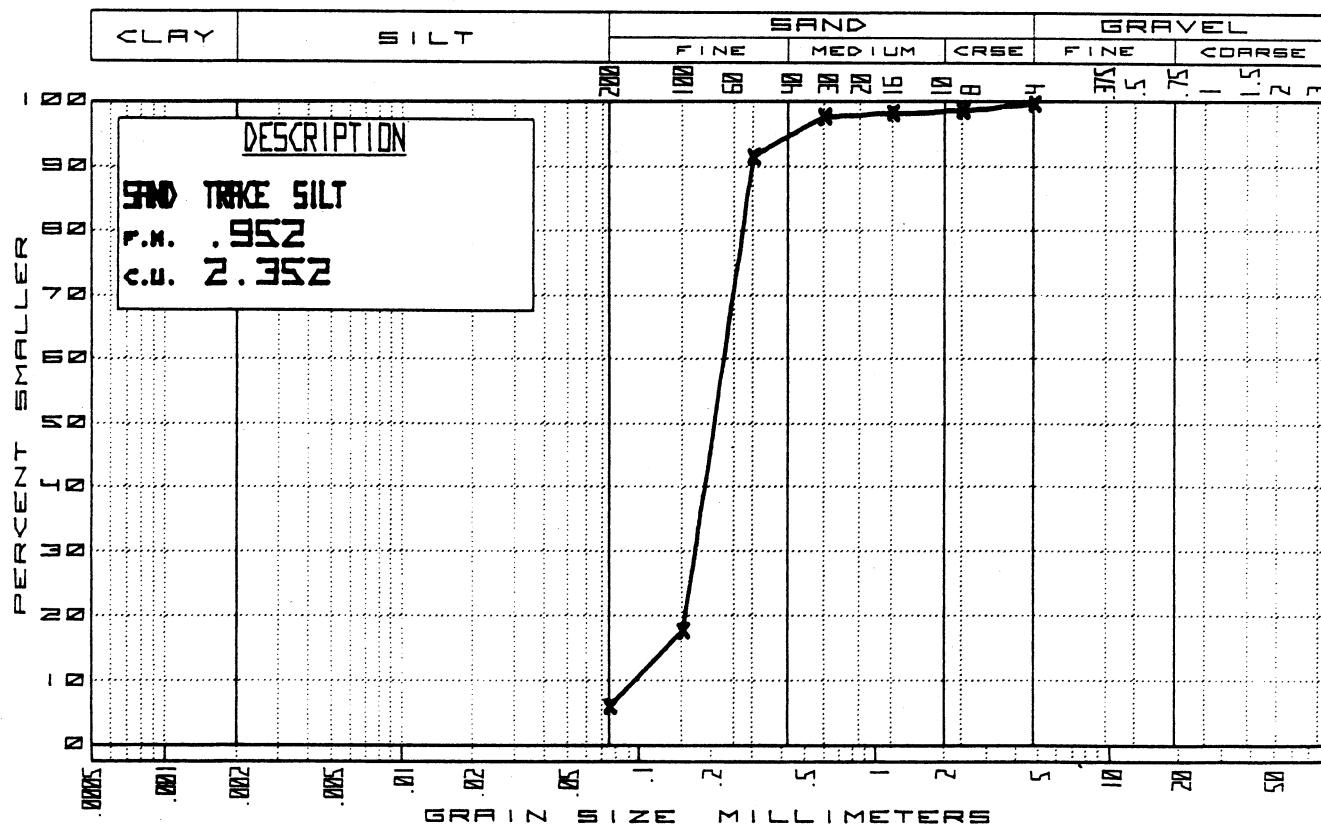
JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

DATE 2-13-76 BASELINE A STATION 22+00 OFFSET 0+00 DEPTH 40.0



JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

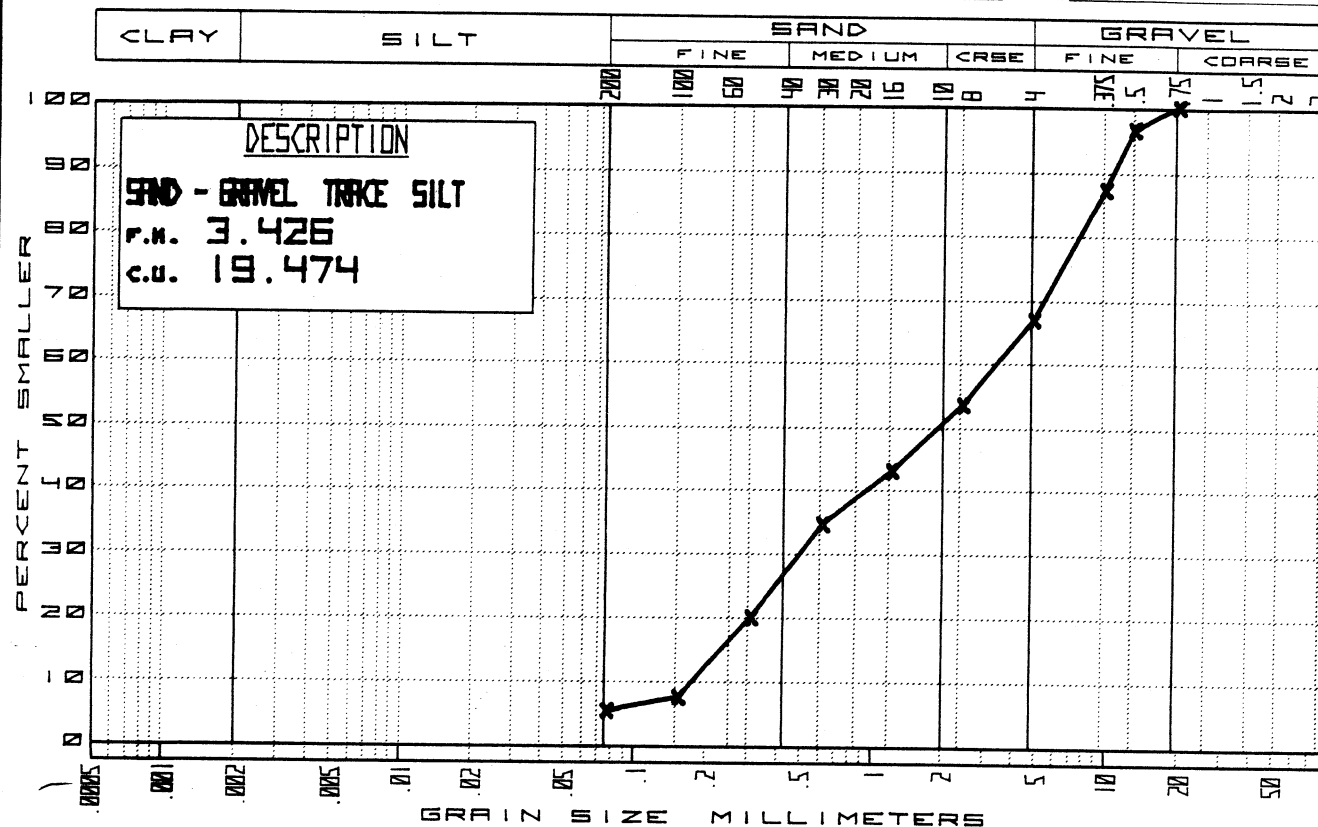
DATE 2-13-76 BASELINE A STATION 22+00 OFFSET 2+00E DEPTH 5.0



All tests performed in accordance with ASTM & CSA standards.

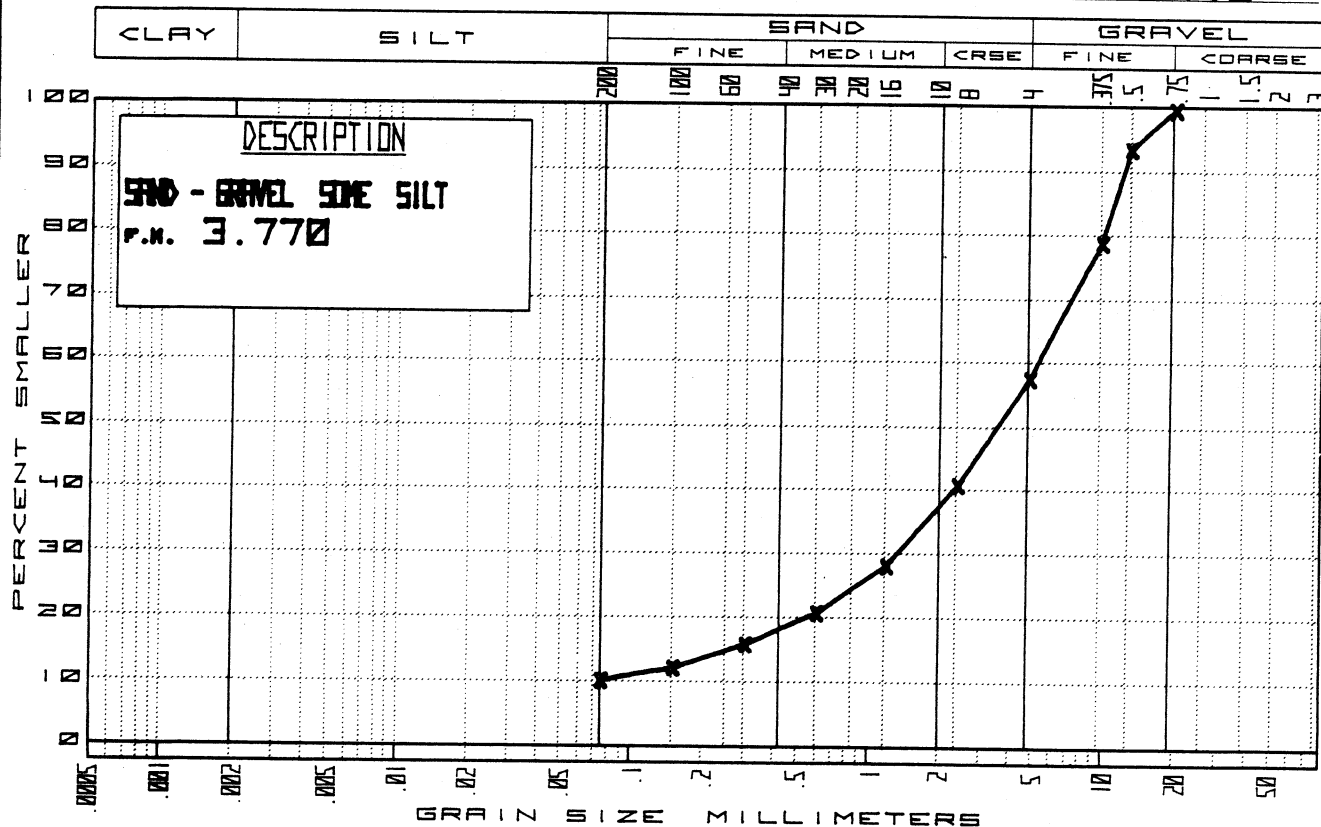
JOB NO. **1-1318** SITE **SWIMMING POINT SOURCE 222**

DATE **2-13-76** BASELINE **A** STATION **22+00** OFFSET **4+00E** DEPTH **25.0**



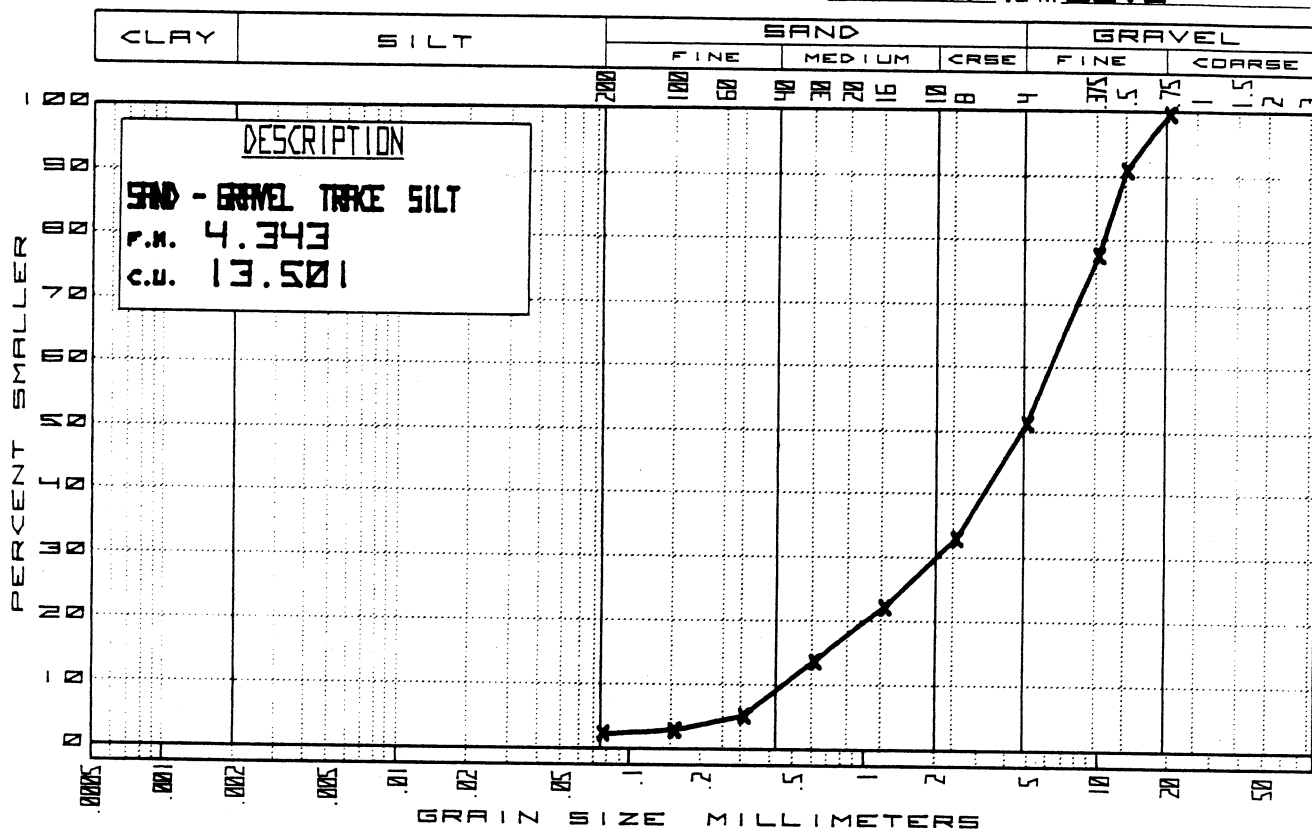
JOB NO. **1-1318** SITE **SWIMMING POINT SOURCE 222**

DATE **2-13-76** BASELINE **A** STATION **26+00** OFFSET **5+00W** DEPTH **5.0-7.0**



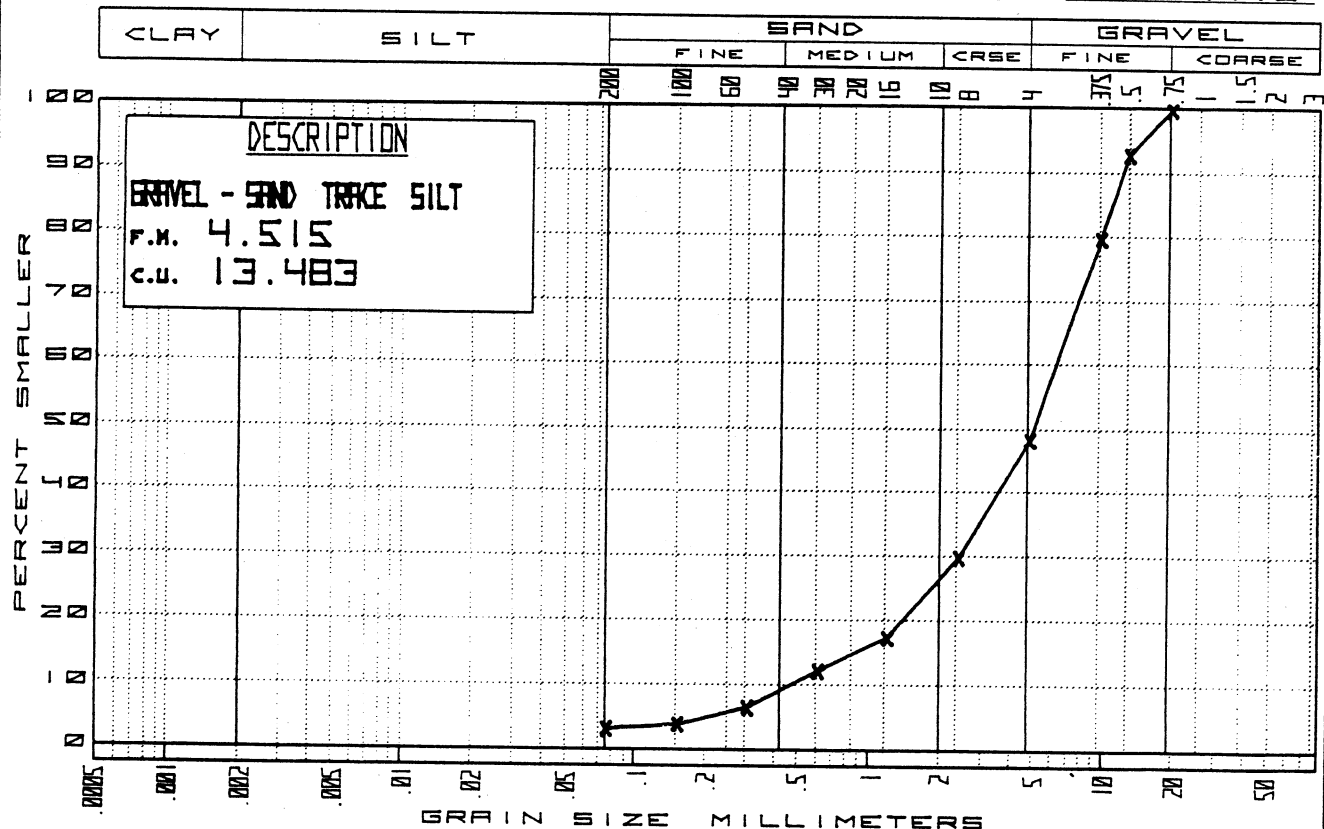
JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

DATE 2-13-76 BASELINE A STATION 26+00 OFFSET 5+00W DEPTH 25.0



JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

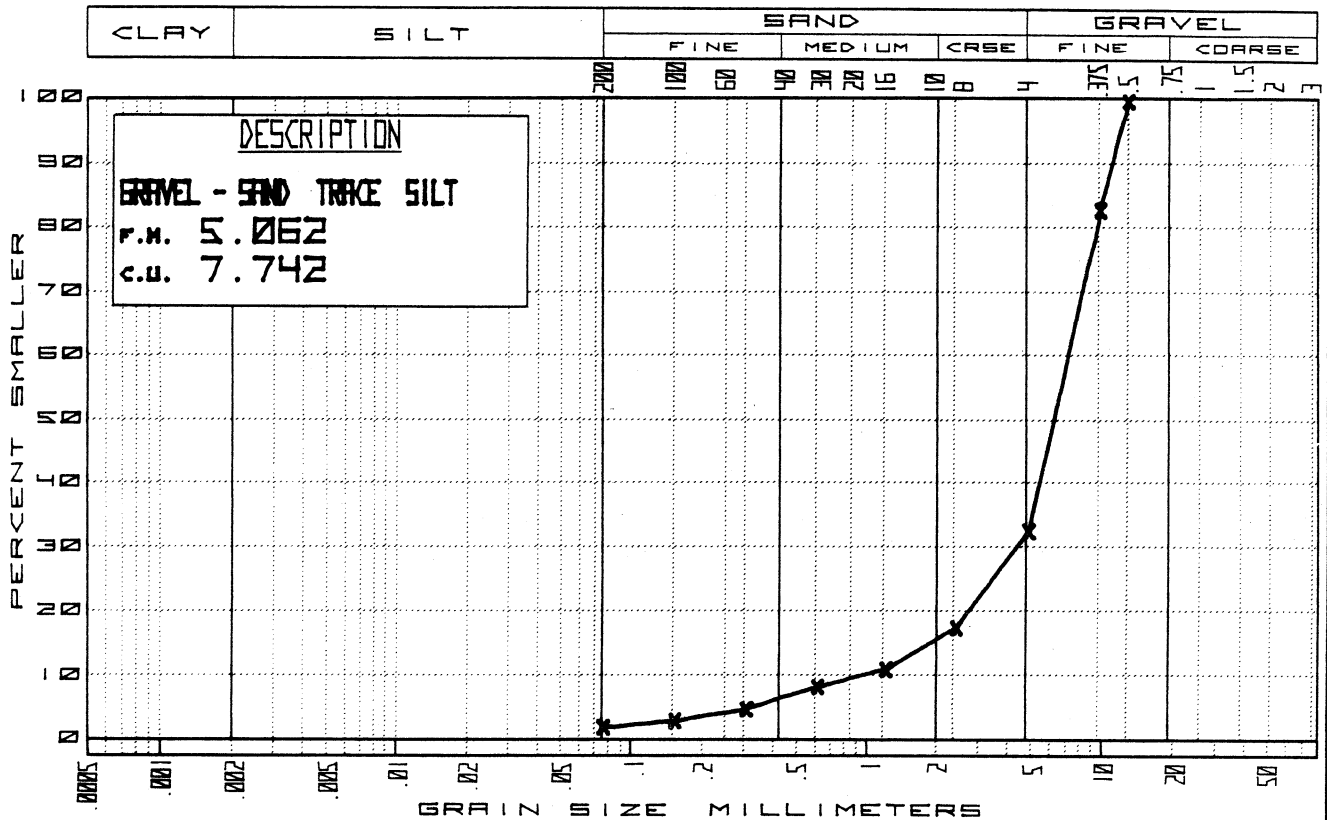
DATE 2-13-76 BASELINE A STATION 26+00 OFFSET 4+00W DEPTH 15.0-17.0



All tests performed in accordance with ASTM & CSA standards.

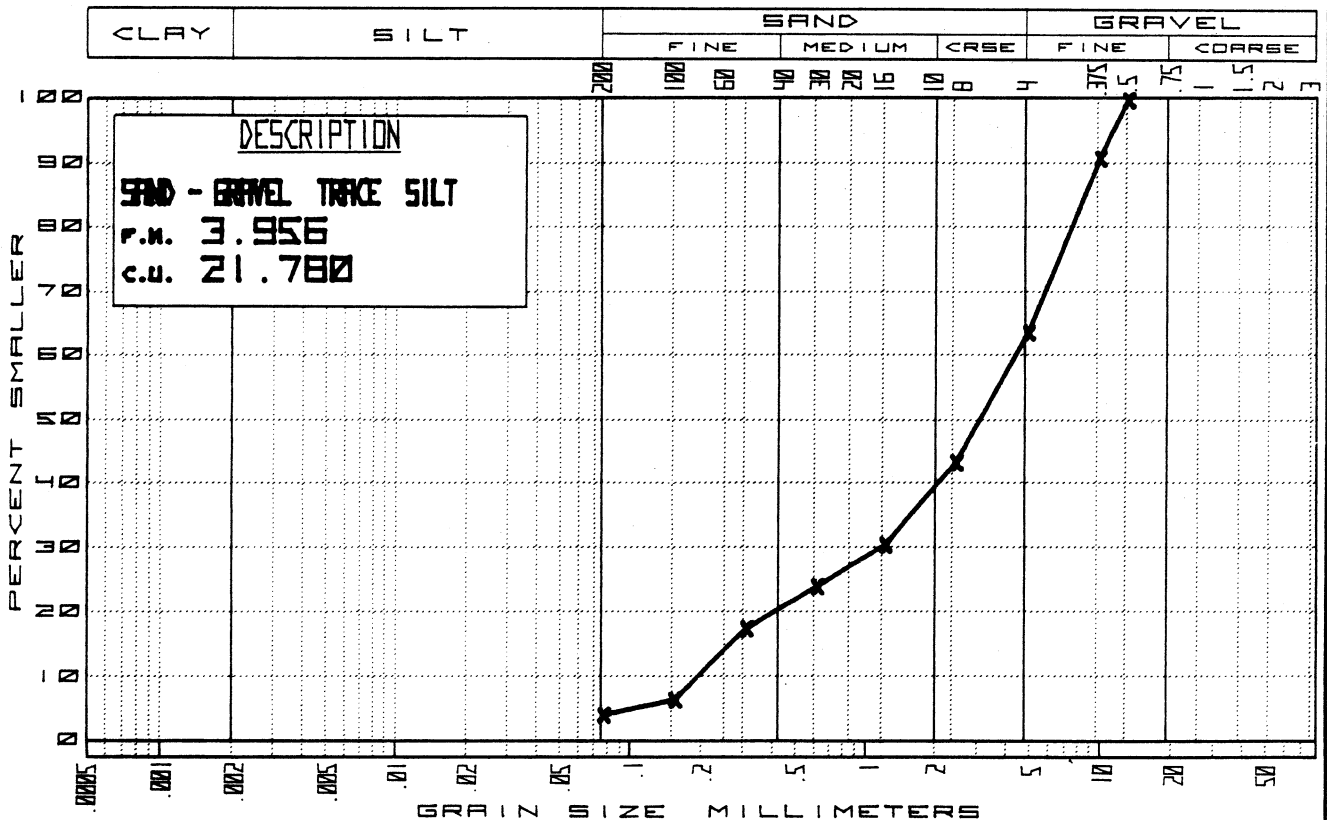
JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

DATE 2-13-76 BASELINE A STATION 26+00 OFFSET 4+00W DEPTH 30.0



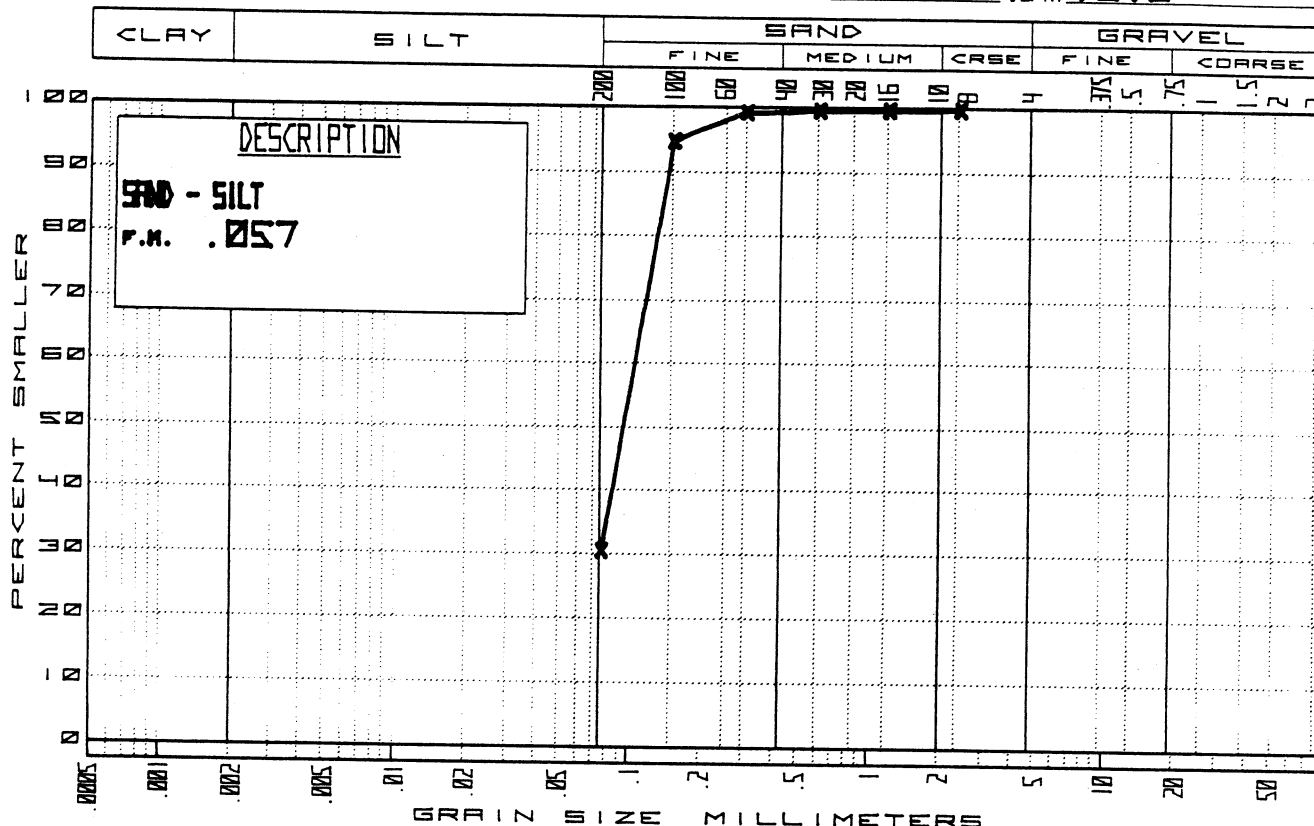
JOB NO. 1-1318 SITE SWIMMING POINT SOURCE 222

DATE 2-13-76 BASELINE A STATION 26+00 OFFSET 0+00 DEPTH 6.0-7.0



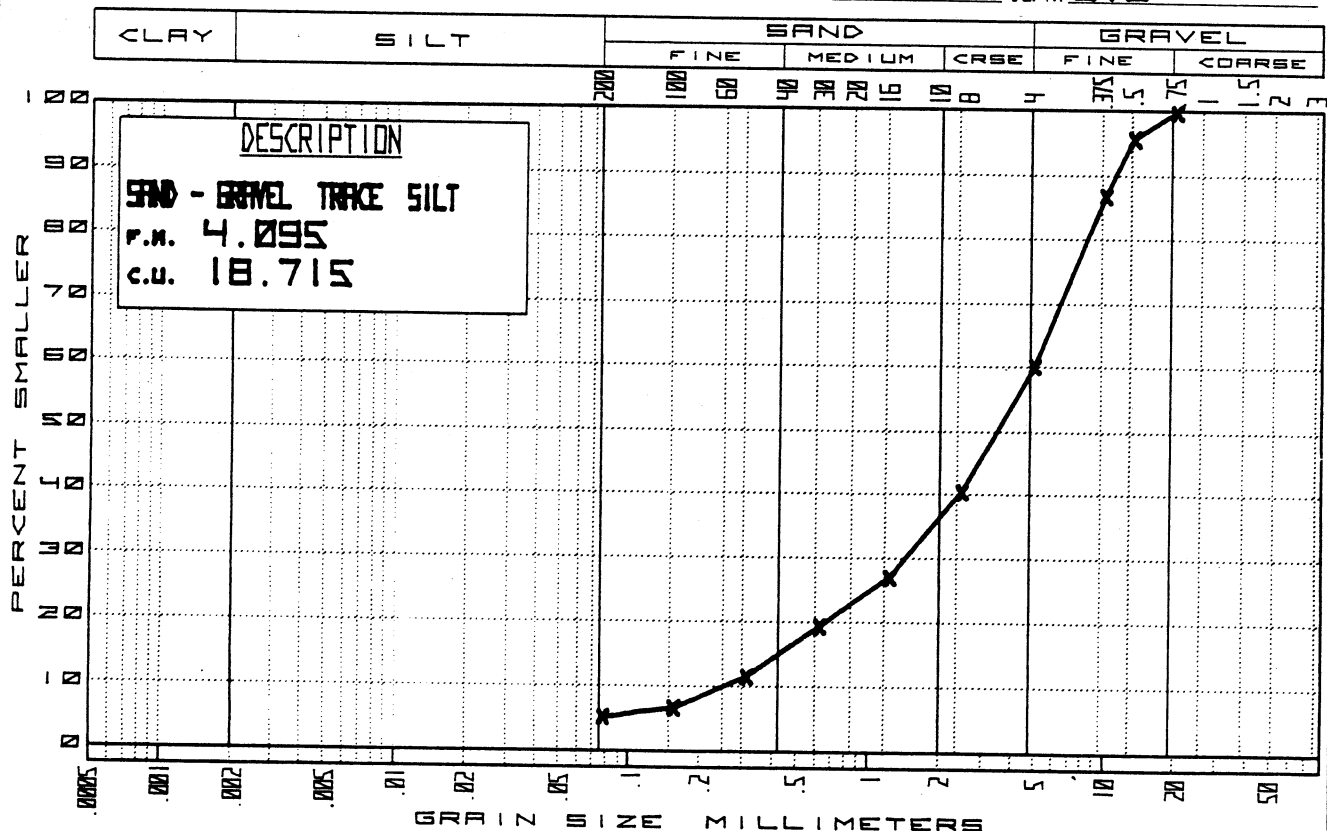
JOB NO. **1-1318** SITE **SWIMMING POINT SOURCE 222**

DATE **2-13-76** BASELINE **A** STATION **33+00** OFFSET **0+00** DEPTH **15.0**



JOB NO. **1-1318** SITE **SWIMMING POINT SOURCE 222**

DATE **2-13-76** BASELINE **A** STATION **38+00** OFFSET **0+00** DEPTH **5.0**



All tests performed in accordance with ASTM & CSA standards.