APPENDIX S

Design Memorandum, Miner Flat Dam, February 1987

MORRISON-MAIERLE, INC.,
VOLUMES I THRU V OF VI

FEBRUARY 2007

DESIGN MEMORANDUM

MINER FLAT DAM

019842-0002

DECEMBER, 1986

(REVISED FEBRUARY 1987)

WHITE MOUNTAIN APACHE TRIBE

WHITERIVER, ARIZONA

VOLUME 3 OF 6

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ENGINEERING GEOLOGY MINER FLAT DAM SITE
WHITE MOUNTAIN APACHE RESERVATION
NAVAJO COUNTY, ARIZONA

Prepared for

Morrison-Maierle, Inc.
Helena, Montana

by

Mineral Systems, Inc.
Golden, Colorado

July, 1986

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INTRODUCTION

The proposed dam on the North Fork of the White River at Miner Flat is east of State Highway 73, about eight miles south of McNary and about eleven miles north of the White Mountain Apache Tribal headquarters at Whiteriver, Arizona (fig. 1). Access to the site, and to the dam abutments, is by a pilot road that connects with State Highway 73 at Miner Flat.

The dam site was selected based on topography. A lava flow in the valley of the North Fork of the Whiteriver has been bisected by the Whiteriver forming steep almost vertical cliffs of about 170 feet in height. To determine the feasibility of the site, geotechnical investigations, including geologic mapping of the dam site and reservoir and drilling of three holes for core, were conducted in February and March, 1982. Based on the geotechnical work conducted in 1982, a program for additional geotechnical study was conducted in 1983. This program included detailed geologic mapping of the dam site; core drilling of ten additional holes, logging of core and testing of drill holes, geophysical investigation of the thickness of the basalt flow and gravel deposits, and bulk sampling and testing of the gravel deposits.

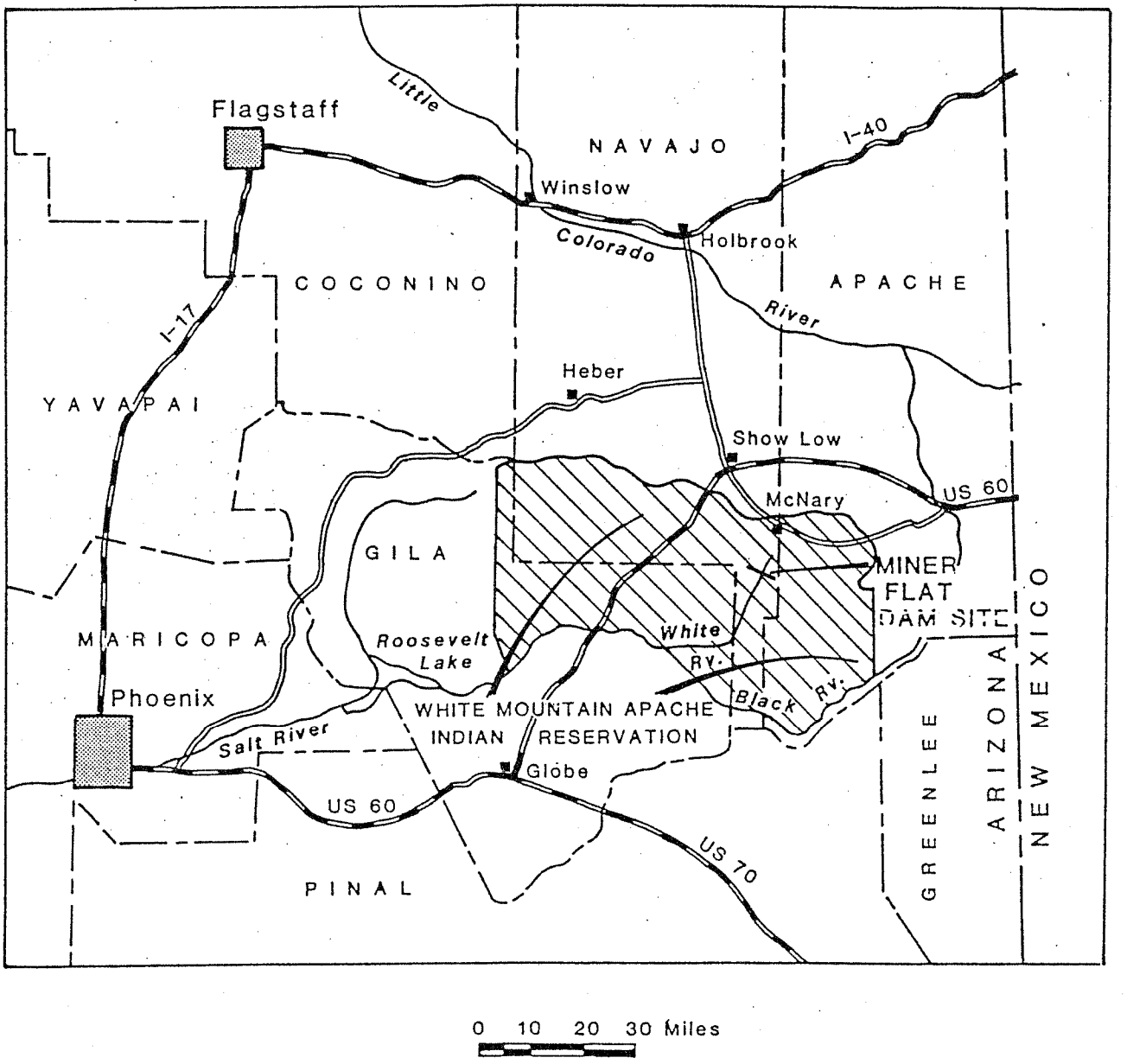


FIGURE 1.--**INDEX MAP OF THE WHITE MOUNTAIN APACHE INDIAN RESERVATION SHOWING LOCATION OF THE MINER FLAT DAM SITE**

Recommendations for additional investigations were made as a result of the 1983 investigations. This additional work, which consisted of core drilling 13 holes, testing of drill holes, and logging and testing of core were carried out in late 1985 and early 1986. This report presents the data obtained during the 1985-1986 investigations.

The geotechnical investigations were conducted by or under the supervision of Mineral Systems, Inc., under contract to Morrison-Maierle, Inc. of Helena, Montana. The preparation of the topographic maps and the surveying of the locations of the drill holes was done by Geotech Research, Inc. of Englewood, Colorado. Drilling during 1985-1986 was done by Kelmine Exploration, Inc. of Denver, Colorado.

GENERAL GEOLOGY

Miner Flat is the top of a basalt flow that flowed down an ancestrial valley of the North Fork of the White River. The area physiographically is in the transition zone between the Colorado Plateau (Hunt, 1956) and the Basin and Range Province (Moore, 1968). It is about eight miles south of a conspicuous topographic feature, the Mogollon Rim, which forms the southern limit of the Colorado Plateau. The geology of the area has not been previously studied in detail. The regional geology is shown on the geologic maps of Gila, Navajo and Apache Counties (Arizona Bureau of Mines, 1959, 1960) and the general geology is described by Moore (1968). The nearest detailed geologic studies are those of McKay (1972) of the Show Low Quadrangle about 15 miles to the northwest. Merrill and Pewe (1977) describe the Late Cenezoic geology of the White Mountains about 20 miles to the west. Condit (1983), in partial fulfillment of the requirements for Doctors Degree at the University of New Mexico, has mapped and dated the basalt flows along the North Fork of the White River to the north of the dam site.

The bedrock of the Miner Flat dam and reservoir site is the Supai Formation; which consists predominantly of sandstone at the site; and a series of basalt flows, which are capped by a partially indurated gravel. Overlying the bedrock are surficial deposits, which include colluvium (including talus), alluvium, alluvial fans and terrace deposits. The geology of the Miner Flat dam site and the reservoir are shown on Figures 2 and 3.

BEDROCK UNITS

The bedrock units are exposed in the cliffs along the North Fork of the White River. A valley was cut by the river into the Supai Formation. This valley was filled with a series of basalt lava flows. The river then deposited gravel on the basalt flow before cutting a channel through the margin of the flows and the Supai Formation.

Supai Formation

The Supai Formation crops out in steep cliffs south of the dam axis and locally in cliffs along the north and south sides of the reservoir. The Supai Formation is of Permian age. In the reservoir area only sandstone of the Limestone and Siltstone Member (McKay, 1972) crops out. At the top of the Limestone and Siltstone Member is a sandstone unit 50 to 70 feet thick. This is the unit that is exposed in much of the Miner Flat area. Below this unit in the area (but not exposed) is about 110 feet of siltstone and sandstone.

The sandstone is pale reddish brown to yellowish brown, fine grained, and well sorted. The beds range in thickness from less than an inch to 15 feet. The thickest beds are conspicuously cross-bedded and

massive. Near the base of the outcrop east of the dam axis beds of siltstone are exposed. The siltstone is reddish brown and sandy. The beds are less than 1 to 2 feet thick, parallel laminated with the laminae general 0.1 to 1 inch thick. The siltstones are gradational with over and underlying beds of sandstone.

Basalt

The basalt crops out and forms conspicuous cliffs at the dam site and along the north side of the reservoir. The flows have filled an ancestral valley of the North Fork of the White River and the surface of the basalt slopes to the south.

The basalt is very dark gray to black, weathering medium to dark gray. It is fine-grained to aphanitic and locally porphyritic. Phenocrysts of plagioclase feldspar and olivine, generally less than 1 mm in size, are conspicuous locally. The basalts are vesicular, with the vesicules of less than 1 mm to 30 mm. The vesicules occur in bands of 1 inch to 1 foot wide. Individual flows range from about 20 to 80 feet in thickness. In drilling it was noted that there was typically a thin clay seam of less than 0.1 to 4 inches between flows. Individual flows are not continuous and cannot be mapped throughout the reservoir

area. The flows moved down the valley in a series of tongues. A tongue would move some distance, stop, and then be partially or completely engulfed by a younger flow. A preliminary study of the flow banding shows banding at many dip angles; generally, however, the dips were all down the gradient of the valley.

The basalts flows of the White Mountains at the headwaters of the North Fork of the White River have been studied by Condit (1983). He has shown that there were a sequence of flows originating in the White Mountains that flowed down valleys to the south and west. He has dated these flows. The ages range from about 0.5 to 2.05 million years B.P. (before the present).

Paleocolluvium/Paleoalluvium

The basalt flowed down a stream valley. In the valley along the sides was colluvium derived from the weathering of the sandstone of the Supai Formation. In the bottom of the valley was alluvium deposited by the stream that eroded the valley. As the basalt flowed down the valley it pushed the colluvium aside and the basalt is now in contact with weathered sandstone, or the basalt flowed over the colluvium or alluvium often incorporating fragments of sandstone or boulders, cobbles, gravel sand and silt from the alluvium into the base of the basalt flow. The thickness of the paleocolluvium/paleoalluvium ranges from less than an inch to as much as about 69 feet.

Quaternary/Tertiary Gravel

Quaternary/Tertiary gravel deposits are classified with the bedrock deposits because they are locally partially indurated, or cemented, and could be considered as sandstones or conglomerates, and they are considerably older than the alluvial deposits along the river and in the terraces. These gravels crop out along the road to the Lower Log Road bridge at the eastern end of the reservoir area (fig. 2) and underly extensive colluvial covered areas north and south of the reservoir. The Quaternary/Tertiary gravel unit consists of stratified but poorly sorted lenses of sand and gravel that include cobbles and boulders. The clasts consist predominantly of well rounded igneous and metamorphic rocks. Correlation of this unit with other gravels, or interbasalt formations, as described by Merrill and Pewe (1977) to the east, or those mapped by McKay (1972) to the northwest, has not been made.

STRUCTURE

The structure of the bedrock is related to the uplift of the Colorado Plateau to the north and the cooling of the lava flows. The beds of the Supai Formation strike northeast to northwest and dip about 3^{o} - 7^{o} to the east. The low angle of dip, and the crossbedding, make the determination of dip difficult. Joints in the Supai Formation are spaced at intervals of 0.5 to 3 feet. Typically the joints strike at right angels or parallel to the strike of the beds, and dip from 60^{o} to 90^{o}. The gentle folding, and the development of joints in the Supai Formation, are probably related to the vertical uplift of the Colorado Plateau in middle or late Tertiary time (Hunt, 1956).

The discontinuities in the basalt are related to the flow banding and joints as a result of cooling of the basalt. When the basaltic lava cooled, the volume decreased, and joints formed. They form at right angles to the cooling surface. As most of the flows were essentially tabular bodies, the cooling surfaces were the base and the top of the flows, and the joints are near vertical. Joints have developed along flow boundaries as a result of stress relief along cliffs from erosion. Figure 4 is a contour diagram of discontinuities in the basalt in the vicinity of the proposed dam based on the data collected along the detail line studies. This diagram shows that the discontinuities strike in all directions and are near vertical -- typical of columnar jointed basalts.

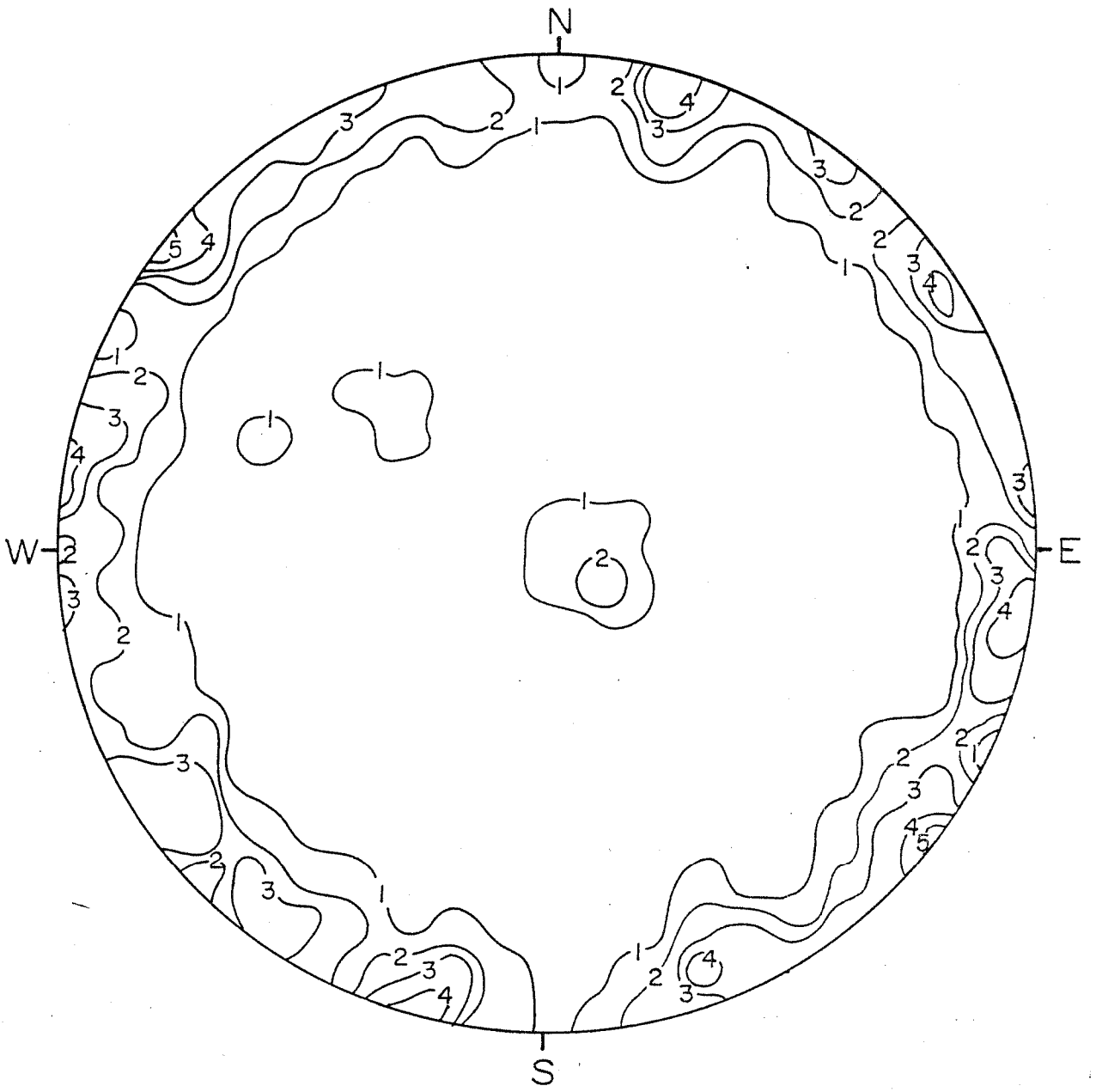


FIGURE 4

EQUAL AREA PLOT (LOWER HEMISPHERE)
OF DISCONTINUITIES (JOINTS) IN BASALT
MINER FLAT DAM SITE

(222 poles, Contour interval 1. percent)

SURFICIAL DEPOSITS

Surficial deposits are derived from the in-place weathering of bedrock and the transportation of weathered material or older surficial deposits. In the Miner Flat area, the surficial deposits include colluvial deposits, including talus deposits, and alluvial deposits, including alluvium, alluvial fans and terrace deposits.

Colluvial Deposits

The Colluvial deposits include the material derived from the inplace weathering of bedrock and talus from the weathering of cliffs.

Colluvium: -- Colluvium is weathered material from the bedrock and reflects the nature of the underlying bedrock. On steep slopes, it does move down slope under the force of gravity. On the geologic maps, Figures 2 and 3, the formation from which the colluvium is derived is indicated by the letter symbol for that formation in parentheses. The colluvium from the basalt consists of silt and clay, reddish brown to dark brown, with subangular sand, gravel, cobbles and boulders composed of basalt. The colluvium derived from the Supai Formation consists of

sand with angular pieces of gravel and cobbles of sandstone. Colluvium derived from the Quaternary/Tertiary gravels consist of cobbles and gravel in a sandy matrix that grades downward in sand and gravel with cobbles. There has been a concentration of the coarser material at the surface. On steep slopes, underlain by two formations, the colluvium on the slope will consist of a mixture of the two types of colluvium. The colluvium ranges in thickness from 0 to at least 50 feet.

Talus: -- Talus, a form of colluvium, consists of blocks of bedrock that have become detached from a cliff and fallen to the base of the cliff. Talus deposits occur below the basalt and sandstone cliffs along the river up and down stream of the dam site. The blocks of basalt and sandstone in the talus range from sand-size to boulders more than 10 feet in maximum dimensions. The talus deposits are estimated to reach a thickness of at least 50 feet.

Alluvial Deposits

Alluvial deposits are those deposits formed by running water. They include alluvium, terrace deposits and alluvial fans.

Alluvium: -- Recent alluvium occurs along the channel of the North Fork of the White River. The material consists of silt, sand, gravel and cobbles derived from pre-existing surficial deposits and transported and deposited by the present river. The sand and gravel are primarily of older metamorphic and igneous rocks, derived from the older Tertiary gravels (McKay, 1972) with a few pieces of basalt. The cobbles are composed of older metamorphic and igneous rocks, basalt, sandstone and limestone. The sedimentary rocks were derived locally from the Supai Formation.

Terrace Deposits: -- The terrace deposits are alluvial deposits formed by the river when it flowed at a higher elevation than at present. These deposits are 4 to 10 feet above the present alluvium along the river, and extend upriver throughout the reservoir area (fig. 2). They are composed of silt, sand, gravel and cobbles similar in composition to those in the alluvial deposits, except that there are more cobbles of sandstone and limestone in the terrace deposits. On top of the terrace deposits are over-bank food deposits of fine sand and silt 0.5 and 2 feet thick.

Alluvial Fans: -- Alluvial fans are formed where tributary steams enter a main valley and there is an abrupt change in gradient. They

are most common along the south side of the river where small streams have cut narrow and steep channels into the Supai Formation. The material in the alluvial fans consists primarily of silt and sand. They do contain some gravel and cobble size pieces of sandstone derived from the steep bedrock slopes bordering the channels.

GEOTECHNICAL INVESTIGATIONS

The geotechnical investigations conducted in 1982 (Robinson, 1982) were primarily for the purpose of determining the feasibility of constructing a dam near Miner Flats, and to select an approximate alignment. The 1982 study consisted of preparing a preliminary geologic map of the dam and reservoir area; drilling, logging, and testing three holes drilled for core approximately along the suggested axis of the dam; and digging two test pits, collecting samples, and running engineering analyses to evaluate the potential gravel resources. The purpose of the 1983 geotechical investigations was to obtain specific data for dam design. The geotechnical investigations (Mineral Systems, 1983) included preparing a detailed (1:600; 1 inch = 50 ft.) geologic outcrop map of the dam area (fig. 3) and completing the geologic outcrop map (fig. 2; 1:4800, 1 inch = 400 ft.) of the reservoir area; making five detail line surveys; making a seismic traverse across the basalt flow to determine the thickness; drilling, logging and testing eight holes drilled for core; installing piezometers to monitor groundwater levels in six of the drill holes; conducting a materials investigation that consisted of digging and sampling three test pits in the alluvial deposits upstream of the proposed dam, drilling three holes to determine the depth to bedrock, running four seismic traverse lines across the deposits, and conducting engineering tests on the samples from the test pits. Based on this work it was possible to establish a Rock Mass Classification for the dam foundation, give an estimate of the amount and

types of material immediately available for construction and to prepare recommendations for further geotechnical investigations for specific dam structures and appurtenant structures.

The geotechnical investigation in 1985-1986 was directed towards further defining the geology of the dam axis and abutment areas, and determining the engineering properties of the rock. Thirteen holes were drilled for core (fig. 2). The core was logged and tested with a point load tester. Packer tests were run on selected intervals in the drill holes and piezometers installed in twelve holes. Goodman jacking tests were run at selected intervals in four holes. All holes accessible were surveyed.

DRILLING

Holes were drilled and cored in the area of the Miner Flat Dam site to determine the engineering properties of the rock and to determine the hydrology of the foundation materials and the bedrock in the reservoir area. Thirteen holes were drilled using NX wire line equipment with double-tube core barrels. The core was logged and point-load tested. Packer tests were conducted to determine the permeability of selected intervals of the drill hole and Goodman jack tests were made to determine the in-situ elastic properties. Piezometers to measure groundwater levels were installed in twelve holes. One hole was lost as a result of running sand. The locations of the drill holes are shown on figures 2 and 3.

Core Logging

An engineering geologic log was made of the core after each run. In addition to standard notations as hole number, location, date, driller, etc., the following parameters were recorded:

Depth

Weathering/Alteration

Rock Type

R.Q.D. (Rock Quality Designation)

Total Core Recovery

Dip of Fractures

Strength (Point Load Test or Cohesive Soil Classification)

SCR (Selected Core Recovery)

The code system for the engineering logging of the core is included as Appendix B. The data from the logging form is encoded into a computer which justifies and prints out the data. Appendix B includes the Engineering Geologic logs of the 1985-1986 drill holes. Logs of the 1982 and 1983 drill holes were previously furnished (Robinson, 1982; Mineral Systems, 1983).

More detailed logs of each run are kept in a separate notebook. The logs include time of run, any drilling problems, as loss of circulation, additives, if any, and detailed geologic descriptions.

Graphic logs, including summary descriptions of rock units and details as to piezometer completions are given in Appendix A.

Testing

During the drilling operations, as the core was logged, selected intervals were subjected to point-load testing. As a drill hole was advanced the hydraulic conductivity, or permeability, of selected intervals of the rock in the walls of the drill hole was measured by packer tests. Also, as the hole was advanced, the *in-situ* elastic moduli of the wall rock was measured using a Goodman jack. After completion of the drill holes piezometers were installed, and developed, for measurement of groundwater levels.

Point-Load Tests and Strength Estimates

From each core run one or more samples of rock were selected for point-load testing or estimating rock strength. The point-load test is a method for measuring the strength of rock specimens in the field using portable equipment. Selected pieces of core with length to diameter ratios of greater than 1:5 are broken by the application of a concentric load using a pair of conical platens. A point-load strength index Is is obtained. The Point-Load Strength Index (Is) is expressed by:

$$Is = \frac{P \quad 2.36}{D^2}$$

where P is the failure load and D is the distance between the platens and 2.36 is a gauge factor. It has been determined that a reasonable correlation exists between the Point Load Index (Is) and the uniaxial compressive strength of materials (Bieniawski, 1975) and is:

$$\sigma c = Is \quad (14 + 0.175D)$$

where σc is the uniaxial compressive strength. The constant (14 + 0.175D) is a conversion factor from metric to English units and for core diameter.

All of the core recovered was not suitable for point-load testing. Some was too soft or friable. For these sections of core the classification for cohesive soil and rock, as proposed by Hoek and Brown (1980, p.98) was used to estimate the uniaxial compressive strength.

The strength of different rock types as determined from the point-load tests, or estimated from the classification of cohesive rock and soil are summarized in the following table. The strengths are classified as to the angle of the core hole. In general, the basalt flows and the beds of sedimentary rock were about horizontal, so the point-load tests on core in vertical holes was parallel to the flows or bedding, and the test in low-angle holes near right angles to the flows or bedding. A graphic presentation of the strength is shown on the logs in Appendix B. Figure 5 shows by histograms the range and average strength of the different units tested.

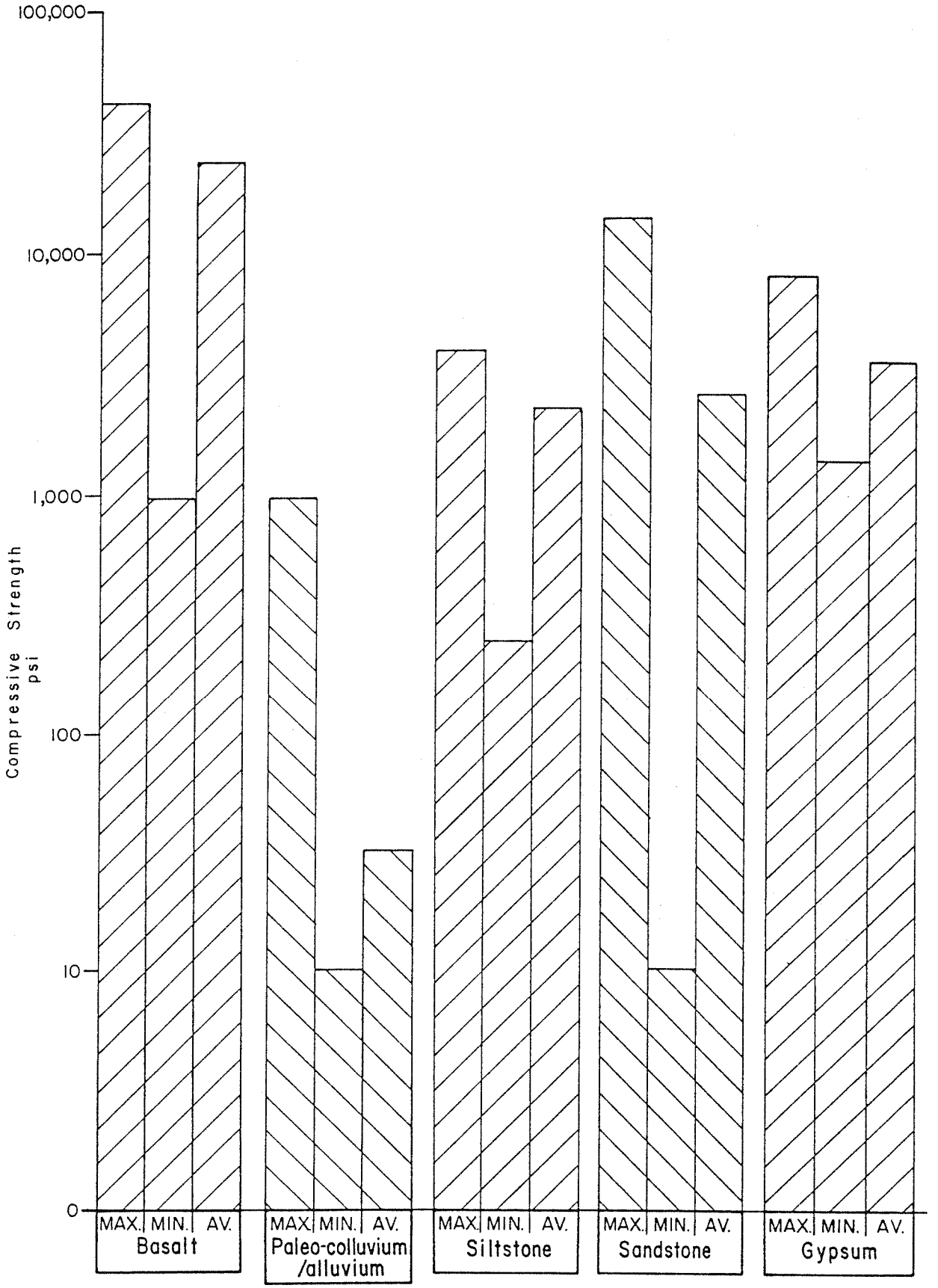


Figure 5 -Histograms showing strength of rock, Miner Flat dam site.

RESULT OF POINT-LOAD TESTS

Miner Flat Dam Site, 1985-1986 (pounds per square inch)

	Basalt			Paleoalluvium/ colluvium		Supai Formation				
						Siltstone		Sandstone	Gypsum	
	Vertical Holes	Angle Holes	Low-Angle Holes	Vertical Holes	Angle Holes	Vertical Holes	Angle Holes	Vertical Holes	Vertical Holes	Angle Holes
Maximum	42,109	36,547	36,547	957	10	13,983	5,403	13,983	8,263	6,594
Minimum	957	3,851	25,424	10	10	239	636	10	1,351	1,510
Average	23,780	22,863	32,308	35	10	2,705	1,629	2,654	4,018	3,284
Number of Samples Tested	255	58	17	64	10	28	18	60	7	12

It was proposed, and is recommended, that representative samples of the core be submitted to a material testing laboratory for determination of uniaxial compressive strengths. The purpose would be to establish the correlation between field and laboratory values for rock units at the proposed dam site.

Packer Tests

Packer Tests were conducted in each drill hole to determine the hydraulic conductivity, or permeability of the rock formations encountered in the drill holes. In general the following procedure was followed.

The hole was drilled for 50 feet into the formation to be tested, or to the bottom of the formation to be tested, and the hole washed until the return water was clear. A wireline inflatable packer was set at 20 feet from bottom of hole and the flow measured at a suitable pressure in relation to the maximum hydrostatic head that would be obtained for a full reservoir. If the flow was less than 20 gpm (gallons per minute), the packer was moved up the hole in 20 foot increments until a flow of about 20 gpm was achieved, or the entire hole was tested or the test interval overlapped a previously tested interval. If the initial flow exceeds 10 gpm then, the tested interval is reduced to the bottom 10 feet of the hole, and the upper part of the hole is tested by using two packers separated by 10 foot intervals. In some instances, because of geology or drilling problems, the hole was drilled to final depth and the double packer system used to test intervals of the hole that were considered significant.

Ideally a complete packer test consisted of five constant head flow vs. time tests. At each pressure, the pressure would be held constant and the flow measured each minute for 5 minutes, then at 10 minutes, and

at the highest pressure at an additional 15 or 20 minutes. The pressures used were:

0.33P Where P = 1 lb/ft reservoir head at the test section

0.66P

P Not to exceed 200 psi

0.50P

0.25P

The average permeability was calculated for specific test sections within each drill hole. The permeability coefficient K is defined by the U.S. Bureau of Reclamation (1974) as:

170 ft.

$$K = \frac{Q}{2\,LH} \ln \frac{L}{r}$$

Where

Q = average flow rate

L = length of test section

H = effective head of water acting on test section

3.250 in

r = radius of drill hole

The following table summarizes the results of the packer tests. The basic data are given in Appendix D.

HYDRAULIC CONDUCTIVITY IN CORE HOLES

Miner Flat Dam Site, 1985-1986 (centimeters per second)

	Basalt			Paleoalluvium/ colluvium		Supai Formation				
						Siltstone		Sandstone	Gypsum	
	Vertical Holes	Angle Holes	Low-Angle Holes	Vertical Holes	Angle Holes	Vertical Holes	Angle Holes	Vertical Holes	Vertical Holes	Angle Holes
Maximum	1.17×10^{-4}	5.71×10^{-4}	1.15×10^{-4}	3.54×10^{-4}	3.85×10^{-4}	1.50×10^{-3}	3.85×10^{-4}	1.73×10^{-3}	2.40×10^{-6}	$8.72 \times 10^{-}$
Minimum	5.20×10^{-8}	8.26×10^{-7}	7.47×10^{-5}	9.56×10^{-6}	1.06×10^{-4}	3.33×10^{-7}	1.25×10^{-6}	2.08×10^{-5}	1.55×10^{-6}	$4.33 \times 10^{-}$
Average	1.99×10^{-6}	5.11×10^{-5}	9.37×10^{-5}	5.92×10^{-5}	1.76×10^{-4}	3.74×10^{-5}	1.55×10^{-5}	2.87×10^{-4}	2.12×10^{-6}	$6.55 \times 10^{-}$
Number of Tests	13	18	3	8	3	11	4	10	2	3

A graphic presentation of hydraulic conductivity is shown in Appendix C.

Goodman Jack Tests

The Goodman jack is a borehole probe for measurement of borehole wall deformation as a function of an applied load. Data from the load-deformation measurements can be used to calculate the in-situ elastic moduli (Youngs modulus, E) of the rock. The probe is designed to operate in NX size (3.000-inch) holes. Deformation pressure is transmitted to the rock through hydraulic actuated movable plates. Two LVDT displacement transducers mounted at each end of the movable plates measure the deformation. The system also includes a portable solid-state indicator for measuring displacement, a hydraulic pump, pressure gauge, hydraulic hose and electric cable. The following table summarizes the results of Goodman Jack tests:

RESULTS GOODMAN JACK TESTS

Hole Number	Rock Type	Top Of Interval Tested (Feet)	Youngs Modulus			
			Extend		Refract	
			E(near)	E(far)	E(near)	E(far)
MF-102	Basalt	40.5	0.68	0.59	1.02	0.81
MF-102	Basalt	80.5	0.42	0.34	0.85	0.70
MF-102	Basalt	160.5	1.32	1.31	2.06	1.96
MF-105	Basalt	18.8	0.45	0.29	--	--
MF-105	Basalt	39.1	0.87	0.58	1.51	1.29
MF-105	Basalt	59.6	0.78	.036	--	--
MF-113	Basalt	80.8	2.46	1.66	2.21	1.48
MF-113	Basalt	101.5	2.58	2.22	2.76	2.46
MF-113	Paleo-alluvium	121.5	0.16	0.07	0.46	ERR
MF-113	Paleo-alluvium	130.6	53.91	15.58	--	--
MF-113	Paleo-alluvium	133.0	0.03	0.35	--	--
MF-117	Basalt	10.0	0.94	0.57	0.93	0.87
MF-117	Basalt	30.0	1.49	0.72	1.51	1.06
MF-117	Basalt	50.0	0.99	1.02	1.39	1.12
MF-117	Basalt	90.2	1.13	0.74	1.62	1.86

A graphic illustration of the lithology, results of the point-load tests and the results of the Goodman Jack tests are given in Appendix C.

It was proposed, and is recommended, that representative samples of the core be submitted to a materials testing laboratory for triaxial compressive testing and the determination of laboratory elastic properties. This would allow a correlation of the field and laboratory tests for the rock units at the Miner Flat dam site.

Piezometers

Piezometers have been installed in most of the holes drilled. In the 1985-1986 program the piezometers are of 1.5 inch PVC pipe. Figure 6 is a schematic diagram of a typical piezometer installation. Slotted PVC pipe was set opposite that section of the drill hole to be monitored. The section of the hole with the slotted PVC was filled with sand. A cement grout seal consisting of 1-bag of cement mixed with enough water to make it pourable--approximately 30 feet--was placed above the sand. The casing, and the space between the PVC pipe and the casing, were cemented to two feet below the bedrock. The piezometers were developed by blowing out the water in the piezometer until the return was clear.

The following table lists the drill holes in which piezometers have been installed in the Miner Flat dam area and measured water levels.

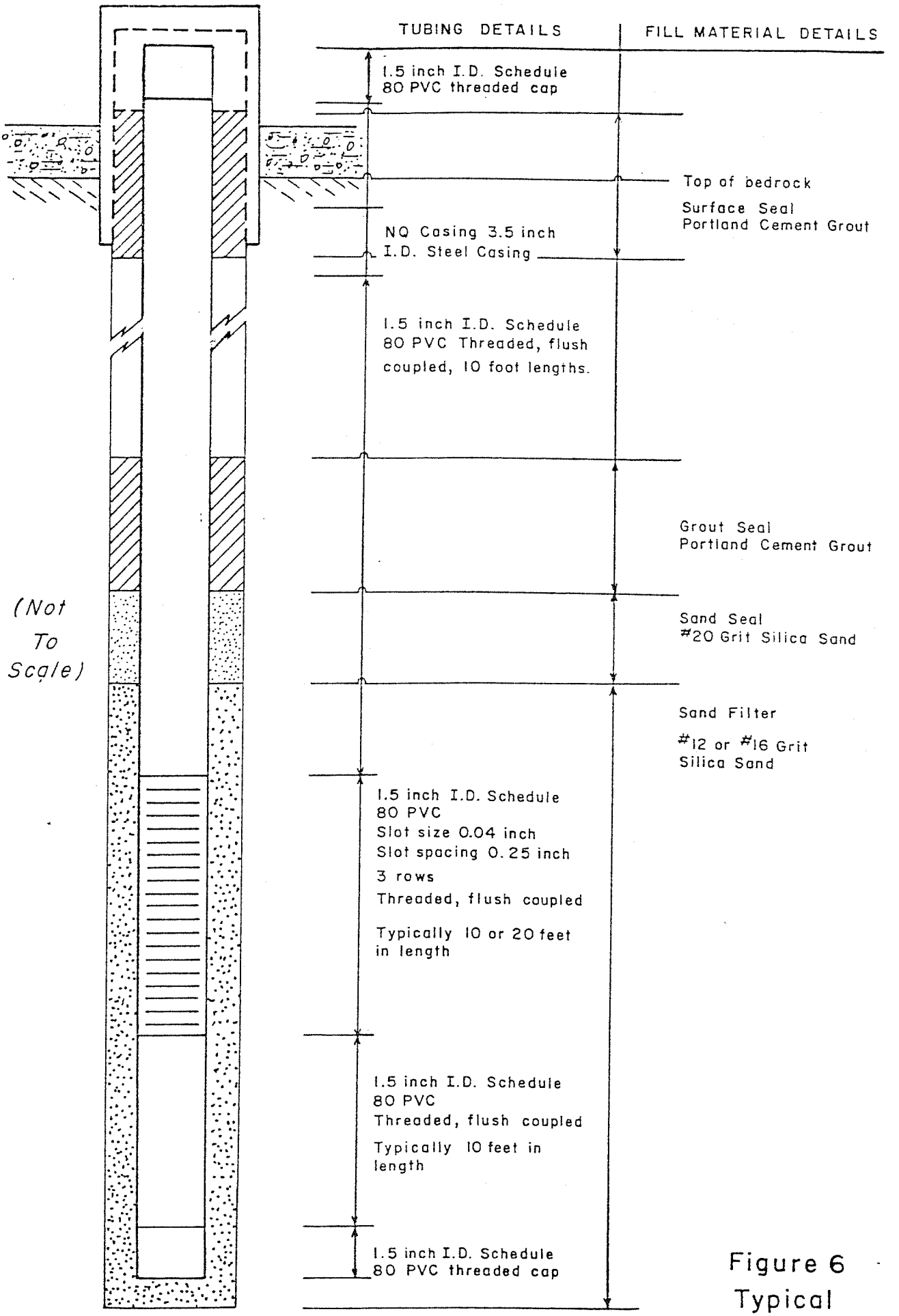


Figure 6
Typical
Piezometer Installation

Mineral Systems, Inc.

29-May-86

MINER FLAT DAM SITE: PIEZOMETERS and WATER LEVELS

HOLE	INSTALLED	DEVELOPED	MEASURED1	DEPTH1	ELEVATION1	MEASURED2	DEPTH2	ELEVATION2	MEASURED3	DEPTH3	ELEVATION3
OH-1	-	-		NA	NA		NA	NA		NA	NA
OH-2	06-Aug-83	-	21-Aug-83	0.4	5921.2		NA	NA	23-Apr-86	3.8	5917.8
OH-3	-	-		NA	NA		NA	NA		NA	NA
OH-3A		-		NA	NA		NA	NA		NA	NA
OH-4		-	21-Aug-83	0.8	5921.0		NA	NA		NA	NA
OH-5	12-Jul-83	-	21-Aug-83	157.8	5920.9		NA	NA		NA	NA
OH-10	06-Jun-83	-	21-Aug-83	4.1	5922.0	03-Mar-86	2.9	5923.1	23-Apr-86	2.9	5923.1
OH-11	06-Jun-83	-	21-Aug-83	8.0	5957.3	03-Mar-86	7.4	5957.9	23-Apr-86	7.4	5957.9
OH-12		-	21-Aug-83	96.4	6014.1		NA	NA		NA	NA
OH-13		-	21-Aug-83	76.7	6030.3		NA	NA		NA	NA
OH-14	22-Jul-83	-	21-Aug-83	173.9	5922.4		NA	NA		NA	NA
OH-19	26-Jul-83	-	21-Aug-83	-4.4	5921.6		NA	NA		NA	NA
MF-102	04-Feb-86	24-Mar-86	03-Feb-86	166.3	5915.8	03-Mar-86	165.3	5916.8	23-Apr-86	165.1	5917.0
MF-105	10-Jan-86	24-Mar-86	03-Feb-86	158.0	5923.4	03-Mar-86	159.8	5921.7	23-Apr-86	158.4	5923.0
MF-106	06-Dec-85	24-Mar-86	03-Feb-86	148.4	5925.4	03-Mar-86	150.0	5923.8	23-Apr-86	149.0	5924.8
MF-113	07-Mar-86	24-Mar-86		NA	NA	03-Mar-86	2.4	5918.1	23-Apr-86	-5.0	5925.5
MF-117	12-Mar-86	-		NA	NA		NA	NA		NA	NA
MF-118	15-Jan-86	24-Mar-86	03-Feb-86	138.0	5939.0	03-Mar-86	138.4	5938.6	23-Apr-86	138.8	5938.2
MF-119	17-Apr-86	23-Apr-86		NA	NA		NA	NA	23-Apr-86	30.2	6063.5
MF-120A	22-Apr-86	23-Apr-86		NA	NA		NA	NA	23-Apr-86	26.1	6055.9
MF-121	23-Feb-86	24-Mar-86		NA	NA	03-Mar-86	168.4	5921.4	23-Apr-86	168.1	5921.7
MF-122	08-Feb-86	24-Mar-86		NA	NA	03-Mar-86	153.2	5920.8	23-Apr-86	152.8	5921.2
MF-123	-	-		NA	NA		NA	NA		NA	NA
MF-124	04-Apr-86	23-Apr-86		NA	NA		NA	NA	23-Apr-86	159.8	5920.8
MF-125A	07-Apr-86	23-Apr-86		NA	NA		NA	NA	23-Apr-86	153.2	5911.8

Drill Hole Surveying

Most of the holes drilled for core in 1985-1986 were surveyed using an Owl Model 1275 digital borehole survey instrument. The survey data and graphic plots of the drill holes are given in Appendix F.

ENGINEERING GEOLOGY

The purpose of the 1985-1986 geotechnical investigations were to better define the distribution, engineering properties, and hydrology of the geologic materials in and adjacent to the proposed alignment for the Miner Flat dam. The work was done by drilling and coring holes, and subjecting the holes and core to testing. As a result of the drilling, the geologic maps (figs. 2 and 3) have been modified from those prepared in 1982 and 1983. The locations of drill holes are shown on figures 2 and 3. Geologic cross sections have been prepared from the geologic maps and the logging and surveying of the drill holes. Figure 7 is a geologic section along the dam axis at a scale of 1:1200 (1 inch = 100 feet). Figures 8 and 9 show geologic sections through the left abutment ridge at a scale of 1:600 (1 inch = 50 feet).

GEOLOGIC UNITS

The dam proposed at Miner Flat is to be a gravity concrete dam. The dam will be founded on basalt. The reservoir will be over surficial deposits that overlie the Supai Formation, the paleocolluvium/ paleoalluvium, the basalt and the Quaternary/Tertiary gravels. The distribution, hydrologic characteristics, and engineering properties of these units will influence the design and construction of the dam and reservoir.

Supai Formation

The upper part of the Supai Formation forms much of the bedrock under the reservoir and the east bank (fig. 2). A Supai Formation ridge forms part of the left abutment of the dam (fig. 3) overlying the Supai Formation is the paleocolluvium/paleoalluvium or basalt.

The Supai Formation consists for the most part of fine-grained sandstone. In the lower part of the section, for the most part below the reservoir, are interlayed sandy siltstone, gypsiterous sandstone and gypsum. The beds are friable to slightly indurated. Locally the lower part of a bed may be cemented with calcium carbonate, or gypsum, making them relatively hard. The uniaxial compressive strength, as determined from point-load tests, or estimated, ranged from about 14,000 to 10 psi. The hydraulic conductivity as determined by packer tests in drill holes ranged from 1.53×10^{-3} to 3.33×10^{-7} cm/sec.

Paleocolluvium/Paleoalluvium

Paleocolluvium (including talus) developed on the Supai Formation along the valley that was eroded into the Supai Formation prior to the floor of the basalt. The paleocolluvium/paleoalluvium are locally exposed between the basalt and Supai Formation in the walls of the present valley (fig. 2).

The paleocolluvium/paleoalluvium as exposed and intersected by drill holes ranged in thickness from 0 to almost 69 feet. In general, this material did not core well because of the range in rock types that compose the material and the range in sorting. The paleocolluvium could consist of only weathered Supai sandstone; angular blocks of sandstone that probably represented talus slopes or pieces of sandstone in silt and clay representative of slope-wash deposits. The paleoalluvium includes clay, silt and sand, and gravel, cobbles and boulders composed of igneous, metamorphic or sedimentary rocks from older formations, or basalt. The materials were poorly consolidated and core recovery was low. It was not possible to obtain representative samples for point-load tests. By placing the packer at the base of the overlying basalt, however, it was possible to determine the hydraulic conductivity. The hydraulic conductivity ranged from 1.06×10^{-4} to 9.56×10^{-6} cm/sec.

Basalt

The basalt will be the foundation of the dam and form both abutments. The basalt occurs on either side of the modern stream, but the mass of the basalt is to the west. The basalt filled a paleo-channel the axis of which is west of the present river (fig. 7). The flows came down the paleochannel in a series of tongues. From the coring and logging several different flows have been identified at the dam site. At the base is typically a massive flow. Most of the massive flow is fine-grained to aphanitic and slightly porphyritic with phenocrysts to 1mm of olivine. At the base will be a zone of less than a half a foot to 3 feet thick of scoraceous and vesicular basalt that has incorporated sand, pieces of sandstone, basalt fragments, or pebbles and cobbles from the underlying paleocolluvium/paleoalluvium. The upper part of the basalt is composed of a series of flows including vesicular and scoraceous basalt. Typically a thin paleosol of brown silty clay occurs between the individual flows. In drill hole 120A, west of the dam site, a 30 + foot paleosol, or paleoalluvium occurred between flows.

The engineering properties of the basalt have been extensively tested. In summary, the strength ranged from about 42,000 to 957 psi (Appendix F), the hydraulic conductivity from 1.15×10^{-4} to 5.20×10^{-8} cm/sec (Appendix D) and Youngs Moduli (E) from 0.34 to 2.76 (Appendix E).

Quaternary/Tertiary Gravel

Overlying the basalt flows at the dam site is a deposit of silt, sand, gravel and cobbles of unknown age. These deposits were formed by stream flowing on, and eroding the basalts. Near the head of the reservoir, on the east and west sides (fig. 2) equivalent gravels are overlain by younger basalt. The gravels are poorly consolidated and coring is difficult. Most of the fines are washed away, and only pieces of the pebbles and cobbles are recovered. From exposures along Highway 73 near Post Office Creek it may be seen that the deposits consist mostly of thin bedded sand and silt with local lenses of gravel and cobbles. On weathered surfaces, as on the Supai Formation ridge east of the left abutment, there is a lag concentration of the gravel and cobbles.

Channels were eroded into the basalt and the Supai Formation by the streams that deposited the Quaternary/Tertiary gravels. Figure 9 shows cross-sections along the Supai Formation ridge east of the left abutment of the dam. Based on the drilling, a channel filled with gravel deposits has been defined. The base of the channel is at an elevation about 6010 feet, which is about 50 feet below the maximum reservoir level.

STRUCTURE

The sedimentary rock units and the basalt flows are almost horizontal. The geologic structures that will influence the design and construction of the dam are the joints and the flow boundaries. No faults were identified in the area of the dam or reservoir.

Joints are not conspicuous in the sedimentary rocks. Because of the extensive cover (colluvium) there are only limited exposures of the sedimentary rocks, and these are the more massive units. In general, the joints are parallel or at right angles to the strike of the beds and dip steeply.

Columnar jointing, typical of basalt flows, occur in the area (fig. 4). The joints are near vertical. The joints in one flow do not extend into the joints in overlying or underlying flows. Joints do occur along the flow boundaries. These joints are near horizontal. Typically the joints, and flow boundaries in the basalt are filled, or their surfaces coated, with a fine silty clay.

GEOHYDROLOGY

The movement of water in the area of the dam and reservoir will be determined by the permeability of the bedrock. In order to evaluate the probable movement numerous packer tests were conducted in the drill holes (Appendix D).

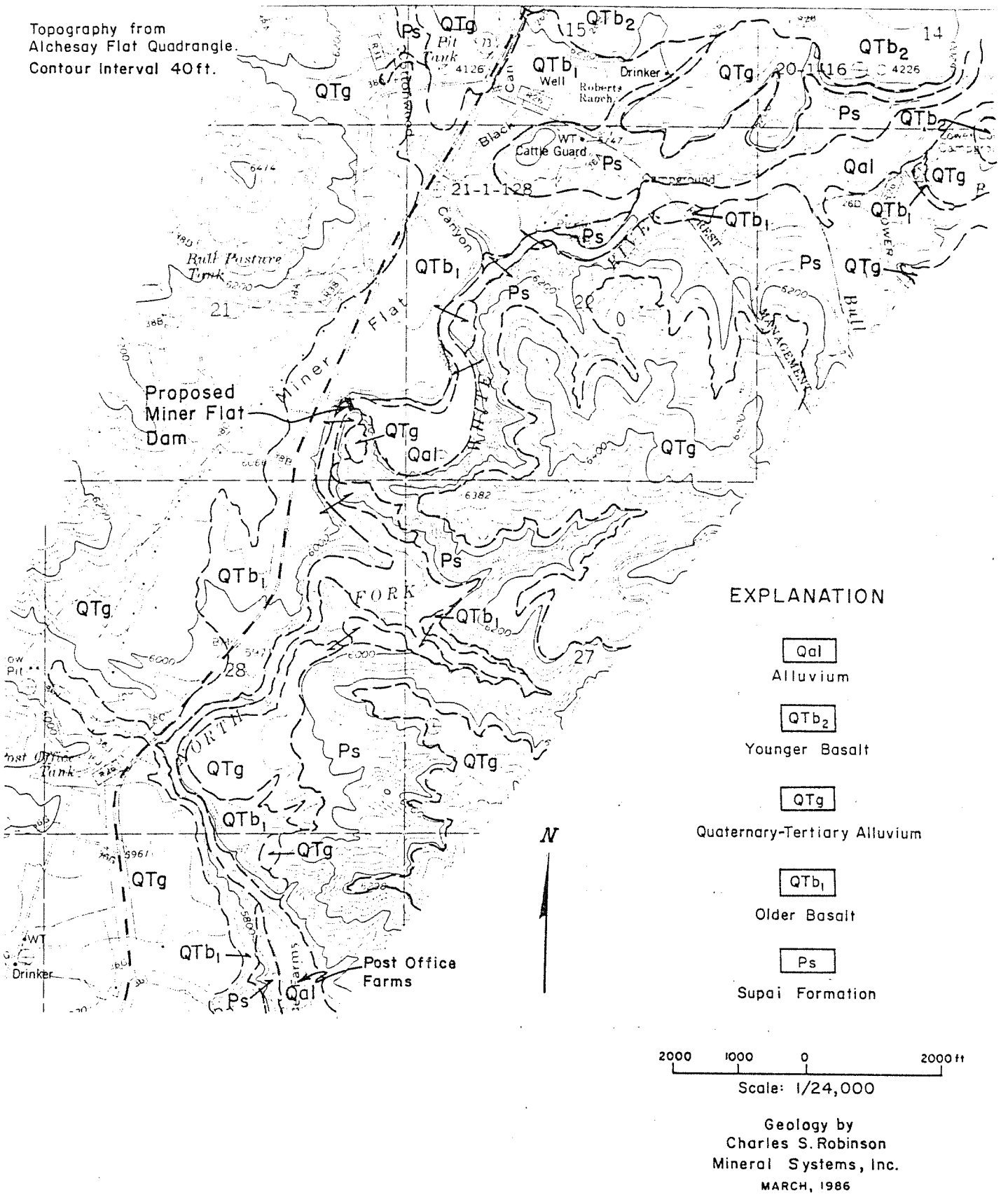
The permeability of the bedrock will depend upon the fracture permeability and the granular permeability. There are few fractures in the sedimentary rocks, and the permeability is primarily a granular permeability. The columnar jointing and the jointing along the flow boundaries in the basalt will be the primary permeability in the basalt. This permeability is limited, as shown by the packer tests. Below the zone of weathering in the basalt, or behind the joints opened by weathering and stress relief in the basalt cliffs, there is little interconnection between the joints and, as a result, the permeability is very low.

Of particular importance in the study of the Miner Flat dam and reservoir was the relation of the paleocolluvium/paleoalluvium to the dam and reservoir. These were the deposits on which the basalt was emplaced. From the geologic mapping it was known that the paleocolluvium/paleoalluvium would intersect the reservoir. It was considered possible that these deposits could serve as hydraulic channels from the reservoir.

Figure 10 is a map that shows the distribution of the basalt in the Miner Flat reservoir area. At the base of the basalt is the paleocolluvium/paleoalluvium. At an assumed maximum reservoir elevation of 6060 feet, it may be seen that water from the reservoir could infiltrate the paleocolluvium/paleoalluvium. Based on the drilling and the geologic mapping it was possible to contour the base of the basalt flow and identify the approximate center of the channel down which the basalt flowed. Water from the reservoir that infiltrates the paleocolluvium/paleoalluvium will move towards the center of the old channel, and then down the old channel.

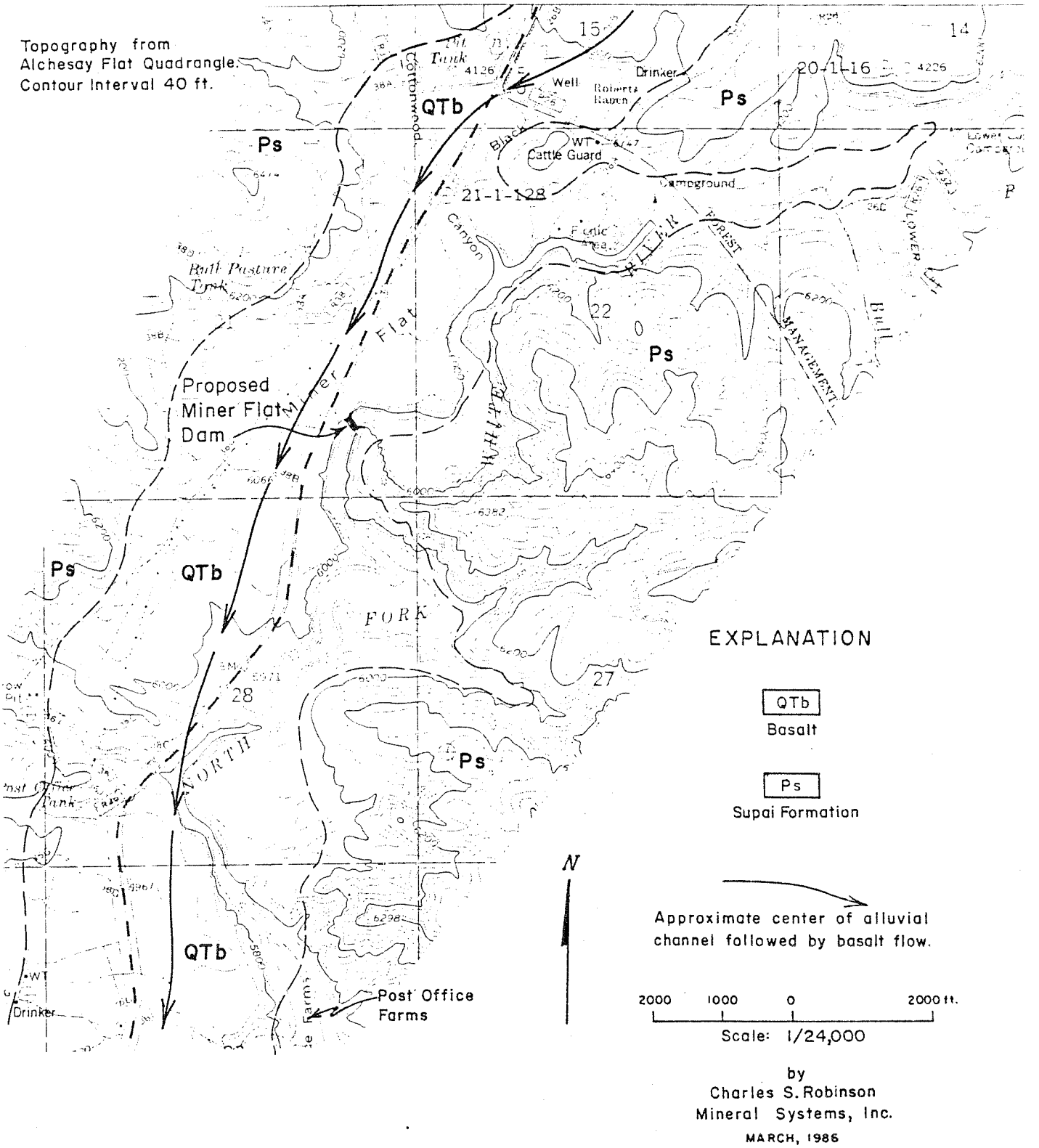
To determine where reservoir water that infiltrated the paleocolluvium/paleoalluvium might reappear, a reconnaissance geologic map was made of the entire Miner Flat dam and reservoir area (fig. 11). From that geologic map, a map showing the approximate limits of the Miner Flat basalt at the time of its emplacement was prepared (fig. 12). From these maps it may be seen that the reservoir water could not get out from under the basalt until at that point where the lower contact of the basalt crosses the North Fork of the White River just north of Post Office Farms.

Every effort was made to test the hydraulic conductivity of the paleocolluvium/paleoalluvium during the drilling program. Seven tests were conducted during the 1983 program and 11 tests in 1985-1986. The hydraulic conductivity ranged from 1.5×10^{-3} to 9.56×10^{-6} cm/sec, with an average of 1.20×10^{-4} cm/sec. With hydraulic conductivities this low, and a path length of more than one mile, the leakage from the reservoir through the paleocolluvium/paleoalluvium will not be significant.



Reconnaissance Geologic Map of the Miner Flat Dam Area, White Mountain Apache Reservation, Arizona

Figure 11



Map showing approximate location of Miner Flat basalt at time of emplacement. White Mountion Apache Reservation, Arizona

Figure 12

RECOMMENDATIONS

The geotechnical investigations of the Miner Flat dam site to date have defined the general suitability of the site for a concrete gravity dam and appurtenant structures. The following recommendations for additional geotechnical investigation are to establish more data for specific design of specific features.

DRILLING

Additional holes should be drilled for core, logged, tested and surveyed as have been the previous holes. Along the dam axis a 150 foot horizontal hole should be drilled, parallel to the dam axis about one third to one half way up the right abutment. A similar hole should be drilled on the left abutment, and an inclined hole should be drilled near the base of the left abutment. The holes in the left abutment should be drilled through the basalt, the paleocolluvium/paleoalluvium and into the sandstone. Short drill holes should be drilled into bedrock to below design grade in the area of all appurtenant structures. This would include at least three holes along the diversion tunnel, or cut, two holes at the power house, two holes along the line of the

proposed penstocks, and at least one hole in the stilling basin. The purpose of those holes would be to determine the depth of bedrock and the competency of the bedrock.

One or more holes should be drilled in the Quaternary/Tertiary gravel filled channel east of the left abutment. The shape of this channel needs to be better defined to design the cut off structure that will be required.

LABORATORY TESTING

Core samples of the different rock types drilled, and those to be drilled should be submitted to a materials testing laboratory for determination of uniaxial and triaxial compressive strengths. These laboratory data could then be correlated with the field measurements to define the in-situ engineering properties of the rock. The discontinuities in the rock, particularly the joints in the basalt, vertical and horizontal, should be subjected to direct shear tests. Based on these data, and the field data, a rock mass classification could be developed for the foundation rock for the dam.

DAM ANALYSES

Four major analyses have yet to be done; a final rock mass classification of the rock that will be involved in the construction, an analyses of the groundwater hydrology on reservoir filling, a slope-stability analyses of the cliffs downstream of the dam and above the power house, and an analyses of erosion in/or below the stilling basin. The program recommended above, and previous work, should give adequate data to make such analyses.

VOLUME II

PRELIMINARY REPORT

ENGINEERING GEOLOGY MINER FLAT DAM SITE

WHITE MOUNTAIN APACHE RESERVATION

NAVAJO COUNTY, ARIZONA

Prepared for

Morrison-Maierle, Inc.
Helena, Montana

by

Mineral Systems, Inc.
Golden, Colorado

July, 1986

VOLUME II

CONTENTS

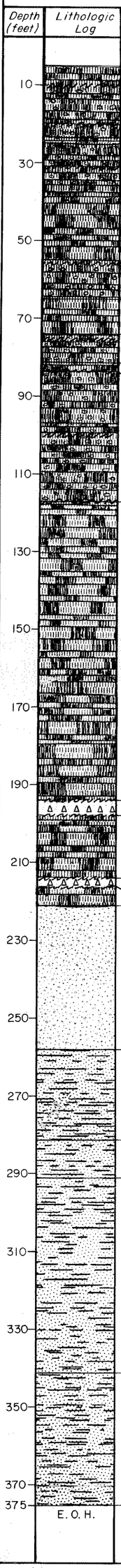
APPENDIX A

Lithologic Logs of Drill Holes

MINER FLAT

DRILL HOLE NO. MF-102
Elevation: 6076 feet
Bearing: 320°
Date Started: 1/21/86

Drilled by: Kelmine Exploration
Logged by: Charles H. Robinson
Inclination: 72°
Date Completed: 1/30/86



Depth (feet)	Description
	Fill and colluvium
10	Basalt, aphanitic, porphyritic, olivine, massive
	Basalt, vesicular, aphanitic, porphyritic, olivine phenocrysts. Clay-filled fractures, slightly weathered.
30	Basalt, vesicular, scoracious basalt at flow boundry at 31.6' Clay-filled vesicules
	Basalt, massive, very fine grained to aphanitic, porphyritic, olivine phenocrysts.
50	
	Basalt, vesicular, clay-filled fractures
70	Basalt, massive
	Basalt, vesicular, highly fractured. Clay-filled fractures
	Basalt, massive, very fine grained
90	
	Basalt, scoracious, highly fractured, vesicular, aphanitic, clay-filled fractures and vesicules.
110	
130	Basalt, massive, very fine grained to aphanitic, porphyritic, olivine phenocrysts. Highly fractured to 139.8'. Clay-filled fractures
150	Fracture, clay-filled at 150'
170	
190	
	Basalt, flow breccia, scoracious, weathered
	Basalt, massive
210	
	Basalt, flow breccia
	Basalt, massive
230	Paleo-colluvium. Upper 2 feet basalt and sandstone boulders. Sandstone boulders <0.5 - 1.65 feet in diameter in sand matrix, moderately yellowish brown.
250	
270	Sandstone, moderately yellowish brown, fine grained, silty, slighty calcareous.
290	Sandstone, reddish to yellowish brown, silty and sandy siltstone, local brecciation.
310	Sandstone, reddish brown, fine grained, silty, locally diagenetic breccia, white sandstone fragments.
330	
350	Sandstone, medium reddish brown, fine grained, with pale light gray silty sandstone, includes silty clay clasts. Gypsiferous, gypsum beds and veinlets to 0.4 feet thick. Locally sandstone brecciated
370	
375	E. O. H.

~~~~~ -- Flow boundary

Mineral Systems, Inc.
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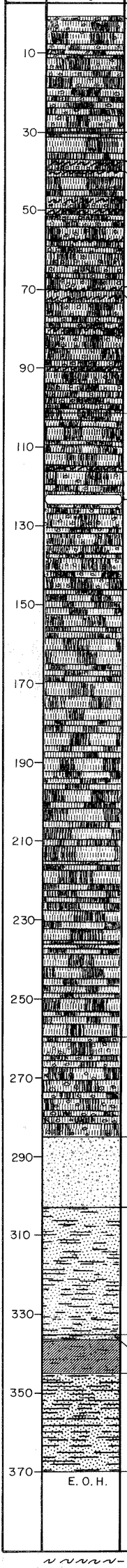
MINER FLAT

DRILL HOLE NO. MF-105
Elevation: 6073 feet
Bearing: 140°
Date Started: 11/23/85

Drilled by: Kelmine Exploration
Logged by: Charles H. Robinson
Inclination: 72°
Date Completed: 1/8/86



Description

Colluvium, weathered from basalt

Basalt, vesicular, fine grained, porphyritic, phenocrysts of olivine. Vesicules 20.01 to 0.25 feet, clay filled, weathered.

Basalt, massive, fine grained to aphanitic, porphyritic.

Basalt, vesicular. Vesicules clay filled.

Basalt, massive, very fine grained

Basalt, vesicular, horizontal fractures, olivine phenocrysts. Fractures clay filled or sand filled.

Basalt, massive, porphyritic.

Basalt, vesicular, fine grained to aphanitic, porphyritic, fractured, vesicules to 0.2 feet. Becomes more massive with depth. Fractures and vesicules filled with sandy clay.

Basalt, massive, medium gray, fine grained to aphanitic, porphyritic. Fractures clay filled.

Lava tube

Basalt, vesicular, locally ropey texture. Vesicules elongate parallel to flow banding. Vesicules and fractures clay filled. Some vesicules quartz filled.

Basalt, massive, medium gray to dark gray, very fine grained to aphanitic, porphyritic, phenocrysts of olivine, fractured. Fractures filled or stained with light brownish gray clay and/or soft olive green talc-like mineral.

Basalt, vesicular, medium gray, vesicules to 0.1 feet, aphanitic. Fractures and vesicules clay filled.

Paleo-alluvium. Boulders, cobbles and gravel in silty sand. Clasts of sandstone, limestone, quartzite, granite and basalt.

Sandstone, silty, reddish orange and yellowish orange, fine to medium grained, poorly indurated, fractures tight.

Sandstone, gypsiferous breccia

Gypsum, sandy and silty

Sandstone, fine grained, silty gypsum 354.5-355.0. Gypsiferous, veinlets of gypsum to 0.05 feet. Locally gypsiferous sandstone breccia.

~~~~~ Flow boundary

Mineral Systems, Inc.
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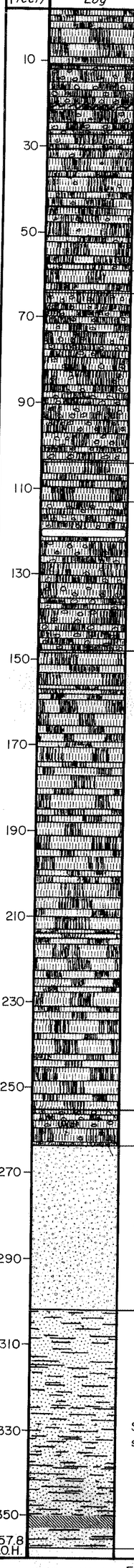
MINER FLAT

DRILL HOLE NO. MF-106
Elevation: 6072 feet
Bearing: 246.9°
Date Started: 11/17/85

Drilled by: Kelmine Exploration
Logged by: Charles H. Robinson
Inclination: 89.4
Date Completed: 12/5/85



Description
Basalt, massive, very fine grained, aphanitic, porphyritic. Few vesicules, clay on fractures.
Basalt, vesicular, very fine grained to aphanitic, porphyritic, olivine phenocrysts. Clay on fractures.
Basalt, slightly vesicular, fine grained to aphanitic. Vesicules filled with clay or silica, clay stained fractures.
Basalt, massive to slightly vesicular
Basalt, vesicular, equigranular, olivine, fine grained to aphanitic. Vesicules filled with clay or silica, clay stained fractures.
Basalt, massive, very fine grained to aphanitic, porphyritic, olivine.
Open cavity
Basalt, vesicular, very fine grained to aphanitic. Vesicules < 0.01 to 0.1 ft. Filled with clay or silica.
Basalt, massive, very fine grained to aphanitic, porphyritic, phenocrysts of olivine. Locally fractured with fractures filled with clay or tight.
Basalt, vesicular, scoraceous, flow breccia.
Paleo-alluvium, boulders, cobbles and gravel in silty sand matrix. Clasts of basalt, granite, gneiss, chert, sandstone and limestone.
Sandstone, reddish orange and yellowish red, fine grained, silty, clayey, slightly calcareous, gypsiferous 341 - 352.8 ft.

~~~~~ - Flow boundary

Mineral Systems, Inc.
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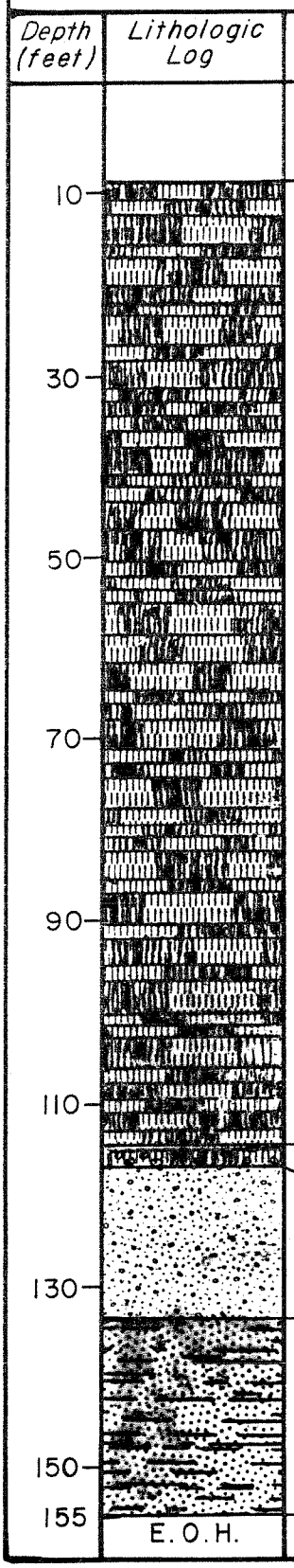
MINER FLAT

DRILL HOLE NO. MF-113
Elevation: 5920 feet
Bearing: 211.1°
Date Started: 2/25/86

Drilled by: Kelmine Exploration
Logged by: Charles H. Robinson
Inclination: 89.7°
Date Completed: 3/27/86



Fill

Basalt, massive, medium gray, very fine grained to aphanitic, porphyritic, phenocrysts of olivine, magnetic. Fractured, fractures tight or slightly clay stained.

Basalt, vesicular, scoraceous, aphanitic.

Paleo-alluvium. Boulders, cobbles, gravel in silty sand. Clasts of basalt, granitic rock, chert, sandstone and limestone.

Sandstone, reddish brown, silty, very fine to fine grained.

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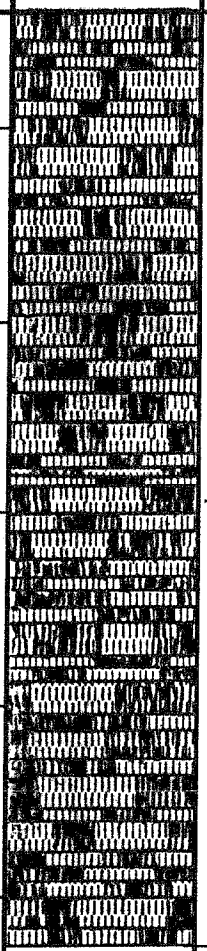
MINER FLAT

DRILL HOLE NO. MF-117
Elevation: 5924 feet
Bearing: 308.7°
Date Started: 3/7/86

Drilled by: Kelmine Exploration
Logged by: Charles H. Robinson
Inclination: 26°
Date Completed: 3/9/86

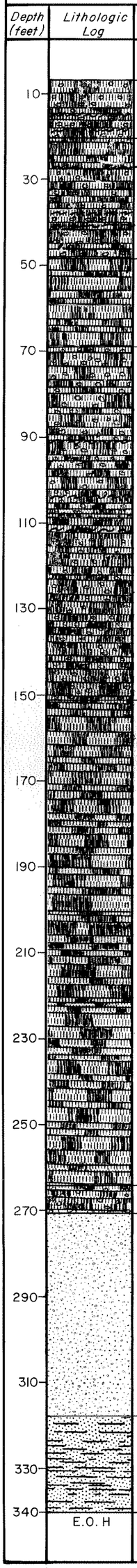
Depth (feet)	Lithologic Log	Description
10		Basalt, massive, medium dark gray, very fine grained to aphanitic, porphyritic. Phenocrysts of olivine to 1 mm. Locally fractured. Fractures filled with clay.
30		
50		
70		
90		
97.4	E. O. H.	

Mineral Systems, Inc.

MINER FLAT

DRILL HOLE NO. MF-118
Elevation: 6077 feet
Bearing: 243.8°
Date Started: 1/11/86

Drilled by: Kelmine Exploration
Logged by: Charles H. Robinson
Inclination: 89.5°
Date Completed: 1/15/86



Description
Colluvium, silty clay
Basalt, vesicular, dark gray, aphanitic, porphyritic, olivine phenocrysts, vesicules up to 0.15 feet. Clay on fractures.
Basalt, massive, very fine grained to aphanitic, porphyritic.
Basalt, vesicular, very fine grained to aphanitic, slightly weathered. Paleosol 38.1 and 40.3. Clay filled fractures and vesicules.
Basalt, massive, medium gray, very grained, porphyritic, phenocrysts of olivine, slightly vesicular. Vesicules filled with clay.
Basalt, vesicular, medium to dark gray, aphanitic, porphyritic, phenocrysts of olivine. Vesicules filled with clay or silica. Paleosol at 90.3, 104 and 112. Fractures filled or stained with clay. Slightly weathered.
Basalt, massive, medium gray and dark brownish gray, very fine grained, porphyritic, phenocrysts of olivine. Locally fractured, fractures coated with clay.
Basalt, vesicular and scoraceous, aphanitic
Paleo-alluvium, boulders, cobbles and gravel in silty sand. Cobbles of basalt, granitic rocks, chert, quartzite, sandstone and limestone. Boulders to 1.35 feet.
Sandstone, reddish and yellowish orange, fine grained, slightly cemented with $CaCo_3$, generally poorly consolidated. Locally diagenetic breccia.

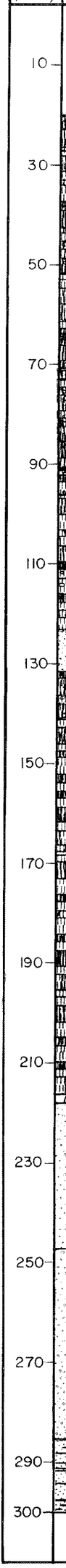
~~~~~ – Flow boundary

Mineral Systems, Inc.
~~~~~

MINER FLAT

DRILL HOLE NO. MF-119
Elevation: 6094 feet
Bearing: 231.9°
Date Started: 4/8/86

Drilled by: Kelmine Exploration
Logged by: Charles H. Robinson
Inclination: 89.9°
Date Completed: 4/16/86



Description
Colluvium. Silty clay, yellowish brown, cobbles of quartzite
Basalt, vesicular, medium gray, slightly weathered
Basalt, massive, medium gray, fine grained, porphyritic, olivine phenocrysts, slightly weathered.
Basalt, vesicular, aphanitic, porphyritic, olivine phenocrysts, moderate gray. Vesicules filled with clay and silica.
Basalt, massive, medium gray, very fine grained to aphanitic, porphyritic, olivine phenocrysts, fractures filled with silica and clay.
Basalt, vesicular, silica filled vesicules.
Basalt, massive, slightly weathered
Basalt, vesicular, scoraceous
Basalt, massive Flow boundary with 1.3 feet paleosol
Basalt, vesicular, reddish gray, weathered.
Basalt, massive, medium gray, very fine grained, aphanitic, porphyritic, olivine phenocrysts.
Basalt vesicular, reddish gray, aphanitic, silica and clay filled vesicules
Paleosol, reddish gray, silty and clayey silt with cobbles or gravel of basalt.
Basalt, vesicular, medium gray and grayish red, aphanitic, ropey flow banding.
Basalt, massive, medium gray, very fine grained to anphanitic, porphyritic, phenoclasts of olivine. Local clay filled fractures
Basalt, flow breccia, fragments of basalt in clay matrix.
Paleo-colluvium talus, reddish brown to reddish orange and light gray sandstone fragments to 0.5 foot in silty sand matrix.
Paleo-alluvium, reddish orange, cobbles and gravel of basalt, quartzite and sandstone in silty and clayey sand matrix. Limestone, quartzite and sandstone pebbles, slightly calcareous.
Sandstone, light yellowish gray, fine grained, friable to slightly calcareous cement, silty and clayey locally.

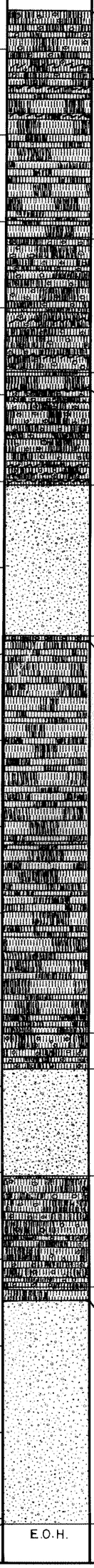
~~~ — Flow boundary

Mineral Systems, Inc.
~~~

MINER FLAT

DRILL HOLE NO. MF-120A
Elevation: 6082 feet
Bearing: 246°
Date Started: 4/18/86

Drilled by: Kelmine Exploration
Logged by: Charles H. Robinson
Inclination: 89.5°
Date Completed: 4/21/86



Depth (feet)	Description
	Colluvium
10	Basalt, vesicular, medium gray, aphanitic, porphyritic, olivine phenocrysts.
30	Basalt, massive, medium gray, very fine grained to aphanitic, porphyritic, phenocrysts of olivine.
50	
70	Basalt, vesicular, medium gray and reddish gray, aphanitic, porphyritic, phyenocrysts of olivine. Vesicules and fractures filled with silica and clay.
90	Basalt, massive, reddish gray, olivine phenocrysts.
	Basalt, vesicular, reddish gray, aphanitic, porphyritic, olivine phenocrysts.
110	Paleosol, medium gray to reddish gray basalt cobbles, gravel and sand in a dense clay matrix. Interflow alluvial deposit.
130	
150	Basalt, vesicular, medium gray, aphanitic, porphyritic.
170	
190	Basalt, massive, medium gray, very fine grained to aphanitic, porphyritic, olivine phenocrysts. Clay stain on fractures.
210	
230	Basalt, vesicular, aphanitic, scoraceous and ropy, cobbles of basalt, clay and sand matrix.
250	Paleosol alluvium. Cobbles and gravel of sandstone, basalt, quartz, quartzite and chert in reddish orange silty sand matrix.
270	Basalt, vesicular, medium gray, aphanitic, porphyritic, olivine phenocrysts. Basalt breccia 275.2-276, 276.7-276.9, 278-278.5 Clay matrix. vesicules filled with clay or silica.
290	Basalt, massive, medium gray very fine grained to aphanitic, porphyritic. At base basalt breccia.
310	Paleo-alluvium, grayish orange, boulders, cobbles and gravel of sandstone, basalt, granitic rocks, metamorphic rocks, quartzite, limestone and chert in silty and clayey sand matrix.
330	
350	
351	E.O.H.

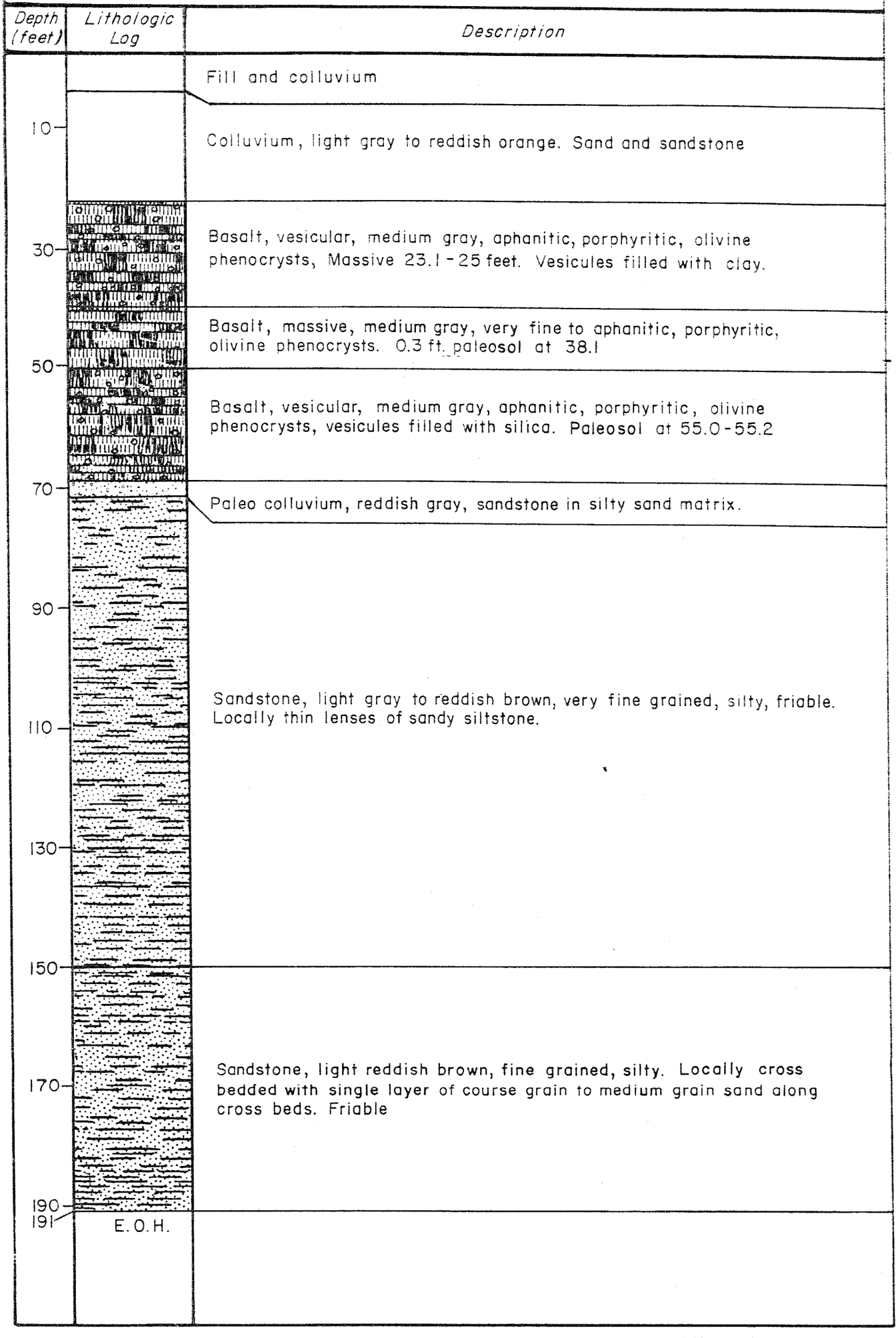
~~~~~ – Flow boundary

Mineral Systems, Inc.
~~~~~

MINER FLAT

DRILL HOLE NO. MF-121
Elevation: 6090 feet
Bearing: 271°
Date Started: 2/10/86

Drilled by: Kelmine Exploration
Logged by: Charles H. Robinson
Inclination: 89.8°
Date Completed: 2/28/86

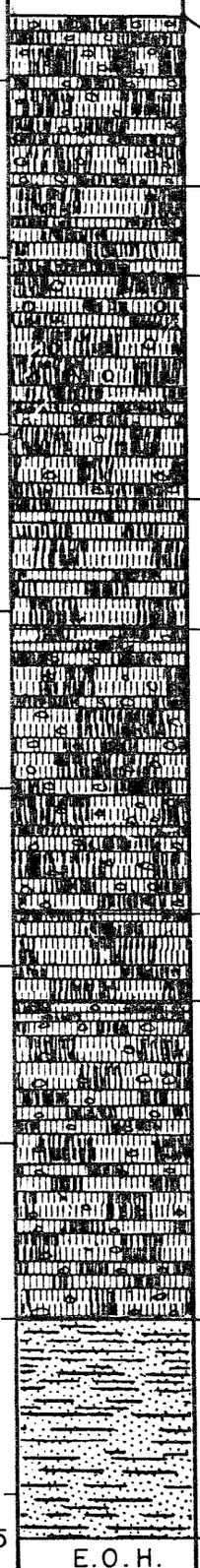


Mineral Systems, Inc

MINER FLAT

DRILL HOLE NO. MF-122
Elevation: 6064 feet
Bearing: 278.5°
Date Started: 2/5/86

Drilled by: Kelmine Exploration
Logged by: Charles H. Robinson
Inclination: 89.9°
Date Completed: 2/8/86



Depth (feet)	Lithologic Log	Description
		Colluvium, clayey sand
10		Basalt, vesicular, medium gray, aphanitic, porphyritic, olivine phenocrysts. Silica and clay filled vesicules and fractures. Specular hematite?
30		Basalt, massive, medium gray, very fine grained, porphyritic, olivine phenocrysts.
50		Basalt, vesicular, medium gray, weathers reddish brown, aphanitic, porphyritic, olivine phenocrysts. Vesicules and veins filled with coarse basalt sand and clay.
70		Basalt, massive, medium gray, very fine grained, porphyritic, olivine phenocrysts. Vesicules filled with clay at 65 ft.
90		Basalt, vesicular, medium gray, aphanitic, porphyritic, olivine phenocrysts. Slightly weathered. Clay and silica filling vesicules.
110		Basalt, massive, medium gray, very fine grained to aphanitic, porphyritic. Flow fractures.
130		Basalt, vesicular and scoraceous, medium gray, aphanitic, porphyritic, olivine phenocrysts. Sand size rock fragments between blocks of scoraceous basalt up to 1.5 ft. long.
150		Sandstone, light reddish brown to medium brown, fine grained. Contact of basalt and sandstone sharp at 150.3 ft.. Less than 0.03 ft. of paleo-colluvium. Sandstone silty and friable
170		
175	E.O.H.	

Mineral Systems, Inc.

MINER FLAT

DRILL HOLE NO. MF-123
Elevation: 6113 feet
Bearing:
Date Started: 3/13/86

Drilled by: Kelmine Exploration
Logged by: Charles H. Robinson
Inclination: 90°
Date Completed: 3/25/86

Depth (feet)	Lithologic Log	Description
10		
30		Quaternary - Tertiary Gravel. Cobbles and gravel in clayey, silty sand. At 43ft. 2-3 ft. dark carbonaceous sandstone. From 51 ft., cobbles, gravel and sand of white, fine grained sandstone.
50		
70		Sandstone, light gray to pinkish gray, light pinkish orange, fine grained, silty, moderately indurated. Sandstone breccia at 74-76 ft.
90		
110		Sandstone, light gray to light pinkish gray, fine grained, silty, poorly indurated. Below 113ft. interbedded reddish brown silty and clayey fine grained sandstone.
130		Sandstone, medium reddish brown, fine to medium grained, silty, some clay, poorly indurated.
150		Sandstone, light reddish to light yellowish brown, fine grained to very fine grained, silty, locally clayey, poorly indurated.
207.5	E.O.H.	

~~~~~ Flow boundary

Mineral Systems, Inc.
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MINER FLAT

DRILL HOLE NO. MF-124
Elevation: 6081 feet
Bearing:
Date Started: 3/1/86

Drilled by: Kelmine Exploration
Logged by: Charles H. Robinson
Inclination: 90°
Date Completed: 3/4/86

Depth (feet)	Lithologic Log	Description
10		Quaternary - Tertiary Gravel. Cobbles, gravel, sand and silt.
30		Basalt, vesicular, medium gray, aphanitic, porphyritic, olivine phenocrysts. Vesicules filled with silty clay.
		Vesicular, clay filled flow boundary
50		
		Basalt, massive, medium gray, very fine grained, porphyritic, olivine phenocrysts. Vertical fractures, clay filling.
70		
90		Basalt, vesicular, medium gray, aphanitic, porphyritic, olivine phenocrysts. Vesicules clay.
110		Sandstone, light reddish orange, very fine grained, very friable. 99.4 - 101.3 only 2 pieces of sanstone recovered. Paleo-colluvium?
130		
180	E. O. H.	

~~~~~-Flow boundary

Mineral Systems, Inc.
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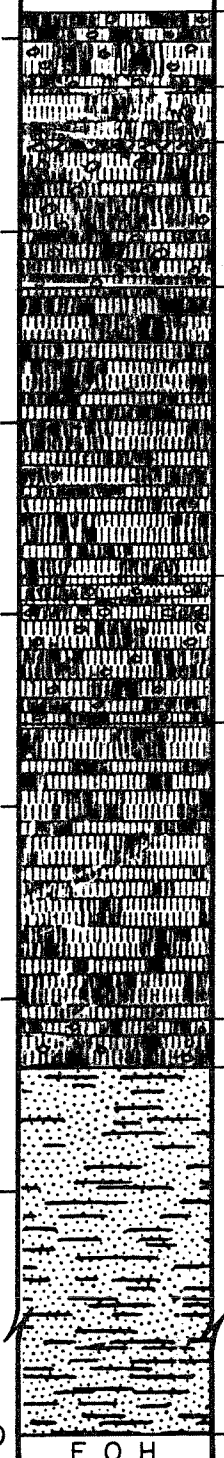
MINER FLAT

DRILL HOLE NO. MF-125A
Elevation:
Bearing: 189.9°
Date Started: 3/5/86

Drilled by: Kelmine Exploration
Logged by: Charles H. Robinson
Inclination: 89.9°
Date Completed: 3/7/86



Depth (feet)	Description
	Quaternary - Tertiary gravel
10	Basalt, vesicular, medium gray, aphanitic, porphyritic, olivine phenocrysts.
	Basalt, massive, medium gray, very fine grained, porphyritic.
30	Basalt, vesicular, medium gray, very fine grained to aphanitic, porphyritic, olivine phenocrysts, slightly magnetic. Clay filled vesicules and fractures.
50	Basalt, massive, medium gray, very fine grained to aphanitic, porphyritic, olivine phenocrysts, slightly magnetic. Fractures vertical, stained with clay.
70	Basalt, vesicular, very fine grained to aphanitic, porphoritic. Vesicules filled with clay.
90	Basalt, massive, medium gray, very fine grained to aphanitic, porphyritic, olive phenocrysts, slightly magnetic.
110	Basalt, vesicular, medium gray, aphanitic.
130	Sandstone, pinkish gray to reddish orange, fine to very fine grained, silty, thinly bedded, poorly indurated.
170	E.O.H.

~~~~~~-Flow boundary

Mineral Systems, Inc.
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APPENDIX B

Engineering Geologic Logs of Drill Holes

APPENDIX B

CODING SYSTEM FOR ENGINEERING GEOLOGIC LOG OF CORE

The following form was used to log the core from the drill holes. The headings across the top are self explanatory. An explanation for the columns is as follows:

Depth: -- Depth at bottom of hole at the completion of each run usually reported by driller.

Weathering/Alteration: -- This is a record of type of weathering or alteration of the rock and the intensity, Table 11, Appendix B.

Rock Type: -- This is the genetic name for the type of rock in the core. If more than one type of rock encountered in a run, the run is logged by rock type. Two letter system used. Table 3. Mineral modifiers are used to further define the rock. Table 4. The grain size is defined on table 5. Texture bedding and sorting are defined by Table 6.

R.Q.D.: -- Is the combined length of core pieces greater than 4-inches long expressed as a percentage of the total core run.

Total Core Recovery: -- Length of core recovered.

Dip of Fractures: -- The number of fractures in the run form angles of 90°-70°, 70°- 50°, and 30°-0° as measured from the core axis, are recorded. Original logging used 90°-60°, 60°-40°, 40°-20 ° and 20°-0°. The roughness is measured using the scale in Appendix A. Alteration or

filling along the fracture is defined on Tables 7, 8 and 9, Appendix B. The type or genetic classification of fractures is given in Table 10.

Strength: -- Selected samples of rock core were tested in the field with a point load tester. It has been found that a reasonable correlation exists between the Point Load Index and the Uniaxial Compress Strength of Material (Bieniawski, 1974).

The Point Load Index (Is) is:

$$IS = \frac{P}{D^2}$$

where P is the failure load and D is the distance between platens. The uniaxial compressive strength σ_c is:

$$\sigma_c = 24\ Is$$

The gauge reading on the point load tester is recorded in the initial logging.

SCR: -- Selected core recovery. The total length of core in a run greater in length than 1 foot expressed as a percentage of the total run.

Comments: -- Notes that may be significant in the interpretation of the engineering properties of the rock or test results are recorded.

MINER FLAT DAM SITE

TABLE 1: ROCK MASS WEATHERING/ALTERATION

CODE	DESCRIPTION
	UNWEATHERED/UNALTERED
A	ARGILLIC
Q	SILICIFICATION
B	CALCAREOUS
W	WEATHERED
	NO DESCRIPTION

MINER FLAT DAM SITE

TABLE 2: INTENSITY

CODE	DESCRIPTION
F	FRESH
S	SLIGHTLY
M	MODERATELY
H	HIGHLY
C	COMPLETELY
R	RESIDUAL SOIL

MINER FLAT DAM SITE

TABLE 3: GENETIC ROCK TYPE

CODE	DESCRIPTION	
BA	BASALT	IGNEOUS
SS	SANDSTONE	SEDIMENTARY
SI	SILTSTONE	SEDIMENTARY
SM	SILTY SANDSTONE	SEDIMENTARY
GY	GYPSUM/ANHYDRITE	SEDIMENTARY
PA	PALEO-ALLUVIUM	SEDIMENTARY
PC	PALEO-COLLVIUM	SEDIMENTARY
FI	FILL	SEDIMENTARY
CO	COLLUVIUM	SEDIMENTARY
TG	TERTIARY GRAVEL	SEDIMENTARY

MINER FLAT DAM SITE

TABLE 4: MINERAL MODIFIERS

CODE	DESCRIPTION
	NO MINERAL MODIFER
O	OLIVINE
Q	QUARTZ
M	SILT
S	SAND
G	GYPSUM
C	CLAY
	NO MINERAL MODIFER
F	IRON
R	GRAVEL
B	COBBLES
O	BOULDERS
A	CARBONATE

MINER FLAT DAM SITE

TABLE 5: GRAIN SIZE

CODE	DESCRIPTION	
A	APHANITIC	IGNEOUS
B	BOULDER	SEDIMENTARY
C	COBBLES	SEDIMENTARY
G	GRAVEL	SEDIMENTARY
V	VERY FINE	IGNEOUS AND METAMORPHIC
F	FINE	IGNEOUS AND METAMORPHIC
M	MEDIUM	IGNEOUS AND METAMORPHIC
R	COURSE	IGNEOUS AND METAMORPHIC
P	VERY COURSE	IGNEOUS AND METAMORPHIC
	NO GRAIN SIZE	SEDIMENTARY

MINER FLAT DAM SITE

TABLE 6: TEXTURE, BEDDING, SORTING

CODE	DESCRIPTION	
V	VESICULAR	IGNEOUS
M	MASSIVE	IGNEOUS
A	APHANITIC	IGNEOUS
P	PORPHYRTIC	IGNEOUS
B	BEDDED	SEDIMENTARY
T	THINNLY BEDDED	SEDIMENTARY
L	LAMINATED	SEDIMENTARY
R	BRECCIATED	IGNEOUS
	NO TEXTURE	IGNEOUS
S	SCORACIOUS	IGNEOUS
X	CROSS BEDDED	SEDIMENTARY

MINER FLAT DAM SITE

TABLE 7: FRACTURE CHARACTERISTICS

CODE	DESCRIPTION
T	TIGHT
O	OPEN
S	STAINED
F	FILLED
H	HEALED
	NO CHARACTERISTICS

MINER FLAT DAM SITE

TABLE 8: STAIN TYPES

CODE	DESCRIPTION
I	IRON
C	CLAY

MINER FLAT DAM SITE

TABLE 9: FILLING TYPES

CODE	DESCRIPTION
Q	QUARTZ
C	CLAY
	NO FILLING TYPES
R	CRUSHED ROCK
G	GYPSUM
F	IRON

MINER FLAT DAM SITE

TABLE 10: GENETIC DISCONTINUITY CLASSIFICATION

CODE	DESCRIPTION
SJ	SINGLE JOINT
JS	JOINT SET
FB	FLOW BOUNDRY
CT	CONTACT
BD	BEDDING

MINER FLAT DAM SITE

TABLE 11: STRENGTH

CODE	DESCRIPTION
S1	VERY SOFT SOIL/ROCK
S2	SOFT SOIL/ROCK
S3	FIRM SOIL/WEAK ROCK
S4	STIFF SOIL
S5	VERY STIFF SOIL
R1	VERY WEAK ROCK
R2	WEAK ROCK
R3	MEDIUM STRONG ROCK
R4	STRONG ROCK
R5	VERY STRONG ROCK

ENGINEERING GEOLOGIC LOG
BOREHOLE: MF-102

SITE:	MINER FLAT DAM SITE	NORTHING:	1,085,798.00	DRILLING METHOD:	NQ3 TRIPLE TUBE CORE
LOCATION:	LEFT ABUTEMENT	EASTING:	576,853.00	DRILLING CONTRACTOR:	KELMINE EXPLORATION
BOREHOLE:	MF-102	ELEVATION:	6,078.40	START DEPTH:	0.00
START DATE:	01/21/86	INCLINATION:	77.9	LOGGED BY:	CHR
COMPLETION DATE:	01/30/86	BEARING:	319.3	PAGE:	1

DEPTH (ft.)	WEATH/ ALT	ROCK TYPE	RQD (%)	TOT CORE RECOVERY (%)	DIP OF FRACTURES TO CORE AXIS: 90 - 70 NO	90 - 70 RGH	90 - 70 ALT	90 - 70 TYPE	70 - 50 NO	70 - 50 RGH	70 - 50 ALT	70 - 50 TYPE	50 - 30 NO	50 - 30 RGH	50 - 30 ALT	50 - 30 TYPE	30 - 0 NO	30 - 0 RGH	30 - 0 ALT	30 - 0 TYPE	STRENGTH (psi)	SCR (%)	CM
8.0	WF	BAD VP	10.0	33.8	0	0			0	0			0	0			0	0			17,089	0.0	‡
12.7	WS	BAD VP	74.5	100.0	5	4	FC	SJ	0	0			0	0			4	3	FC	SJ	17,089	32.3	‡
23.3	WF	BAD VV	68.4	97.2	6	3	T	SJ	0	0			0	0			3	3	FC	SJ	19,419	67.5	‡
31.2	WF	BAD VM	83.0	98.7	6	4	T	SJ	0	0			0	0			3	4	FC	SJ	22,215	83.0	‡
41.8	WF	BAD VV	52.9	82.4	7	4	FC	SJ	0	0			0	0			3	4	FC	SJ	18,642	39.1	‡
51.0	WF	BAD VM	71.5	100.0	3	3	T	SJ	6	3	FC	SJ	0	0			2	3	FC	SJ	17,089	29.7	‡ #
61.0	WF	BAD VM	74.5	98.0	0	0			5	3	SC	SJ	0	0			3	2	SC	SJ	17,399	37.1	‡
71.0	WF	BAD VM	78.7	100.0	0	0			5	3	SC	SJ	0	0			2	2	SC	SJ	26,721	59.3	‡
81.0	WF	BAD VM	72.3	98.5	0	0			2	3	SC	SJ	0	0			7	3	FC	SJ	22,526	53.0	‡
91.0	WS	BAD VV	25.3	87.5	12	4	FC	SJ	5	3	FC	SJ	0	0			8	3	FC	SJ	10,875	14.7	‡
101.0	WS	BAD VS	0.0	28.0	0	0			0	0			0	0			0	0			18,642	0.0	‡
111.0	WS	BAD VS	0.0	26.0	0	0			0	0			0	0			0	0			R3	0.0	
121.0	WF	BADQVM	21.2	50.0	2	3	T	SJ	4	3	T	SJ	0	0			5	3	T	SJ	17,089	0.0	‡
131.0	WF	BADQFM	64.1	100.0	3	3	T	SJ	0	0			4	3	T	SJ	5	4	T	SJ	29,517	49.2	
139.8	WF	BADQFM	11.5	48.3	11	3	SC	SJ	7	4	FC	SJ	6	4	FC	SJ	8	3	FC	SJ	4,661	0.0	‡
150.1	WF	BAD FM	75.7	100.0	6	4	T	SJ	0	0			2	3	T	SJ	5	3	FC	SJ	34,954	47.8	‡
160.3	WF	BADQPM	84.8	100.0	4	3	T	SJ	2	3	T	SJ	0	0			2	3	SC	SJ	27,963	84.8	‡ #
170.6	WF	BADQPM	94.5	98.1	0	0			0	0			0	0			2	2	T	SJ	30,294	94.5	
180.7	WF	BADQPM	93.1	99.5	4	5	SC	SJ	2	4	SC	SJ	0	0			0	0			28,740	87.3	
190.8	WF	BADQPM	100.0	100.0	0	0			0	0			0	0			0	0			31,071	100.0	‡
200.9	WF	BADQPM	77.2	100.0	0	0			0	0			4	3	SC	SJ	2	2	FC	SJ	34,178	77.2	‡ #
211.0	WF	BADQVV	74.3	100.0	0	0			1	4	SC	SJ	0	0			8	2	FC	SJ	32,624	74.3	‡ #
220.4	WF	BADQVV	43.7	64.9	4	3	T	SJ	0	0			0	0			3	2	FC	SJ	24,856	17.0	‡
230.6	WR	PCSCGM	0.0	0.0	0	0			0	0			0	0			0	0			S2	0.0	‡
232.6	WR	PCSCGM	0.0	0.0	0	0			0	0			0	0			0	0			S2	0.0	‡
237.7	WR	PCSBFM	0.0	68.6	0	0			0	0			0	0			0	0			S2	0.0	‡
241.0	WR	PCSBFM	0.0	19.1	0	0			0	0			0	0			0	0			S2	0.0	‡
249.1	WR	PCSBFM	0.0	42.6	0	0			0	0			0	0			0	0			S2	0.0	
257.9	WR	PCSBFM	0.0	74.4	0	0			0	0			0	0			0	0			S2	0.0	‡
263.9	WS	SSS FM	40.5	83.3	4	2	T	SJ	0	0			0	0			1	2	T	SJ	2,641	28.3	‡
269.9	WS	SS AFM	18.8	23.8	1	2	T	SJ	0	0			0	0			0	0			932	18.8	‡

ENGINEERING GEOLOGIC LOG
BOREHOLE: MF-102

SITE:	MINER FLAT DAM SITE	NORTHING:	1,085,798.00	DRILLING METHOD:	NQ3 TRIPLE TUBE CORE
LOCATION:	LEFT ABUTEMENT	EASTING:	576,853.00	DRILLING CONTRACTOR:	KELMINE EXPLORATION
BOREHOLE:	MF-102	ELEVATION:	6,078.40	START DEPTH:	0.00
START DATE:	01/21/86	INCLINATION:	77.9	LOGGED BY:	CHR
COMPLETION DATE:	01/30/86	BEARING:	319.3	PAGE:	2

DEPTH (ft.)	WEATH/ ALT	ROCK TYPE	RQD (%)	TOT CORE RECOVERY (%)	DIP OF FRACTURES TO CORE AXIS: 90 - 70 NO	90 - 70 RGH	90 - 70 ALT	90 - 70 TYPE	70 - 50 NO	70 - 50 RGH	70 - 50 ALT	70 - 50 TYPE	50 - 30 NO	50 - 30 RGH	50 - 30 ALT	50 - 30 TYPE	30 - 0 NO	30 - 0 RGH	30 - 0 ALT	30 - 0 TYPE	STRENGTH (psi)	SCR (%)	CM
281.0	WF	SS AFM	0.0	10.8	0	0			0	0			0	0			0	0			2,330	0.0	*
291.0	WF	SSMAFR	85.8	91.5	0	0			0	0			0	0			0	0			777	85.8	*
301.0	WF	SSMAFR	50.0	52.0	0	0			0	0			0	0			0	0			621	50.0	*
311.0	WF	SSMAFR	100.0	100.0	0	0			0	0			0	0			0	0			1,165	100.0	* #
321.0	WF	SSM FR	38.2	71.7	5	4	FR	SJ	0	0			0	0			0	0			2,175	38.2	
331.0	WF	SSMCFR	40.3	54.4	8	2	T	SJ	3	2	T	SJ	0	0			0	0			699	36.2	*
341.0	WF	SSM FM	44.2	67.5	4	2	T	SJ	0	0			0	0			1	2	T	SJ	854	44.2	*
361.0	WF	SSMGFR	50.0	50.0	0	0			0	0			0	0			0	0			4,195	50.0	*
371.0	WF	SSMGFR	97.5	100.0	0	0			0	0			0	0			0	0			1,787	97.5	* #
375.0	WF	SSMGFR	100.0	100.0	0	0			1	2	T	SJ	0	0			0	0			2,253	100.0	* #

DEPTH ---------- COMMENT ----------

= TOTAL CORE RECOVERY > 100%

8.0 BOREHOLE ON LEFT ABUTEMENT DRILLED ALONG AXIS OF PROPOSED DAM.
12.7 TOP OF ROCK AT DEPTH OF 4.5 FEET. FLOW BOUNDRY AT 9.9 FEET.
23.3 MEDIUM GRAY OLIVINE BASALT; SLIGHTLY VESICULAR TO MASSIVE.
31.2 FLOW BOUNDRY AT 20 FEET; LOST DRILLING FLUID CIRCULATION AT 20 FEET.
41.8 SCORACIOUS BASALT (FLOW BOUNDRY) AT 31.6 FEET.
51.0 MASSIVE; VERY FINE-GRAINED; PORPHYRITIC; OLIVINE BASALT.
61.0 FLOW BOUNDRY AT 54.2-55 FEET.
71.0 VESICULAR BASALT TO 65 FEET; MASSIVE BASALT BELOW 65 FEET.
81.0 FLOW BOUNDRY 73.7-75 FEET.
91.0 SCORACIOUS BASALT; FLOW BOUNDRY BELOW 83 FEET.
101.0 FLOW BOUNDRY; GRAVEL TO COBBLE SIZED PIECES OF SCORACIOUS BASALT WITH CLAY.
121.0 FLOW BOUNDRY TO 117.2 FEET; MASSIVE BASALT BELOW 119.5 FEET.
139.8 INTENSELY FRACTURED
150.1 MASSIVE BASALT
160.3 QUARTZ FILLING OF FLOW BANDING; FLOW BANDING AT 20 DEGREES TO CORE AXIS.
190.8 ONE PIECE OF CORE 10.1 FEET LONG.
200.9 FRACTURE BELOW 198.6 PARALLEL TO CORE AXIS REDUCES RQD&SCR.
211.0 SCORACIOUS FLOW BRECCIA 204-208.2 FEET.
220.4 MASSIVE BASALT TO 215 FEET; FLOW BRECCIA WITH CLAY MATRIX BELOW 215 FEET.

DEPTH	COMMENT
	# = TOTAL CORE RECOVERY > 100%
230.6	NO RECOVERY; ROCK TYPE BASED ON MATERIAL BELOW.
232.6	DRILLING INDICATES UNCONSOLIDATED MATERIAL. PALEO-COLLUVIUM
237.7	SANDSTONE COBBLES UP TO 0.5 FEET IN DIAMETER.
241.0	RECOVERED ONE SANDSTONE COBBLE 0.5 FEET IN DIAMETER.
257.9	SANDSTONE BOULDER 1.65 FEET IN DIAMETER.
263.9	PALEO-COLLUVIUM/SANDSTONE CONTACT APPROX. 259 FEET.
269.9	MODERATE YELLOWISH BROWN;SANDSTONE;FINE-GRAINED;SLIGHTLY CALCAREOUS.
281.0	VERY SOFT & POORLY INDURATED SANDSTONE. HYDRAULIC COMMUNICATION WITH DH-4.
291.0	MEDIUM REDDISH BROWN & PALE YELLOWISH ORANGE;MOTTLED SILTY SANDSTONE BRECCIA
301.0	WATER LEVEL AT 166.45 FEET AT 9:00 AM.
311.0	ONE PIECE OF CORE 10.2 FEET LONG.
331.0	CLAYEY SILTY SANDSTONE TO SANDY SILTSTONE.
341.0	MEDIUM REDDISH BROWN TO PALE BLUEISH GRAY SILTY SANDSTONE WITH CLAY CLASTS.
361.0	GYPSIFEROUS SANDSTONE AT 347.5; BRECCIATED
371.0	GYPSUM VEINLETS UP TO 0.03 FEET THICK.
375.0	END OF HOLE

ENGINEERING GEOLOGIC LOG
BOREHOLE: MF-105

SITE:	MINER FLAT DAM SITE	NORTHING:	1,086,058.00	DRILLING METHOD:	NQ3 TRIPLE TUBE CORE
LOCATION:	RIGHT ABUTEMENT	EASTING:	576,636.00	DRILLING CONTRACTOR:	KELMINE EXPLORATION
BOREHOLE:	MF-105	ELEVATION:	6,078.40	START DEPTH:	0.00
START DATE:	11/23/85	INCLINATION:	72	LOGGED BY:	CHR
COMPLETION DATE:	01/08/86	BEARING:	140	PAGE:	1

DEPTH (ft.)	WEATH/ ALT	ROCK TYPE	RQD (%)	TOT CORE RECOVERY (%)	DIP OF FRACTURES TO CORE AXIS: 90 - 70 NO	90 - 70 RGH	90 - 70 ALT	90 - 70 TYPE	70 - 50 NO	70 - 50 RGH	70 - 50 ALT	70 - 50 TYPE	50 - 30 NO	50 - 30 RGH	50 - 30 ALT	50 - 30 TYPE	30 - 0 NO	30 - 0 RGH	30 - 0 ALT	30 - 0 TYPE	STRENGTH (psi)	SCR (%)	CM
5.8	WS	BAO VP	39.7	60.3	8	3	SI	SJ	0	0			0	0			4	3	SI	SJ	18,642	0.0	*
11.2	WS	BAO VP	61.1	100.0	9	3	SI	SJ	0	0			0	0			2	2	SI	SJ	18,642	20.2	
16.3	WF	BAO VP	95.9	98.4	2	3	T	SJ	1	3	SI	SJ	0	0			0	0			15,225	95.9	*
21.2	WS	BAO VV	63.7	100.0	6	6	FC	SJ	0	0			0	0			5	4	FC	SJ	21,749	0.0	* #
26.0	WF	BAO VV	62.3	87.5	8	3	SC	SJ	1	3	T	SJ	0	0			2	4	FC	SJ	15,225	26.0	
31.0	WF	BAO PV	75.0	98.6	5	3	SC	SJ	0	0			2	3	SC	SJ	2	3	SC	SJ	25,322	44.4	*
36.0	WF	BAO PV	100.0	100.0	0	0			0	0			0	0			2	3	SC	SJ	21,905	99.0	*
40.0	WF	BAO PV	85.0	100.0	4	4	FC	SJ	0	0			0	0			0	0			20,973	53.3	*
50.2	WF	BAO PV	50.1	99.0	8	3	FC	SJ	0	0			4	3	T	SJ	9	3	FC	SJ	25,322	19.1	*
59.5	WF	BAO PV	47.3	95.9	11	4	FC	SJ	0	0			5	3	SC	SJ	6	3	FC	SJ	23,148	17.5	*
68.0	WF	BAO PV	6.4	55.3	15	3	FC	SJ	0	0			5	3	FC	SJ	7	3	FC	SJ	18,953	0.0	*
75.2	WF	BAO PV	65.8	100.0	8	3	SC	SJ	0	0			7	3	FC	SJ	4	3	FC	SJ	20,196	47.9	*
85.0	WS	BAOFFP	49.5	93.4	12	3	FC	SJ	2	3	FC	SJ	4	3	FC	SJ	6	3	FC	SJ	18,642	34.0	*
92.5	WF	BAO FO	42.1	92.3	9	4	FC	SJ	4	3	FC	SJ	0	0			7	2	FC	SJ	12,894	17.3	*
102.8	WS	BAOFFB	73.8	98.5	12	4	FC	SJ	0	0			0	0			3	3	T	SJ	14,758	50.0	*
105.1	WF	BAOSVP	97.8	97.8	0	0			0	0			0	0			0	0			10,875	97.8	*
115.0	WF	BAOSPV	36.4	83.3	8	3	T	SJ	1	3	SC	SJ	0	0			3	5	FC	SJ	21,594	36.4	*
125.0	WS	BAO PV	26.2	65.0	11	4	SC	SJ	0	0			0	0			4	3	FC	SJ	18,642	25.8	*
135.0	WS	BAO PV	62.5	96.0	5	4	SC	SJ	8	3	SC	SJ	0	0			6	3	FC	SJ	15,535	10.0	*
145.0	WF	BAO VP	59.5	99.2	17	4	SC	FB	0	0			0	0			1	5	FC	SJ	15,535	40.0	*
155.0	WF	BAOQVM	73.5	100.0	12	3	SC	SJ	3	3	T	SJ	1	4	SC	SJ	1	3	T	SJ	23,303	60.0	* #
163.2	WF	BAOQVM	41.6	94.9	8	3	T	SJ	4	3	T	SJ	3	3	T	SJ	3	3	SC	SJ	24,080	27.1	
173.3	WF	BAOQVM	54.4	98.1	7	4	SC	SJ	7	3	T	SJ	0	0			6	3	SC	SJ	27,963	15.4	
183.5	WF	BAOQVM	15.7	98.8	18	3	T	SJ	5	4	T	SJ	16	3	T	SJ	13	3	SC	SJ	27,342	0.0	
193.8	WF	BAOQVM	31.3	97.1	10	4	T	SJ	9	4	T	SJ	4	3	T	SJ	9	3	SC	SJ	31,381	12.3	*
203.9	WF	BAOQVM	55.6	100.0	6	4	T	SJ	7	4	T	SJ	0	0			4	2	SC	SJ	28,585	36.7	
214.0	WF	BAOQVM	78.7	89.4	7	3	T	SJ	1	4	T	SJ	0	0			2	3	SC	SJ	31,071	39.6	
218.8	WF	BAOQVM	89.6	100.0	0	0			0	0			0	0			1	4	T	SJ	31,847	89.6	
229.1	WF	BAOQVM	84.8	97.9	5	5	T	SJ	2	3	T	SJ	0	0			4	2	T	SJ	32,624	69.0	
239.2	WF	BAOQVM	77.2	100.0	7	5	T	SJ	0	0			0	0			5	2	FC	SJ	20,973	45.5	* #
249.4	WF	BAOQVM	100.0	100.0	0	0			0	0			0	0			0	0			26,410	100.0	*

ENGINEERING GEOLOGIC LOG
BOREHOLE: MF-105

SITE:	MINER FLAT DAM SITE	NORTHING:	1,086,058.00	DRILLING METHOD:	NQ3 TRIPLE TUBE CORE
LOCATION:	RIGHT ABUTEMENT	EASTING:	576,636.00	DRILLING CONTRACTOR:	KELMINE EXPLORATION
BOREHOLE:	MF-105	ELEVATION:	6,078.40	START DEPTH:	0.00
START DATE:	11/23/85	INCLINATION:	72	LOGGED BY:	CHR
COMPLETION DATE:	01/08/86	BEARING:	140	PAGE:	2

DEPTH (ft.)	WEATH/ ALT	ROCK TYPE	RQD (%)	TOT CORE RECOVERY (%)	DIP OF FRACTURES TO CORE AXIS: 90 - 70 NO	90 - 70 RGH	90 - 70 ALT	90 - 70 TYPE	70 - 50 NO	70 - 50 RGH	70 - 50 ALT	70 - 50 TYPE	50 - 30 NO	50 - 30 RGH	50 - 30 ALT	50 - 30 TYPE	30 - 0 NO	30 - 0 RGH	30 - 0 ALT	30 - 0 TYPE	STRENGTH (psi)	SCR (%)	CM
259.6	WF	BAOQVM	100.0	100.0	0	0			0	0			0	0			0	0			35,731	100.0	‡
269.9	WF	BAOQVM	61.7	98.3	0	0			0	0			0	0			2	5	FC	SJ	35,731	61.7	‡
280.0	WF	BAOQVM	100.0	100.0	2	3	T	SJ	0	0			0	0			1	3	FC	SJ	23,303	100.0	‡
285.0	WS	BAO VV	64.0	92.0	6	2	FC	SJ	5	3	FC	SJ	0	0			10	2	FC	SJ	14,914	0.0	‡
290.0	WF	PARBGB	0.0	50.0	0	0			0	0			0	0			0	0			S2	0.0	‡
295.0	WF	PARBGB	0.0	78.0	0	0			0	0			0	0			0	0			S2	0.0	‡
300.0	WF	PARBGB	0.0	62.0	0	0			0	0			0	0			0	0			S2	0.0	
303.3	WF	PARBGB	0.0	51.5	0	0			0	0			0	0			0	0			S2	0.0	
305.0	WM	SSMCFM	95.9	100.0	0	0			0	0			0	0			0	0			1,554	100.0	
310.0	WM	SSMSFM	32.6	90.0	0	0			0	0			9	2	T	SJ	0	0			777	22.0	‡
315.0	WM	SSMCFL	97.0	100.0	4	2	T	SJ	0	0			0	0			0	0			2,020	47.0	
320.0	WM	SSMCFL	100.0	100.0	2	2	T	SJ	0	0			0	0			0	0			1,398	100.0	#
325.0	WM	SSMCFL	92.0	96.6	1	4	T	SJ	0	0			0	0			0	0			1,398	32.0	
330.0	WM	SISCVL	57.4	73.6	0	0			2	3	T	SJ	0	0			0	0			854	57.4	
335.1	WM	SSMCFB	0.0	52.4	4	3	T	SJ	0	0			2	2	T	SJ	0	0			699	0.0	
337.7	WF	SSMCVB	78.8	94.2	0	0			0	0			2	2	T	SJ	3	1	FC	SJ	2,486	78.8	
340.0	WF	GYSGFM	100.0	100.0	2	2	T	SJ	0	0			0	0			0	0			5,282	0.0	#
345.0	WF	GYMSFM	100.0	100.0	0	0			0	0			0	0			0	0			6,447	100.0	‡ #
350.0	WF	SMGCVB	70.0	100.0	0	0			0	0			0	0			6	3	T	SJ	1,864	56.0	‡
355.0	WF	GYSGMM	100.0	100.0	0	0			0	0			0	0			0	0			5,204	100.0	‡
360.0	WF	SSSGFM	100.0	100.0	0	0			0	0			0	0			0	0			3,029	100.0	‡
365.0	WF	SSMGVB	100.0	100.0	0	0			0	0			0	0			0	0			1,476	100.0	‡
370.0	WF	SSMGVB	96.0	96.0	0	0			0	0			0	0			0	0			2,641	96.0	‡

DEPTH ---------- COMMENT ----------

= TOTAL CORE RECOVERY > 100%

DEPTH	COMMENT
5.8	TOP OF ROCK APPROXIMATELY .75 TO 1.0 FEET
16.3	INCREASE IN VESICLES. VESICLES UP TO .25X.15 FEET.
21.2	JOINTS AND SOME VESSICLES FILLED WITH SANDY-SILTY CLAY.
31.0	FILM OF CLAY ON FRACTURE SURFACES.
36.0	MASSIVE BASALT
40.0	FLOW BOUNDRY 38.1 TO 40.0 FEET.

DEPTH	---------- COMMENT ----------
	# = TOTAL CORE RECOVERY > 100%
50.2	MASSIVE BASALT 42-48;FLOW BOUNDRY 48-50.2
59.5	VESSICULAR TO 57.5;FLOW BOUNDRY AT 57.5 WITH SANDY CLAY FILLED FRACTURES.
68.0	POOR RECOVERY/ASSUMED FLOW BOUNDRY
75.2	FLOW BOUNDRY AT 72 FEET
85.0	SLIGHTLY WEATHERED;FLOW BOUNDRY AT 80; 100% WATER LOSS AT 82-83.
92.5	PALEO-SOL AT 90 FEET; 0.25 FEET RECOVERED.
102.8	FLOW BANDING 10 DEGREES TO CORE AXIS AT 99 FEET.
105.1	STRENGTH MEASURED PARALLEL TO FLOW BANDING.
115.0	1 CLAY FILLED VERTICAL FRACTURE 108-110.3 FEET.
125.0	100% CIRCULATION LOSS AT 116.5; LAVA TUBE 122-125 FEET.
135.0	VESICULAR BASALT
145.0	FLOW BANDED BASALT 20 DEGREES TO CORE AXIS;VESICULAR TO "ROPEY TEXTURE"
155.0	FLOW BANDED "ROPEY TEXTURE" TO 147 FEET; 147 MASSIVE BASALT.
193.8	MASSIVE BASALT; HARD TO VERY HARD.
239.2	OLIIVE GREEN "TALC LIKE" FRACTURE FILLING.
249.4	ONE PIECE OF CORE 10.2 FEET LONG.
259.6	ONE PIECE OF CORE 10.2 FEET LONG.
269.9	1 VERTICAL FRACTURE 260.8-269.9 FEET.
280.0	CONTACT WITH FLOW BOUNDRY BRECCIA AT 279.9 FEET.
285.0	SCORACIOUS BASALT FRAGMENTS WITH CLAY MATRIX ; BRECCIA
290.0	PALEO-ALLUVIUM WITH LIMESTONE;QTZITE;CHERT;GRANITIC GRAVEL AND COBBLES.
295.0	BASALT BOULDER 293.5-295 FEET.
303.3	CONTACT WITH SUPAI SANDSTONE AT 303.3
305.0	MEDIUM REDDISH ORANGE AND PALE ORANGISH YELLOW SILTY SANDSTONE.
315.0	MEDIUM REDDISH ORANGE AND PALE ORANGISH YELLOW; MOTTLED; SILTY SANDSTONE .
325.0	POORLY INDURATED
330.0	MEDIUM REDDISH ORANGE SANDY SILTSTONE; POORLY INDURATED.
337.7	GYPSIFEROUS SANDSTONE BRECCIA.
340.0	CONTACT WITH GYPSUM AT 337.7
345.0	SILTY SANDSTONE INTERBED 343.4-344.4
350.0	GYPSIFEROUS SANDY SILTSTONE
355.0	SOLID GYPSUM
360.0	GYPSIFEROUS SANDSTONE
365.0	GYPSIFEROUS SILTY SANDSTONE.
370.0	END OF HOLE

ENGINEERING GEOLOGIC LOG
BOREHOLE: MF-106

SITE:	MINER FLAT DAM SITE	NORTHING:	1,086,059.60	DRILLING METHOD:	NQ3 TRIPLE TUBE CORE
LOCATION:	RIGHT ABUTEMENT	EASTING:	576,634.60	DRILLING CONTRACTOR:	KELMINE EXPLORATION
BOREHOLE:	MF-106	ELEVATION:	6,073.40	START DEPTH:	0.00
START DATE:	11/13/86	INCLINATION:	89.4	LOGGED BY:	CHR
COMPLETION DATE:	12/07/85	BEARING:	246.9	PAGE:	1

DEPTH (ft.)	WEATH/ ALT	ROCK TYPE	RQD (%)	TOT CORE RECOVERY (%)	DIP OF FRACTURES TO CORE AXIS: 90 - 70 NO	90 - 70 RGH	90 - 70 ALT	90 - 70 TYPE	70 - 50 NO	70 - 50 RGH	70 - 50 ALT	70 - 50 TYPE	50 - 30 NO	50 - 30 RGH	50 - 30 ALT	50 - 30 TYPE	30 - 0 NO	30 - 0 RGH	30 - 0 ALT	30 - 0 TYPE	STRENGTH (psi)	SCR (%)	CM	
5.0	WF	BAO PV	16.4	27.0	3	2	SI	SJ	0	0			0	0			2	3	SI	SJ	16,467	0.0	†	
8.9	WF	BAO PV	24.4	100.0	4	3	T	SJ	0	0			4	4	SI	SJ	3	3	FQ	SJ	20,973	0.0	†	#
14.0	WF	BAO PV	98.0	100.0	0	0			0	0			0	0			2	4	SC	SJ	17,866	98.0	†	#
19.0	WF	BAO AV	74.6	94.0	6	5	SC	SJ	0	0			0	0			3	4	FC	SJ	10,875	62.6	†	
24.1	WS	BAO AV	57.8	91.6	8	8	FC	SJ	0	0			4	6	SC	SJ	3	4	FC	SJ	17,089	49.4	†	
29.2	WF	BAO VP	100.0	100.0	1	1	SC	SJ	0	0			0	0			1	2	FC	SJ	22,915	93.1	†	#
34.2	WF	BAO VP	52.6	98.0	5	4	SI	SJ	0	0			3	4	SC	SJ	3	6	FC	SJ	26,876	25.4	†	
39.2	WF	BAO VP	92.0	100.0	2	3	FC	SJ	1	3	T	SJ	0	0			1	6	FC	SJ	21,283	40.0		#
44.4	WF	BAO VP	60.4	97.5	7	5	FC	SJ	0	0			3	4	SC	SJ	1	6	SC	SJ	24,856	24.2		
49.4	WF	BAO VP	92.0	100.0	5	8	FC	SJ	2	4	T	SJ	0	0			0	0			21,749	58.0		#
54.3	WF	BAOQVM	100.0	100.0	1	3	SC	SJ	0	0			0	0			1	2	SI	SJ	26,876	100.0		#
59.4	WF	BAOQVM	95.5	97.5	0	0			0	0			1	3	SI	SJ	0	0			22,060	95.5	†	
64.4	WF	BAO VP	92.0	100.0	0	0			0	0			0	0			3	3	FC	SJ	27,187	92.0	†	#
69.5	WF	BAO VP	33.3	92.7	8	5	FC	SJ	0	0			5	4	T	SJ	6	4	FC	SJ	19,574	24.5		
74.6	WF	BAO VP	68.6	93.1	4	4	FC	SJ	0	0			0	0			2	4	FC	SJ	17,866	61.8	†	
79.4	WF	BAO VP	70.2	100.0	7	4	SC	SJ	0	0			3	6	T	SJ	2	3	FC	FB	22,215	37.1	†	#
84.7	WF	BAO AV	76.4	94.9	8	3	FC	SJ	3	4	FC	SJ	0	0			0	0			20,507	46.6	†	
89.8	WF	BAO AV	59.8	92.7	10	4	FC	FB	5	3	FC	SJ	0	0			5	2	FC	SJ	18,021	0.0	†	
94.9	WF	BAO AV	66.9	100.0	7	3	SC	SJ	2	4	SC	SJ	0	0			4	3	FC	SJ	22,526	55.5		
100.0	WF	BAOQVA	68.6	98.2	4	6	SC	SJ	0	0			0	0			1	5	FC	SJ	18,798	50.4	†	
104.9	WF	BAOQVP	98.8	100.0	3	4	SC	SJ	0	0			0	0			0	0			17,089	96.3		#
110.0	WF	BAOQVP	100.0	100.0	0	0			0	0			0	0			0	0			27,653	100.0		
115.1	WF	BAOQVP	81.0	99.0	3	3	FC	SJ	0	0			0	0			1	3	FC	SJ	23,303	72.5		
120.1	WF	BAOQVP	85.0	95.0	4	4	SC	SJ	1	2	SC	SJ	0	0			2	4	FC	SJ	18,642	34.2	†	
125.4	WF	BAO VP	0.0	25.5	11	3	FC	SJ	0	0			0	0			3	3	FC	SJ	17,866	0.0	†	
129.9	WF	BAO AV	89.6	98.4	3	4	FC	SJ	0	0			0	0			0	0			22,526	74.7		
134.8	WF	BAO AV	100.0	100.0	3	4	SC	SJ	0	0			0	0			1	3	T	SJ	13,205	92.2		#
140.0	WF	BAO AV	66.7	93.1	11	3	T	FB	0	0			0	0			1	4	FC	SJ	12,117	0.0	†	
145.0	WS	BAO AV	65.4	100.0	12	4	SC	FB	0	0			0	0			3	4	FC	SJ	7,768	0.0	†	
150.1	WF	BAOQAV	86.3	99.0	4	6	SC	FB	0	0			0	0			2	5	T	SJ	17,399	40.6	†	
155.0	WF	BAOQAV	58.2	100.0	7	5	SC	SJ	0	0			3	4	T	SJ	2	4	T	SJ	23,303	0.0		#

ENGINEERING GEOLOGIC LOG
BOREHOLE: MF-106

SITE:	MINER FLAT DAM SITE	NORTHING:	1,086,059.60	DRILLING METHOD:	NQ3 TRIPLE TUBE CORE
LOCATION:	RIGHT ABUTEMENT	EASTING:	576,634.60	DRILLING CONTRACTOR:	KELMINE EXPLORATION
BOREHOLE:	MF-106	ELEVATION:	6,073.40	START DEPTH:	0.00
START DATE:	11/13/85	INCLINATION:	89.4	LOGGED BY:	CHR
COMPLETION DATE:	12/07/85	BEARING:	246.9	PAGE:	2

DEPTH (ft.)	WEATH/ ALT	ROCK TYPE	RQD (%)	TOT CORE RECOVERY (%)	DIP OF FRACTURES TO CORE AXIS: 90 - 70 NO	90 - 70 RGH	90 - 70 ALT	90 - 70 TYPE	70 - 50 NO	70 - 50 RGH	70 - 50 ALT	70 - 50 TYPE	50 - 30 NO	50 - 30 RGH	50 - 30 ALT	50 - 30 TYPE	30 - 0 NO	30 - 0 RGH	30 - 0 ALT	30 - 0 TYPE	STRENGTH (psi)	SCR (%)	CM
160.0	WF	BAQQVP	3.0	3.0	3	4	T	SJ	0	0			0	0			0	0			22,060	3.0	
165.0	WF	BAQ VP	28.0	100.0	7	4	T	SJ	0	0			0	0			5	5	SC	SJ	26,876	0.0	‡
170.0	WF	BAQ VP	23.4	100.0	9	3	T	SJ	5	3	T	SJ	0	0			7	5	SC	SJ	26,565	0.0	
175.1	WF	BAQ VP	53.9	100.0	8	4	T	SJ	0	0			0	0			4	5	FC	SJ	34,954	19.6	#
180.0	WF	BAQ VP	43.9	100.0	11	3	T	SJ	6	3	T	SJ	0	0			3	5	FC	SJ	25,167	0.0	#
185.0	WF	BAQ VP	45.4	100.0	5	4	T	SJ	4	3	SC	SJ	0	0			4	4	SC	SJ	20,196	31.4	
190.0	WF	BAQQVP	54.0	100.0	5	4	T	SJ	0	0			4	4	T	SJ	7	4	T	SJ	27,963	21.8	
195.0	WF	BAQQVP	55.0	99.0	3	3	T	SJ	5	4	SC	SJ	0	0			3	4	SC	SJ	27,497	20.0	
200.0	WF	BAQQVP	76.6	100.0	0	0			0	0			2	4	T	SJ	1	3	FC	SJ	32,779	65.0	‡ #
204.9	WF	BAQQVP	100.0	100.0	0	0			0	0			0	0			0	0			30,138	100.0	#
210.0	WF	BAQQVM	98.6	98.6	0	0			0	0			0	0			0	0			32,158	98.6	
215.0	WF	BAQQVM	100.0	100.0	0	0			0	0			0	0			0	0			31,226	100.0	
220.0	WF	BAQQVM	98.8	99.6	0	0			0	0			0	0			0	0			29,828	98.8	
225.0	WF	BAQQVM	8.8	100.0	0	0			0	0			0	0			1	4	T	SJ	31,226	88.0	#
230.0	WF	BAQQVM	100.0	100.0	1	3	T	SJ	0	0			0	0			0	0			30,138	100.0	#
235.0	WF	BAQQVM	100.0	100.0	1	3	T	SJ	0	0			0	0			0	0			29,828	100.0	
240.0	WF	BAQQVM	99.0	99.4	0	0			0	0			0	0			0	0			29,517	99.0	
245.0	WF	BAQQVM	100.0	100.0	0	0			0	0			0	0			0	0			29,517	100.0	#
250.0	WF	BAQQVM	100.0	100.0	0	0			1	3	T	SJ	0	0			0	0			32,003	100.0	
255.0	WF	BAQQVM	80.0	100.0	2	4	T	SJ	0	0			1	4	FQ	SJ	0	0			31,692	80.0	‡
260.0	WF	BA GR	19.4	80.0	6	4	FC	SJ	0	0			0	0			5	3	FC	SJ	2,796	0.0	‡
263.4	WF	BA GR	0.0	58.8	10	3	FC	FB	6	3	FC	FB	0	0			0	0			R2	0.0	‡
267.4	WF	PAS CB	0.0	66.3	0	0			0	0			0	0			0	0			S2	0.0	‡
270.9	WF	PAMSCB	0.0	48.6	0	0			0	0			0	0			0	0			S2	0.0	
275.9	WF	PAMSCB	0.0	64.0	0	0			0	0			0	0			0	0			S2	0.0	
279.1	WF	PASCBB	0.0	53.1	0	0			0	0			0	0			0	0			S2	0.0	
284.3	WF	PASCBB	0.0	32.7	0	0			0	0			0	0			0	0			S2	0.0	
288.8	WF	PASCBB	0.0	70.0	0	0			0	0			0	0			0	0			S2	0.0	
294.7	WF	PASCBB	0.0	16.9	0	0			0	0			0	0			0	0			S2	0.0	
297.9	WF	PASCBB	0.0	46.9	0	0			0	0			0	0			0	0			S2	0.0	
301.0	WF	PASCBB	0.0	54.8	0	0			0	0			0	0			0	0			S2	0.0	

ENGINEERING GEOLOGIC LOG
BOREHOLE: MF-106

SITE:	MINER FLAT DAM SITE	NORTHING:	1,086,059.60	DRILLING METHOD:	NB3 TRIPLE TUBE CORE
LOCATION:	RIGHT ABUTEMENT	EASTING:	576,634.60	DRILLING CONTRACTOR:	KELMINE EXPLORATION
BOREHOLE:	MF-106	ELEVATION:	6,073.40	START DEPTH:	0.00
START DATE:	11/13/85	INCLINATION:	89.4	LOGGED BY:	CHR
COMPLETION DATE:	12/07/85	BEARING:	246.9	PAGE:	3

DEPTH (ft.)	WEATH/ ALT	ROCK TYPE	RQD (%)	TOT CORE RECOVERY (%)	DIP OF FRACTURES TO CORE AXIS: 90 - 70 NO	90 - 70 RGH	90 - 70 ALT	90 - 70 TYPE	70 - 50 NO	70 - 50 RGH	70 - 50 ALT	70 - 50 TYPE	50 - 30 NO	50 - 30 RGH	50 - 30 ALT	50 - 30 TYPE	30 - 0 NO	30 - 0 RGH	30 - 0 ALT	30 - 0 TYPE	STRENGTH (psi)	SCR (%)	CM
311.8	WM	SSMCFB	98.0	98.0	1	2	T	SJ	0	0			1	2	T	SJ	0	0			2,641	87.0	
317.0	WM	SSMCFB	68.8	87.5	0	0			0	0			3	2	T	SJ	2	2	T	SJ	932	27.5	
322.0	WM	SISCVB	92.2	100.0	0	0			0	0			0	0			3	3	T	SJ	1,709	61.0	#
327.0	WM	SSMCVB	57.4	98.2	0	0			2	3	FO	SJ	0	0			0	0			7,302	57.4	*
330.6	WM	SSM VB	100.0	100.0	0	0			0	0			7	2	T	SJ	0	0			1,329	100.0	#
335.9	WF	GY VM	86.7	86.7	3	2	T	BD	0	0			0	0			0	0			5,437	86.7	*
341.0	WF	SSMGFB	86.5	98.1	5	2	T	BD	0	0			0	0			0	0			2,020	75.0	*
346.0	WF	SSMCFB	95.0	100.0	0	0			6	2	T	SJ	0	0			0	0			2,409	95.0	*
351.0	WF	SSMGFR	68.0	100.0	5	2	T	SJ	0	0			0	0			5	6	FO	SJ	8,078	43.0	* #
352.8	WF	SSB FR	61.1	100.0	0	0			0	0			5	3	T	SJ	0	0			3,729	0.0	#
355.0	WF	GY FM	100.0	100.0	0	0			0	0			0	0			0	0			4,505	100.0	* #

DEPTH ---------- COMMENT ----------

= TOTAL CORE RECOVERY > 100%

5.0 0-3.5 FEET COLLUVIUM
8.9 8.4-8.6 FEET VERTICAL FRACTURE
14.0 ONE PIECE OF CORE 4.3 FEET LONG
18.0 15.0 FEET VESICULAR
24.1 20 FEET FLOW BOUNDRY; VERY VESICULAR WITH SILICA FILLINGS
29.2 DECREASE IN THE NUMBER OF VESICLES WITH DEPTH
34.2 30.1-33.0 FEET VERTICAL FRACTURE
59.4 MASSIVE; 4.21 FEET STICK OF CORE
64.4 62 FEET FLOW BOUNDRY
74.6 74 FEET FLOW BOUNDRY
79.4 76-77 FEET SLIGHT WEATHERING: FLOW BOUNDRY
84.7 80.1 FEET FLOW BOUNDRY WITH SILICA FILLED VESICLES
89.9 FLOW BOUNDRY
100.0 VERTICAL FRACTURE 1.3 FEET LONG
100.0 VERTICAL FRACTURE 1.3 FEET LONG
120.1 119.7 FEET 100% WATER LOSS
125.4 119.7-121.5 FEET OPEN LAVA TUBE
142.0 STRENGTH PARALLEL TO FLOW BANDING

DEPTH	---------- COMMENT ----------
	# = TOTAL CORE RECOVERY > 100%
145.0	STRENGTH TO FLOW BANDING; FLOW BOUNDRIES
150.1	147.2 FEET BOTTOM OF BASALT FLOW
195.0	DRILLING FLUID COMING UP DH-1
20[illegible].6	: FRACTURE @ 20 DEGREES 1/4 INCH THICK AND FILLED WITH CLAY
255.0	QUARTZ FILLED FRACTURE AT 60 DEGREES
260.0	253 FEET FLOW BRECCIA
263.4	FLOW BOUNDRY
267.4	PALEO- ALLUVIUM
302.0	CONTACT WITH SILTY SANDSTONE
327.0	330.1
335.8	330.9 CONTACT WITH GYPSUM
341.0	GYPSIFEROUS SANDSTONE
346.0	GYPSUM INCLUSIONS (INTRUSIONS ?)
351.0	SANDSTONE BRECCIA HEALED WITH GYPSUM
355.0	END OF HOLE

ENGINEERING GEOLOGIC LOG
BOREHOLE: MF-113

SITE:	MINER FLAT DAM SITE	NORTHING:	0	DRILLING METHOD:	NQ3 TRIPLE TUBE CORE
LOCATION:	RIGHT ABUTEMENT	EASTING:	0	DRILLING CONTRACTOR:	KELMINE EXPLORATION
BOREHOLE:	MF-113	ELEVATION:	5,920.50	START DEPTH:	0.00
START DATE:	02/25/86	INCLINATION:	89.7	LOGGED BY:	CHR
COMPLETION DATE:	02/27/86	BEARING:	211.1	PAGE:	1

DEPTH (ft.)	WEATH/ ALT	ROCK TYPE	RQD (%)	TOT CORE RECOVERY (%)	DIP OF FRACTURES TO CORE AXIS: 90 - 70 NO	90 - 70 RGH	90 - 70 ALT	90 - 70 TYPE	70 - 50 NO	70 - 50 RGH	70 - 50 ALT	70 - 50 TYPE	50 - 30 NO	50 - 30 RGH	50 - 30 ALT	50 - 30 TYPE	30 - 0 NO	30 - 0 RGH	30 - 0 ALT	30 - 0 TYPE	STRENGTH (psi)	SCR (%)	CM
9.1	WR	FISBRM	0.0	0.0	0	0			0	0			0	0			0	0			S2	0.0	*
13.4	WS	BAO VM	30.2	100.0	6	4	T	SJ	0	0			0	0			3	5	SC	SJ	30,294	0.0	*
14.3	WS	BAO VM	0.0	100.0	2	5	T	SJ	1	4	T	SJ	0	0			1	4	T	SJ	31,071	0.0	
19.5	WS	BAOQVM	16.3	99.6	12	4	T	SJ	3	4	T	SJ	0	0			5	5	T	SJ	32,313	0.0	*
24.5	WS	BAO VM	25.4	100.0	8	4	T	SJ	5	4	SC	SJ	0	0			6	4	SC	SJ	37,285	0.0	
29.6	WS	BAO VM	8.4	96.3	5	4	T	SJ	10	4	SC	SJ	0	0			6	4	SC	SJ	32,624	0.0	*
34.6	WF	BAO VM	28.0	100.0	3	5	T	SJ	8	4	SC	SJ	0	0			7	4	SC	SJ	31,071	0.0	
39.7	WF	BAOQVM	62.2	98.0	0	0			6	4	T	SJ	0	0			3	4	T	SJ	32,313	52.9	*
44.7	WF	BAOQVM	74.2	80.0	4	4	T	SJ	0	0			0	0			3	4	T	SJ	32,003	42.2	*
54.8	WF	BAOQVM	43.6	50.3	7	3	T	SJ	0	0			0	0			0	0			31,071	30.4	
59.9	WF	BAOQVM	100.0	100.0	7	3	T	SJ	0	0			0	0			0	0			36,352	0.0	
65.0	WF	BAOQVM	88.2	100.0	2	3	T	SJ	3	3	T	SJ	0	0			2	3	T	SJ	32,624	65.9	
70.0	WF	BAOQVM	84.0	98.0	5	3	T	SJ	0	0			0	0			0	0			30,760	37.0	
75.1	WF	BAOQVM	84.7	100.0	6	4	T	SJ	1	3	T	SJ	0	0			0	0			30,760	29.0	
80.0	WF	BAOQVM	91.8	100.0	4	3	T	SJ	0	0			0	0			0	0			27,963	68.6	
85.0	WF	BAOQVM	93.0	100.0	3	2	T	SJ	0	0			0	0			0	0			30,294	70.0	
90.0	WF	BAOQVM	98.0	100.0	1	2	T	SJ	2	2	T	SJ	0	0			0	0			34,799	68.0	
95.0	WF	BAOQVM	100.0	100.0	4	2	T	SJ	0	0			0	0			0	0			35,265	63.6	#
100.0	WF	BAOQVM	100.0	100.0	1	2	T	SJ	0	0			0	0			0	0			33,401	100.0	*
105.0	WF	BAOQVM	100.0	100.0	3	2	T	SJ	0	0			0	0			0	0			32,624	89.0	
110.0	WF	BAOQVM	91.4	100.0	0	0			2	2	T	SJ	0	0			0	0			41,168	91.4	*
115.0	WF	BAOQVM	64.0	99.0	8	2	T	SJ	0	0			0	0			0	0			34,178	33.4	*
120.0	WM	BAO VS	0.0	50.0	0	0			0	0			0	0			0	0			R2	0.0	*
125.0	WR	PAGRRB	0.0	67.4	0	0			0	0			0	0			0	0			S2	0.0	*
126.4	WR	PAGRRB	0.0	92.9	0	0			0	0			0	0			0	0			S2	0.0	*
129.3	WR	PAGRRB	0.0	51.7	0	0			0	0			0	0			0	0			S2	0.0	*
135.2	WR	PAGRRB	0.0	37.3	0	0			0	0			0	0			0	0			S2	0.0	*
140.0	WS	SSMSFM	47.9	89.6	5	4	T	SJ	4	3	T	SJ	0	0			3	3	T	SJ	5,437	47.9	*
145.0	WS	SSMCVR	72.6	83.0	1	2	T	SJ	1	2	T	SJ	0	0			0	0			1,243	72.6	*
150.0	WS	SSMCVR	0.0	0.0	0	0			0	0			0	0			0	0			R2	0.0	*
155.0	WS	SSMSFR	21.4	100.0	13	2	T	SJ	0	0			0	0			5	2	T	SJ	1,476	0.0	*

DEPTH	---------- COMMENT ----------
	# = TOTAL CORE RECOVERY > 100%
9.1	BOREHOLE AT RIVER LEVEL AT RIGHT ABUTEMENT. 0-9.1 FILL USED TO BUILD PAD.
13.4	MEDIUM GRAY OLIVINE BASALT; PORPHYRITIC; SLIGHTLY MAGNETIC.
19.5	SLIGHT CLAY STAINING ON FRACTURE SURFACES.
29.6	BASALT IS SLIGHTLY WEATHERED AND MASSIVE WITH NO VESSICLES.
39.7	OLIVINE BASALT WITH QUARTZ; NO STAINING OR ALTERATION OF JOINT SURFACES.
44.7	DEPTH OF WEATHERING ALONG JOINTS APPROX. 35 FEET.
100.0	ONE FRACTURE 90 DEGREES TO CORE AXIS.
110.0	NOTE POINT LOAD TEST VALUE! VERY HIGH
115.0	VESICULAR TO SCORACIOUS BASALT (FLOW BOUNDRY) AT 114.7 FEET.
120.0	SCORACIOUS BASALT TO 117 FEET CONTACT WITH PALEO-ALLUVIUM.
125.0	PALEO-ALLUVIUM; SAND;GRAVEL;COBBLES&BOULDERS OF BASALT;SANDSTONE;LIMESTONE.
126.4	PALEO-ALLUVIUM WITH CHERT AND GRANITIC COBBLES; BASALT BOULDERS TO 1.0 FEET.
129.3	PALEO-ALLUVIUM WITH QUARTZITE GRAVEL AND COBBLES.
135.2	PALEO-ALLUVIUM/SANDSTONE CONTACT AT APPROX. 134 FEET.
140.0	WHITE TO REDDISH BROWN MOTTLED SILTY SANDSTONE; FINE-GRAINED.
145.0	REDDISH BROWN SILTY CLAYEY SANDSTONE BRECCIA WITH MNOX STAINED FRAGMENTS.
150.0	NO RECOVERY ROCK TYPE ASSUMED FROM PREVIOUS RUN.
155.0	REDDISH BROWN SILTY SANDSTONE BRECCIA; END OF HOLE.

ENGINEERING GEOLOGIC LOG
BOREHOLE: MF-117

SITE:	MINER FLAT DAM SITE	NORTHING:	0	DRILLING METHOD:	NQ3 TRIPLE TUBE CORE
LOCATION:	RIGHT ABUTEMENT	EASTING:	0	DRILLING CONTRACTOR:	KELMINE EXPLORATION
BOREHOLE:	MF-117	ELEVATION:	5,924.50	START DEPTH:	0.00
START DATE:	03/06/86	INCLINATION:	26	LOGGED BY:	CHR
COMPLETION DATE:	03/09/86	BEARING:	309.5	PAGE:	1

DEPTH (ft.)	WEATH/ ALT	ROCK TYPE	RQD (%)	TOT CORE RECOVERY (%)	DIP OF FRACTURES TO CORE AXIS: 90 - 70 NO	90 - 70 RGH	90 - 70 ALT	90 - 70 TYPE	70 - 50 NO	70 - 50 RGH	70 - 50 ALT	70 - 50 TYPE	50 - 30 NO	50 - 30 RGH	50 - 30 ALT	50 - 30 TYPE	30 - 0 NO	30 - 0 RGH	30 - 0 ALT	30 - 0 TYPE	STRENGTH (psi)	SCR (%)	CM
2.8	WS	BAOQVM	64.3	100.0	8	4	SC	SJ	0	0			0	0			2	3	SC	SJ	26,410	0.0	‡
3.3	WS	BAOQVM	90.0	90.0	0	0			0	0			0	0			0	0			24,856	0.0	‡
8.5	WS	BAOQVM	75.2	100.0	4	4	SC	SJ	0	0			0	0			4	3	SC	SJ	25,633	19.8	‡ #
13.2	WS	BAOQVM	59.6	100.0	4	3	SC	SJ	4	3	SC	SJ	0	0			5	3	SC	SJ	24,856	23.8	#
18.2	WS	BAOQVM	41.6	100.0	6	3	SC	SJ	7	3	SC	SJ	0	0			4	3	SC	SJ	27,963	0.0	#
23.4	WS	BAOQVM	19.4	100.0	9	3	SC	SJ	7	3	SC	SJ	0	0			6	3	SC	SJ	30,760	0.0	#
28.0	WS	BAOQVM	28.3	100.0	10	4	SC	SJ	3	4	SC	SJ	0	0			9	4	SC	SJ	30,294	0.0	#
32.8	WS	BAOQVM	0.0	100.0	18	3	T	SJ	10	3	T	SJ	0	0			12	3	SC	SJ	33,245	0.0	‡
37.5	WF	BAOQVM	12.6	92.6	12	3	T	SJ	5	3	SC	SJ	0	0			5	3	SC	SJ	33,401	0.0	
41.9	WF	BAOQVM	26.1	100.0	9	3	T	SJ	7	3	SC	SJ	0	0			7	3	SC	SJ	35,420	0.0	#
48.3	WF	BAOQVM	14.5	100.0	12	4	T	SJ	6	4	SC	SJ	0	0			10	4	SC	SJ	35,420	0.0	
58.2	WF	BAOQVM	21.2	100.0	16	3	SC	SJ	13	3	SC	SJ	0	0			9	3	SC	SJ	34,488	0.0	
67.6	WF	BAOQVM	22.6	97.3	14	3	T	SJ	20	3	SC	SJ	0	0			11	3	SC	SJ	34,954	0.0	
77.6	WF	BAOQVM	50.5	99.5	7	3	SC	SJ	9	3	SC	SJ	0	0			5	3	SC	SJ	35,731	23.5	
87.6	WF	BAOQVM	52.1	99.5	8	3	SC	SJ	17	3	SC	SJ	0	0			5	3	SC	SJ	35,731	0.0	‡
97.4	WF	BAOQVM	21.6	100.0	14	3	T	SJ	19	3	SC	SJ	0	0			9	3	SC	SJ	33,245	0.0	#
105.0	WF	BAOQVM	30.5	100.0	10	3	SC	SJ	12	3	SI	SJ	0	0			5	3	SC	SJ	35,110	0.0	‡ #

DEPTH ---------- COMMENT ----------

\# = TOTAL CORE RECOVERY > 100%

2.8 BOREHOLE DRILLED TO CROSS AXIS OF DAM APPROX. 30 FEET INTO ABUTEMENT.

3.3 MEDIUM GRAY OLIVINE BASALT WITH QUARTZ;PORPHYRTIC WITH OLIVINE PHENOCRYSTS.

8.5 SLIGHTLY MAGNETIC

32.8 INTENSELY FRACTURED; ALL PIECES SMALLER THAN 0.35 FEET.

87.6 OCCASIONAL FLOW BANDING 20 DEGREES TO CORE AXIS (IE.HORIZONTAL).

105.0 END OF HOLE; HOLE MAKES 6 GALLONS PER MINUTE AFTER HOLE COMPLETION.

ENGINEERING GEOLOGIC LOG
BOREHOLE: MF-118

SITE:	MINER FLAT DAM SITE	NORTHING:	1,086,321.00	DRILLING METHOD:	NQ3 TRIPLE TUBE CORE
LOCATION:	PALEO-CHANNEL	EASTING:	576,417.00	DRILLING CONTRACTOR:	KELMINE EXPLORATION
BOREHOLE:	MF-118	ELEVATION:	6,077.00	START DEPTH:	0.00
START DATE:	1/11/86	INCLINATION:	89.5	LOGGED BY:	CHR
COMPLETION DATE:	1/15/86	BEARING:	243.8	PAGE:	1

DEPTH (ft.)	WEATH/ ALT	ROCK TYPE	RQD (%)	TOT CORE RECOVERY (%)	DIP OF FRACTURES TO CORE AXIS: 90 - 70 NO	90 - 70 RGH	90 - 70 ALT	90 - 70 TYPE	70 - 50 NO	70 - 50 RGH	70 - 50 ALT	70 - 50 TYPE	50 - 30 NO	50 - 30 RGH	50 - 30 ALT	50 - 30 TYPE	30 - 0 NO	30 - 0 RGH	30 - 0 ALT	30 - 0 TYPE	STRENGTH (psi)	SCR (%)	CM
8.7	WR	COMCVM	0.0	55.7	0	0			0	0			0	0			0	0			S3	0.0	*
10.0	WS	BAO VV	69.2	100.0	4	6	T	SJ	0	0			0	0			0	0			9,321	0.0	*
19.7	WS	BAO VV	65.2	100.0	10	4	T	SJ	4	3	T	SJ	0	0			4	3	T	SJ	7,768	33.9	*
29.9	WF	BAO VV	63.7	84.9	11	4	T	SJ	2	3	FC	SJ	0	0			5	3	FC	SJ	21,439	39.2	*
40.3	WS	BAO VV	74.0	98.6	10	4	T	SJ	0	0			0	0			4	3	FC	SJ	13,982	42.8	*
48.2	WF	BAO VV	52.4	92.8	10	3	FC	SJ	0	0			0	0			4	2	FC	SJ	21,749	33.7	*
58.8	WS	BAO VM	58.5	94.5	8	4	SC	SJ	4	3	SC	SJ	0	0			4	4	SC	SJ	26,410	32.5	
69.0	WF	BAOQVM	89.4	100.0	4	3	SC	SJ	1	3	T	SJ	0	0			1	3	FC	SJ	24,701	83.0	*
79.4	WF	BAOQVM	67.3	100.0	8	4	SC	SJ	2	6	T	SJ	0	0			2	2	FC	SJ	20,196	52.4	*
89.8	WF	BAOQVM	55.2	93.3	9	3	SC	SJ	6	3	FC	SJ	0	0			4	2	FC	SJ	10,409	0.0	*
100.1	WS	BAOQVV	13.9	66.7	8	4	SC	SJ	8	3	FC	SJ	0	0			10	2	FC	SJ	10,875	10.1	*
110.7	WF	BAOQVV	64.3	91.8	6	3	SC	SJ	2	4	FC	SJ	0	0			8	3	FC	SJ	17,866	54.2	*
121.1	WF	BAOQVM	39.4	95.4	11	4	FC	SJ	2	3	SC	SJ	0	0			5	4	FC	SJ	22,992	27.9	*
131.0	WM	BAO VV	55.9	92.6	6	4	SC	SJ	3	3	SC	SJ	0	0			9	3	FC	SJ	16,467	37.6	*
141.0	WF	BAO VV	75.5	100.0	8	4	T	SJ	3	3	T	SJ	0	0			3	3	SC	SJ	13,516	56.5	*
151.0	WF	BAOQVM	79.2	100.0	11	4	T	SJ	1	4	T	SJ	0	0			1	3	T	SJ	9,321	63.3	* #
161.0	WF	BAOQVM	54.0	100.0	7	3	T	SJ	1	3	T	SJ	0	0			4	4	T	SJ	24,235	49.1	*
171.0	WF	BAOQVM	61.4	100.0	6	4	T	SJ	4	4	T	SJ	0	0			3	4	FC	SJ	24,080	31.0	
181.0	WF	BAOQVM	71.5	100.0	12	4	SC	SJ	2	6	SC	SJ	0	0			3	4	FC	SJ	37,285	53.3	
191.0	WF	BAOQVM	44.0	100.0	8	3	T	SJ	9	4	T	SJ	0	0			5	3	FC	SJ	37,595	25.4	
201.0	WF	BAOQVM	62.7	100.0	7	3	T	SJ	3	3	T	SJ	0	0			6	3	SC	SJ	35,731	36.8	
211.0	WF	BAOQVM	100.0	100.0	5	3	T	SJ	0	0			0	0			0	0			38,838	84.5	*
221.0	WF	BAOQVM	100.0	100.0	0	0			0	0			0	0			0	0			41,168	100.0	
231.0	WF	BAOQVM	25.0	100.0	0	0			0	0			0	0			1	4	FC	SJ	34,954	25.0	*
241.0	WF	BAOQVM	74.0	100.0	0	0			1	3	FC	SJ	0	0			2	4	T	SJ	33,090	74.0	
251.0	WF	BAOQVM	99.0	100.0	0	0			0	0			0	0			1	3	T	SJ	36,508	99.0	*
261.0	WF	BAOQVM	100.0	100.0	0	0			0	0			0	0			1	4	T	SJ	37,595	100.0	#
271.0	WF	BAOQVV	42.3	60.0	5	3	SC	SJ	0	0			0	0			4	3	FC	SJ	27,187	34.2	*
278.0	WR	PASGFB	0.0	50.0	0	0			0	0			0	0			0	0			S2	0.0	*
279.4	WR	PASGFB	0.0	35.7	0	0			0	0			0	0			0	0			S2	0.0	
285.1	WR	PASGFB	0.0	67.2	0	0			0	0			0	0			0	0			S2	0.0	*

ENGINEERING GEOLOGIC LOG
BOREHOLE: MF-118

SITE:	MINER FLAT DAM SITE	NORTHING:	1,086,321.00	DRILLING METHOD:	NQ3 TRIPLE TUBE CORE
LOCATION:	PALEO-CHANNEL	EASTING:	576,417.00	DRILLING CONTRACTOR:	KELMINE EXPLORATION
BOREHOLE:	MF-118	ELEVATION:	6,077.00	START DEPTH:	0.00
START DATE:	1/11/86	INCLINATION:	89.5	LOGGED BY:	CHR
COMPLETION DATE:	1/15/86	BEARING:	243.8	PAGE:	2

DEPTH (ft.)	WEATH/ ALT	ROCK TYPE	RQD (%)	TOT CORE RECOVERY (%)	DIP OF FRACTURES TO CORE AXIS: 90 - 70 NO	90 - 70 RGH	90 - 70 ALT	90 - 70 TYPE	70 - 50 NO	70 - 50 RGH	70 - 50 ALT	70 - 50 TYPE	50 - 30 NO	50 - 30 RGH	50 - 30 ALT	50 - 30 TYPE	30 - 0 NO	30 - 0 RGH	30 - 0 ALT	30 - 0 TYPE	STRENGTH (psi)	SCR (%)	CM
288.3	WR	PASGFB	0.0	89.1	0	0			0	0			0	0			0	0			S2	0.0	
289.1	WR	PASGFB	0.0	87.5	0	0			0	0			0	0			0	0			S2	0.0	
290.2	WR	PASGFB	0.0	45.5	0	0			0	0			0	0			0	0			S2	0.0	
295.6	WR	PASGFB	0.0	46.3	0	0			0	0			0	0			0	0			S2	0.0	
297.9	WR	PASGFB	0.0	7.4	0	0			0	0			0	0			0	0			S2	0.0	‡
303.4	WR	PASGFB	0.0	70.0	0	0			0	0			0	0			0	0			S2	0.0	‡
308.4	WR	PASGFB	0.0	80.0	0	0			0	0			0	0			0	0			S3	0.0	‡
309.7	WR	PASGFB	0.0	53.8	0	0			0	0			0	0			0	0			S2	0.0	
314.0	WR	PASGFB	0.0	74.4	0	0			0	0			0	0			0	0			S2	0.0	
319.3	WR	PASGFB	0.0	67.9	0	0			0	0			0	0			0	0			S3	0.0	‡
324.2	WS	SSMCFM	100.0	100.0	0	0			0	0			0	0			0	0			777	100.0	‡ #
329.5	WF	SSMCFR	33.0	60.4	4	3	T	SJ	1	2	T	SJ	0	0			0	0			1,243	33.0	‡
334.7	WF	SSMSFR	0.0	51.9	5	3	T	SJ	0	0			0	0			3	3	T	SJ	3,418	0.0	
340.0	WF	SSMSFR	0.0	0.0	0	0			0	0			0	0			0	0			R2	0.0	‡

DEPTH ---------- COMMENT ----------

= TOTAL CORE RECOVERY > 100%

8.7 BOREHOLE DRILLED TO INVESTIGATE PALEO-CHANNEL; SILTY CLAY WITH SOME SAND.
10.0 COLLUVIUM/BASALT CONTACT AT 8.7 FEET.
19.7 DARK GRAY TO BLACK OLIVINE BASALT; SLIGHTLY WEATHERED; VESICULAR.
29.9 100% LOSS OF DRILLING FLUID CIRCULATION AT 14 FEET. FLOW BOUNDRIES AT 14.2
40.3 FLOW BOUNDRIES AT 18.8 & 27.5-28 & PALEOSOL 38.1-38.3 & 40.1-40.3.
48.2 CLAY FILLED FRACTURES AT 20 DEGREES TO CORE AXIS.
69.0 FEW VESICLES; SOME FILLED WITH QUARTZ AND/OR CLAY.
79.4 69-70 FEET NEARLY VERTICAL FRACTURE FILLED WITH CLAY 0.02 FEET THICK.
89.8 MULTIPLE FLOW BOUNDRIES; VESICULAR BASALT WITH CLAY AND QUARTZ FILLING.
100.1 CLAY PALEOSOL AT 90.3.
110.7 PALEOSOL AT 104 FEET.
121.1 PALEOSOL AT 112 FEET.
131.0 VISICULAR AND FLOW BANDED; MODERATELY WEATHERED.
141.0 DEGREE OF WEATHERING DECREASES.
151.0 FLOW BANDING TO 147 FEET. STRENGTH ACROSS FLOW BANDING.

DEPTH	---------- COMMENT ----------
	# = TOTAL CORE RECOVERY > 100%
161.0	MEDIUM GRAY OLIVINE BASALT WITH QUARTZ; MASSIVE.
211.0	MASSIVE BASALT; HARD.
231.0	ONE UNDULATING FRACTURE AT APPROX. 0 DEGREES FROM 223.5-230.6 FEET WITH CLAY
251.0	ONE FRACTURE AT 10 DEGREES TO CORE AXIS.
271.0	MASSIVE BASALT TO 264.5; CONTACT WITH SCORACIOUS TO VESICULAR BASALT.
278.0	PALEO-ALLUVIUM; GRAVEL AND COBBLES OF QUARTZITE;CHERT AND BASALT IN A SANDY SILT
285.1	PALEO-ALLUVIUM AS ABOVE WITH BASALT;QURATZITE AND SANDSTONE COBBLES.
297.9	SILTY SAND WITH GRAVEL AND COBBLES OF BASALT;QUARTZ AND QUARTZITE.
303.4	PARTIALLY CEMENTED PALEO-ALLUVIUM.
308.4	WELL CEMENTED PALEO-ALLUVIUM 304-305.
319.3	SLIGHTLY TO MODERATELY CEMENTED TO 318.0. WEATHERED SUPAI BEDROCK AT 318.0.
324.2	REDDISH AND YELLOWISH ORANGE SILTY SANDSTONE WITH SOME CLAY.
329.5	MEDIUM GRAY SILTY SANDSTONE BRECCIA
340.0	CORE BARREL MISLATCH; ROCK TYPE ASSUMED FROM PREVIOUS RUN. END OF HOLE.

ENGINEERING GEOLOGIC LOG
BOREHOLE: MF-119

SITE:	MINER FLAT DAM SITE	NORTHING:	1,086,816.00	DRILLING METHOD:	NQ3 TRIPLE TUBE CORE
LOCATION:	PALEO-CHANNEL	EASTING:	576,078.00	DRILLING CONTRACTOR:	KELMINE EXPLORATION
BOREHOLE:	MF-119	ELEVATION:	6,093.70	START DEPTH:	0.00
START DATE:	4/ 8/86	INCLINATION:	89.81	LOGGED BY:	CHR
COMPLETION DATE:	4/16/86	BEARING:	235.1	PAGE:	1

DEPTH (ft.)	WEATH/ ALT	ROCK TYPE	RQD (%)	TOT CORE RECOVERY (%)	DIP OF FRACTURES TO CORE AXIS: 90 - 70 NO	90 - 70 RGH	90 - 70 ALT	90 - 70 TYPE	70 - 50 NO	70 - 50 RGH	70 - 50 ALT	70 - 50 TYPE	50 - 30 NO	50 - 30 RGH	50 - 30 ALT	50 - 30 TYPE	30 - 0 NO	30 - 0 RGH	30 - 0 ALT	30 - 0 TYPE	STRENGTH (psi)	SCR (%)	CM
20.0	WR	CDGCVM	0.0	40.0	0	0			0	0			0	0			0	0			S3	0.0	*
25.3	WS	BAO VV	56.6	82.1	7	4	T	SJ	0	0			1	4	SC	SJ	0	0			19,108	0.0	*
26.8	WS	BAO VV	62.0	100.0	2	3	T	SJ	0	0			0	0			0	0			18,332	0.0	*
32.3	WS	BAO VM	77.6	92.7	5	3	T	SJ	1	3	T	SJ	0	0			0	0			15,535	29.6	*
36.0	WS	BAO VM	100.0	100.0	0	0			0	0			0	0			0	0			13,671	100.0	* #
41.0	WF	BAOQVV	52.0	100.0	7	4	FC	SJ	2	3	FC	SJ	0	0			2	3	FC	SJ	12,117	32.6	*
46.0	WF	BAOQVV	48.0	100.0	9	3	FC	SJ	2	4	FC	SJ	2	3	FC	SJ	4	3	FC	SJ	24,235	21.0	*
51.0	WF	BAO VV	0.0	94.0	7	4	FC	SJ	8	4	FC	SJ	0	0			4	3	FC	SJ	19,264	0.0	*
56.0	WF	BAOQVM	87.0	100.0	4	4	SC	SJ	0	0			0	0			1	3	FC	SJ	21,749	87.0	*
61.0	WF	BAOQVM	87.6	100.0	4	4	T	SJ	0	0			0	0			1	3	FC	SJ	24,856	62.0	*
66.0	WS	BAO VV	36.0	81.0	6	4	FC	SJ	0	0			0	0			5	4	FC	SJ	17,866	0.0	*
71.0	WS	BAOQVM	83.0	100.0	7	4	SC	SJ	0	0			0	0			0	0			20,196	60.0	
76.0	WS	BAOQVV	74.4	100.0	7	4	SC	SJ	0	0			0	0			0	0			17,089	50.0	* #
81.0	WS	BAOQVV	68.4	100.0	6	4	SC	SJ	3	4	FC	SJ	0	0			0	0			19,419	50.0	* #
86.0	WF	BAOQVM	72.0	100.0	7	4	SC	SJ	2	4	SC	SJ	0	0			0	0			19,419	50.0	*
91.0	WM	BAOQVV	66.0	100.0	8	4	FC	SJ	0	0			4	4	FC	SJ	0	0			2,330	36.0	*
96.0	WM	BAOQVV	71.0	98.0	5	4	SC	SJ	0	0			1	3	FC	SJ	2	3	FC	SJ	17,399	30.4	*
101.0	WM	BAOQVM	96.0	100.0	3	3	SC	SJ	0	0			0	0			0	0			24,856	96.0	*
106.0	WF	BAOQVM	100.0	100.0	0	0			2	3	T	SJ	0	0			0	0			30,294	100.0	*
111.0	WF	BAOQVM	100.0	100.0	2	3	T	SJ	1	3	T	SJ	0	0			0	0			26,721	100.0	
116.0	WF	BAOQVM	63.4	100.0	4	3	T	SJ	1	3	SC	SJ	0	0			2	3	SC	SJ	27,187	56.4	*
121.0	WM	BAOQVV	47.4	90.0	6	4	FC	SJ	2	3	FC	SJ	0	0			3	4	FC	SJ	15,846	0.0	*
126.0	WM	BAOQVV	38.4	78.0	3	3	SC	SJ	0	0			0	0			0	0			15,535	0.0	*
131.0	WH	BAO VV	0.0	55.4	20	3	FC	SJ	0	0			0	0			10	3	FC	SJ	S3	0.0	*
136.0	WM	BAOQVV	29.0	100.0	7	4	FC	SJ	5	4	FC	SJ	0	0			5	4	FC	SJ	8,234	0.0	*
141.0	WS	BAOQVV	100.0	100.0	2	3	T	SJ	0	0			0	0			0	0			16,778	71.8	*
146.0	WF	BAOQVM	94.0	100.0	4	3	T	SJ	1	3	T	SJ	0	0			0	0			21,128	59.4	
150.0	WF	BAOQVM	100.0	100.0	0	0			0	0			0	0			0	0			23,303	100.0	*
155.1	WF	BAO VM	100.0	100.0	3	3	T	SJ	2	3	T	SJ	0	0			0	0			23,614	77.5	
160.3	WF	BAOQVM	88.8	100.0	2	3	T	SJ	3	3	T	SJ	0	0			0	0			27,187	79.2	
165.5	WF	BAOQVM	93.3	100.0	2	3	T	SJ	1	3	T	SJ	0	0			0	0			27,963	93.3	

ENGINEERING GEOLOGIC LOG
BOREHOLE: MF-119

SITE:	MINER FLAT DAM SITE	NORTHING:	1,086,816.00	DRILLING METHOD:	NQ3 TRIPLE TUBE CORE
LOCATION:	PALEO-CHANNEL	EASTING:	576,078.00	DRILLING CONTRACTOR:	KELMINE EXPLORATION
BOREHOLE:	MF-119	ELEVATION:	6,093.70	START DEPTH:	0.00
START DATE:	4/ 8/86	INCLINATION:	89.81	LOGGED BY:	CHR
COMPLETION DATE:	4/16/86	BEARING:	235.1	PAGE:	2

DEPTH (ft.)	WEATH/ ALT	ROCK TYPE	RQD (%)	TOT CORE RECOVERY (%)	DIP OF FRACTURES TO CORE AXIS: 90 - 70 NO	90 - 70 RGH	90 - 70 ALT	90 - 70 TYPE	70 - 50 NO	70 - 50 RGH	70 - 50 ALT	70 - 50 TYPE	50 - 30 NO	50 - 30 RGH	50 - 30 ALT	50 - 30 TYPE	30 - 0 NO	30 - 0 RGH	30 - 0 ALT	30 - 0 TYPE	STRENGTH (psi)	SCR (%)	CM
170.7	WF	BAQQVM	80.8	100.0	5	3	T	SJ	0	0			0	0			1	2	FC	SJ	27,963	50.0	#
173.0	WF	BAQQVM	100.0	100.0	3	3	T	SJ	1	3	T	SJ	0	0			0	0			27,031	46.5	#
176.0	WF	BAQQVM	67.0	73.3	2	3	T	SJ	1	3	FC	SJ	0	0			0	0			26,410	0.0	
181.0	WF	BAQQVM	100.0	100.0	5	3	T	SJ	2	3	T	SJ	0	0			0	0			27,963	20.6	
186.0	WF	BAQQVM	87.4	100.0	1	3	T	SJ	0	0			1	3	FC	SJ	0	0			29,517	87.4	
191.0	WF	BAQQVM	85.4	100.0	1	3	T	SJ	0	0			0	0			2	3	FC	SJ	30,449	74.0	
196.0	WF	BAQQVM	99.0	100.0	2	4	T	SJ	0	0			0	0			0	0			29,206	86.4	#
201.0	WF	BAQQVM	100.0	100.0	0	0			0	0			0	0			0	0			29,517	100.0	‡ #
206.0	WF	BAQQVM	97.0	99.0	0	0			0	0			0	0			1	3	HC	SJ	28,274	97.0	‡
211.0	WF	BAQQVM	83.6	100.0	0	0			0	0			0	0			2	3	HC	SJ	31,692	68.0	‡ #
216.0	WF	BAQQVM	100.0	100.0	4	2	T	SJ	0	0			0	0			4	5	HC	SJ	25,167	81.0	
221.0	WR	PCSOFM	19.4	70.0	4	4	FC	SJ	0	0			0	0			0	0			S2	0.0	‡
224.0	WR	PCSOFM	0.0	60.7	0	0			0	0			0	0			0	0			S2	0.0	‡
229.0	WR	PCSOFM	0.0	42.0	0	0			0	0			0	0			0	0			S2	0.0	
234.0	WR	PCSOFM	0.0	43.4	0	0			0	0			0	0			0	0			S2	0.0	‡
239.8	WR	PCSCFM	0.0	37.1	0	0			0	0			0	0			0	0			S2	0.0	
245.2	WR	PCSCFM	0.0	63.9	0	0			0	0			0	0			0	0			S2	0.0	
250.7	WR	PCSOFM	0.0	49.1	0	0			0	0			0	0			0	0			S2	0.0	‡
256.0	WR	PASBRB	0.0	56.6	0	0			0	0			0	0			0	0			S2	0.0	‡
261.0	WR	PCSOFM	0.0	55.0	0	0			0	0			0	0			0	0			S2	0.0	‡
266.0	WR	PASGFM	0.0	50.0	0	0			0	0			0	0			0	0			S2	0.0	‡
271.0	WR	PCSOFM	0.0	40.0	0	0			0	0			0	0			0	0			S2	0.0	‡
276.0	WR	PASGFM	0.0	37.0	0	0			0	0			0	0			0	0			S2	0.0	‡
281.0	WR	PAGCRM	0.0	38.0	0	0			0	0			0	0			0	0			S2	0.0	‡
291.0	WF	SSSCFM	22.6	47.3	4	2	T	SJ	0	0			5	2	T	SJ	0	0			4,971	0.0	‡
292.4	WS	SSCAFR	92.9	92.9	0	0			0	0			0	0			0	0			4,661	0.0	‡
296.9	WS	SSCAFR	46.7	91.6	4	3	FC	SJ	3	4	FC	SJ	0	0			1	6	FC	SJ	13,671	34.9	‡
300.0	WS	SSCAFR	0.0	0.0	0	0			0	0			0	0			0	0			R3	0.0	‡

DEPTH ---------- COMMENT ----------

= TOTAL CORE RECOVERY > 100%

20.0 COLLUVIUM/TERTIARY GRAVEL. YELLOWISH ORANGE SILTY CLAY WITH COBBLES OF QUARTZITE.

DEPTH	COMMENT
	# = TOTAL CORE RECOVERY > 100%
25.3	PALE TO MEDIUM GRAY OLIVINE BASALT;VESICULAR WITH CLAY FILLING VESSICLES.
26.8	VESSICLES BECOMING SMALLER AND FEWER.
32.3	MASSIVE OLIVINE BASALT. FLOW BANDING 80-90 DEGREES TO CORE AXIS.
36.0	ONE PIECE OF CORE 3.75 FEET LONG.
41.0	FLOW BOUNDRY AT 38.2. CLAY FILLING FRACTURES; CLAY & QUARTZ FILLING SOME VESSICLES
46.0	VESICULAR BASALT
51.0	FLOW BOUNDRIES AT 47 AND 50 FEET.
56.0	MASSIVE AT 51.1; SOME VESSICLES AND FRACTURES WITH QUARTZ FILLING.
61.0	NEARLY VERTICAL FRACTURE AT 59.2 FEET FILLED WITH DENSE CLAY .25 INCHES THICK.
66.0	SCORACIOUS TO VESSICULAR BASALT 62.5-65 FEET; FLOW BOUNDRY.
76.0	SCORACIOUS TO VESICULAR BASALT 72.7- 75 FEET; FLOW BOUNDRY. QUARTZ FILLING .
81.0	FLOW BOUNDRY AT 80.2 FEET.
86.0	FLOW BOUNDRY AT 84 FEET.
91.0	PALEOSOL/FLOW BOUNDRY AT 86-87.3 FEET. MODERATELY WEATHERED BASALT BELOW.
96.0	ROPEY TEXTURED FLOW BANDING AT 94 FEET 20-40 DEGREES TO CORE AXIS.
101.0	GRAYISH RED OLIVINE BASALT WITH QUARTZ;MODERATELY WEATHERED;MASSIVE.
106.0	MEDIUM GRAY MAASSIVE BASALT.
116.0	BECOMING VESICULAR WITH QUARTZ FILLING SOME VESICLES.
121.0	FLOW BOUNDRY AT 118.5. MODERATELY WEATHERED.
126.0	PALEOSOL AT 123.2;SANDY CLAEY SILT WITH GRAVEL AND COBBLES OF BASALT.
131.0	GRAYISH RED BASLAT PALEOSOL.
136.0	SCORACIOUS AND ROPEY TEXTURED BASALT;MODERATELY TO HIGHLY WEATHERED.
141.0	BECOMING LESS WEATHERED AND LESS VESICULAR.
150.0	ONE PIECE OF CORE 4.0 FEET LONG.
201.0	ONE PIECE OF CORE 5.1 FEET LONG.
206.0	NEARLY VERTICAL FRACTURE HEALED WITH OVERCONSOLIDATED CLAY 202.7-206.5 FEET.
211.0	ONE FRACTURE AT 10 DEGREES TO CORE AXIS HEALED WITH CLAY AT 209.4-210.8 FEET
221.0	BASALT FLOW BRECCIA TO 217.3. PALEO-COLLUVIUM; SANDSTONE TALUS.
224.0	POOR RECOVERY OF PALEO-COLLUVIUM.
234.0	SANDSTONE TALUS BLOCKS UP TO 0.5 FEET.
250.7	SANDSTONE TALUS BLOCKS UP TO 3 FEET.
256.0	PALEO-ALLUVIUM WITH GRAVEL AND COBBLES OF CHERT; QUARTZITE AND STANDSTONE.
261.0	PALEO-COLLUVIUM WITH BASALT COBBLES AND SANDSTONE BOULDERS.
266.0	PALEO-ALLUVIUM/PALEO-COLLUVIUM WITH QUARTZITE GRAVEL AND SANDSTONE BOULDERS.
271.0	PALEO-COLLUVIUM WITH SANDSTONE COBBLES AND BOULDERS.
276.0	PALEOCOLLUVIUM/ALLUVIUM WITH SANDSTONE BOULDERS AND QUARTZITE & LIMESTONE GRAVEL
281.0	PALEO-ALLUVIUM WITH LIMESTONE AND QUARTZITE GRAVEL AND SANDSTONE COBBLES.

ENGINEERING GEOLOGIC LOG
BOREHOLE: MF-120A

SITE:	MINER FLAT DAM SITE	NORTHING:	0	DRILLING METHOD:	NQ3 TRIPLE TUBE CORE
LOCATION:	PALEO-CHANNEL	EASTING:	0	DRILLING CONTRACTOR:	KELMINE EXPLORATION
BOREHOLE:	MF-120A	ELEVATION:	6,082.00	START DEPTH:	0.00
START DATE:	4/18/86	INCLINATION:	89.5	LOGGED BY:	CHR
COMPLETION DATE:	4/21/86	BEARING:	250.4	PAGE:	1

DEPTH (ft.)	WEATH/ ALT	ROCK TYPE	RQD (%)	TOT CORE RECOVERY (%)	DIP OF FRACTURES TO CORE AXIS: 90 - 70 NO	90 - 70 RGH	90 - 70 ALT	90 - 70 TYPE	70 - 50 NO	70 - 50 RGH	70 - 50 ALT	70 - 50 TYPE	50 - 30 NO	50 - 30 RGH	50 - 30 ALT	50 - 30 TYPE	30 - 0 NO	30 - 0 RGH	30 - 0 ALT	30 - 0 TYPE	STRENGTH (psi)	SCR (%)	CM
8.5	WR	COCRVM	0.0	23.5	0	0			0	0			0	0			0	0			S3	0.0	‡
11.8	WS	BAO VV	63.6	100.0	4	4	T	SJ	0	0			2	3	FC	SJ	1	3	FC	SJ	21,749	33.3	‡
17.1	WS	BAO VV	33.8	92.5	5	4	SC	SJ	3	4	SC	SJ	3	3	FC	SJ	1	3	FC	SJ	20,817	0.0	‡
22.3	WS	BAOQVM	67.9	96.2	4	3	FC	SJ	3	3	FC	SJ	1	3	SC	SJ	1	3	SC	SJ	18,642	56.3	‡
26.0	WS	BAOQVM	29.7	96.5	1	3	SC	SJ	4	4	SC	SJ	0	0			2	3	SC	SJ	21,749	0.0	‡
30.5	WS	BAOQVV	100.0	100.0	1	3	SC	SJ	3	3	SC	SJ	0	0			0	0			18,642	100.0	#
35.6	WS	BAOQVM	55.9	100.0	2	3	T	SJ	3	3	T	SJ	0	0			5	4	T	SJ	17,866	33.3	‡ #
40.8	WS	BAO VV	40.4	100.0	9	3	SC	SJ	6	3	FC	SJ	5	4	FC	SJ	6	3	FC	SJ	34,178	0.0	
46.0	WS	BAO VM	57.7	80.4	6	3	T	SJ	3	4	SC	SJ	0	0			0	0			27,963	24.8	
51.0	WF	BAO VM	62.4	100.0	7	4	T	SJ	0	0			3	3	FC	SJ	2	4	FC	SJ	23,303	34.6	‡ #
56.0	WF	BAOQVM	84.0	100.0	3	3	T	SJ	2	3	T	SJ	0	0			0	0			22,526	43.4	‡
57.2	WS	BAOQVV	100.0	100.0	0	0			0	0			0	0			0	0			20,196	100.0	‡
61.0	WM	BAOQVM	72.6	98.4	7	3	FC	SJ	0	0			0	0			0	0			18,953	0.0	‡
66.0	WM	BAOQVV	68.8	100.0	8	3	SC	SJ	0	0			0	0			0	0			23,769	58.6	‡
71.0	WM	BAOQVM	96.0	100.0	6	4	T	SJ	0	0			0	0			0	0			25,167	68.0	
76.0	WM	BAOQVV	86.8	98.0	6	4	FC	SJ	0	0			0	0			0	0			19,730	31.0	‡
81.0	WM	BAOQVV	79.4	100.0	3	4	FC	SJ	3	3	FC	SJ	0	0			0	0			15,225	67.6	‡
86.0	WM	BAOQVV	39.4	100.0	8	3	FC	SJ	0	0			1	3	FC	SJ	4	4	FC	SJ	7,768	0.0	‡ #
91.0	WS	BAOQVM	73.4	100.0	4	4	SC	SJ	2	3	SC	SJ	2	3	FC	SJ	2	3	FC	SJ	25,167	52.6	‡ #
96.0	WS	BAOQVV	43.0	100.0	8	3	FC	SJ	4	3	FC	SJ	0	0			0	0			15,535	0.0	‡
101.0	WS	BAOQVV	72.0	96.0	4	3	SC	SJ	1	3	SC	SJ	0	0			2	3	SC	SJ	24,546	0.0	‡
106.0	WM	BAOQVS	56.2	98.0	6	4	FC	SJ	4	3	FC	SJ	0	0			3	3	FC	SJ	13,982	47.6	‡
111.0	WM	BAOQVS	32.4	82.0	10	3	FC	SJ	0	0			0	0			5	3	FC	SJ	18,332	22.0	‡
116.0	WC	PACBVB	0.0	68.2	0	0			0	0			0	0			0	0			S2	0.0	‡
121.0	WR	PASBFB	12.0	58.0	0	0			0	0			0	0			0	0			S2	0.0	
122.4	WR	PASBFB	0.0	78.6	0	0			0	0			0	0			0	0			S2	0.0	
126.0	WR	PASBFB	0.0	72.2	0	0			0	0			0	0			0	0			S2	0.0	
131.0	WR	PASBFB	0.0	40.0	0	0			0	0			0	0			0	0			S2	0.0	
136.0	WR	PASBFB	0.0	46.0	0	0			0	0			0	0			0	0			S2	0.0	
141.0	WR	PASBFB	0.0	52.0	0	0			0	0			0	0			0	0			S2	0.0	
146.0	WR	PASBFB	0.0	40.0	0	0			0	0			0	0			0	0			S2	0.0	

ENGINEERING GEOLOGIC LOG
BOREHOLE: MF-120A

SITE:	MINER FLAT DAM SITE	NORTHING:	0	DRILLING METHOD:	NQ3 TRIPLE TUBE CORE
LOCATION:	PALEO-CHANNEL	EASTING:	0	DRILLING CONTRACTOR:	KELMINE EXPLORATION
BOREHOLE:	MF-120A	ELEVATION:	6,082.00	START DEPTH:	0.00
START DATE:	4/18/86	INCLINATION:	89.5	LOGGED BY:	CHR
COMPLETION DATE:	4/21/86	BEARING:	250.4	PAGE:	2

DEPTH (ft.)	WEATH/ ALT	ROCK TYPE	RQD (%)	TOT CORE RECOVERY (%)	DIP OF FRACTURES TO CORE AXIS: 90 - 70 NO	90 - 70 RGH	90 - 70 ALT	90 - 70 TYPE	70 - 50 NO	70 - 50 RGH	70 - 50 ALT	70 - 50 TYPE	50 - 30 NO	50 - 30 RGH	50 - 30 ALT	50 - 30 TYPE	30 - 0 NO	30 - 0 RGH	30 - 0 ALT	30 - 0 TYPE	STRENGTH (psi)	SCR (%)	CM
151.0	WM	BAO VM	38.0	98.0	0	0			5	4	SC	SJ	0	0			4	4	SC	SJ	35,731	0.0	*
154.5	WF	BAOQVV	88.6	88.6	0	0			0	0			0	0			0	0			34,954	88.6	*
159.7	WF	BAOQVM	70.2	100.0	5	4	T	SJ	3	4	T	SJ	0	0			1	4	T	SJ	30,760	0.0	*
164.8	WF	BAOQVM	92.2	98.0	7	4	T	SJ	0	0			0	0			0	0			30,760	31.8	
166.0	WF	BAOQVM	100.0	100.0	0	0			0	0			0	0			0	0			27,963	100.0	*
171.0	WF	BAOQVM	70.0	100.0	5	3	T	SJ	0	0			1	3	T	SJ	3	3	T	SJ	31,847	56.0	*
176.0	WF	BAOQVM	80.2	100.0	5	4	T	SJ	0	0			0	0			1	4	T	SJ	37,285	53.4	#
181.0	WF	BAOQVM	82.4	94.0	2	4	T	SJ	4	4	T	SJ	0	0			1	4	T	SJ	34,178	50.4	
186.0	WF	BAOQVM	63.6	100.0	4	4	T	SJ	0	0			2	2	T	SJ	1	3	T	SJ	31,071	37.4	
191.0	WF	BAOQVM	0.0	100.0	14	4	T	SJ	0	0			0	0			4	3	T	SJ	29,517	0.0	
196.0	WF	BAOQVM	100.0	100.0	0	0			0	0			0	0			0	0			30,760	100.0	*
201.0	WF	BAOQVM	100.0	100.0	0	0			0	0			0	0			0	0			32,935	100.0	*
206.0	WF	BAOQVM	100.0	100.0	2	2	T	SJ	0	0			0	0			0	0			33,401	100.0	
211.0	WF	BAOQVM	90.0	100.0	2	3	T	SJ	2	2	T	SJ	0	0			0	0			31,071	59.0	
216.0	WF	BAOQVM	100.0	100.0	0	0			0	0			0	0			0	0			31,847	100.0	
221.0	WF	BAOQVM	100.0	100.0	0	0			0	0			0	0			0	0			31,071	100.0	
226.0	WF	BAOQVM	100.0	100.0	0	0			0	0			0	0			0	0			31,071	100.0	
231.0	WF	BAOQVM	100.0	100.0	0	0			0	0			0	0			0	0			30,760	100.0	
236.0	WF	BAOQVM	100.0	100.0	0	0			0	0			1	4	T	SJ	1	3	T	SJ	36,042	100.0	*
241.0	WC	BAO VR	56.0	92.0	0	0			0	0			0	0			0	0			R1	0.0	*
246.0	WH	BAO VS	61.0	90.0	3	3	SC	SJ	2	3	SC	SJ	0	0			1	3	FC	SJ	4,661	0.0	*
251.0	WR	PAS FB	0.0	18.0	0	0			0	0			0	0			0	0			S2	0.0	*
256.0	WR	PASGFB	0.0	6.0	0	0			0	0			0	0			0	0			S2	0.0	
261.0	WR	PASGFB	0.0	38.0	0	0			0	0			0	0			0	0			S1	0.0	
266.0	WR	PASGFB	0.0	84.0	0	0			0	0			0	0			0	0			S2	0.0	*
271.0	WR	PASGFB	0.0	89.0	0	0			0	0			0	0			0	0			R1	0.0	*
276.0	WM	BAOQVV	70.6	99.0	4	3	SC	SJ	4	3	FC	SJ	0	0			0	0			32,003	20.6	*
281.0	WM	BAOQVV	73.2	97.6	5	4	SC	SJ	0	0			3	4	FC	SJ	2	3	SC	SJ	35,731	23.0	*
286.0	WF	BAOQVV	98.2	100.0	1	4	T	SJ	2	3	SC	SJ	0	0			1	3	SC	SJ	38,527	89.2	* #
291.0	WF	BAOQVM	90.0	98.0	2	3	T	SJ	1	3	T	SJ	0	0			0	0			36,508	90.0	*
296.0	WF	BAOQVM	88.0	100.0	1	3	FC	SJ	1	3	SC	SJ	0	0			1	3	SC	SJ	37,285	54.0	*

ENGINEERING GEOLOGIC LOG
BOREHOLE: MF-120A

SITE:	MINER FLAT DAM SITE	NORTHING:	0	DRILLING METHOD:	NQ3 TRIPLE TUBE CORE
LOCATION:	PALEO-CHANNEL	EASTING:	0	DRILLING CONTRACTOR:	KELMINE EXPLORATION
BOREHOLE:	MF-120A	ELEVATION:	6,082.00	START DEPTH:	0.00
START DATE:	4/18/86	INCLINATION:	89.5	LOGGED BY:	CHR
COMPLETION DATE:	4/21/86	BEARING:	250.4	PAGE:	3

DEPTH (ft.)	WEATH/ ALT	ROCK TYPE	RQD (%)	TOT CORE RECOVERY (%)	DIP OF FRACTURES TO CORE AXIS: 90 - 70 NO	90 - 70 RGH	90 - 70 ALT	90 - 70 TYPE	70 - 50 NO	70 - 50 RGH	70 - 50 ALT	70 - 50 TYPE	50 - 30 NO	50 - 30 RGH	50 - 30 ALT	50 - 30 TYPE	30 - 0 NO	30 - 0 RGH	30 - 0 ALT	30 - 0 TYPE	STRENGTH (psi)	SCR (%)	CM
301.0	WF	BAOQVM	46.0	74.0	1	4	T	SJ	0	0			0	0			0	0			34,954	46.0	I
306.0	WR	PASGRB	0.0	64.0	0	0			0	0			0	0			0	0			S3	0.0	I
311.0	WR	PAGBRB	0.0	45.0	0	0			0	0			0	0			0	0			S3	0.0	I
316.0	WR	PACBRB	0.0	48.0	0	0			0	0			0	0			0	0			S3	0.0	I
321.0	WR	PASBRB	0.0	38.0	0	0			0	0			0	0			0	0			S3	0.0	
326.0	WR	PASBRB	0.0	78.0	0	0			0	0			0	0			0	0			S3	0.0	I
331.0	WR	PASRRB	0.0	38.0	0	0			0	0			0	0			0	0			S3	0.0	
336.0	WR	PASRRB	0.0	68.0	0	0			0	0			0	0			0	0			S3	0.0	
341.0	WR	PASRRB	0.0	84.0	0	0			0	0			0	0			0	0			R1	0.0	I
346.0	WC	SMSCVM	0.0	69.0	0	0			0	0			0	0			0	0			R1	0.0	I
351.0	WC	SMSCVM	66.0	66.0	0	0			0	0			0	0			0	0			R1	66.0	I

DEPTH	COMMENT
8.5	BASALT/TERTIARY GRAVEL COLLUVIUM; SILTY CLAY WITH BASALT BOULDERS.
11.8	MEDIUM GRAY OLIVINE BASALT;SLIGHTLY WEATHERED TO FRESH.
17.1	FLOW BOUNDRY/PALEOSOL AT 14 FEET;FLOW BANDING NEARLY VERTICAL.
22.3	PALEOSOL AT 18-18.3; SCORACIOUS 18.3-18.6 FEET.
26.0	PALEOSOL AT 25 FEET.
35.6	MEDIUM GRAY OLIVINE BASALT WITH QUARTZ;MASSIVE.
51.0	FLOW BANDING FROM 20-90 DEGREES FROM CORE AXIS.
56.0	VESICULAR BELOW 54 FEET.
61.0	MODERATE REDDISH BROWN OLIVINE BASALT WITH QUARTZ;VESICULAR WITH CLAY&QUARTZ
66.0	MODERATELY WEATHERED;QUARTZ CRYSTALS FILLING SOME VESSICLES.
76.0	FLOW BOUNDRY AT 73.2 FEET.
81.0	FLOW BOUNDRY AT 80.5 FEET.
86.0	REDDISH GRAY VESUCULAR TO SCORACIOUS BASALT.
91.0	FLOW BOUNDRY AT 89.7.
96.0	FLOW BANDING AT 45 DEGREES TO CORE AXIS.
101.0	FLOW BOUNDRY AT 96.7 FEET WITH 0.6 FEET CLAY PALEOSOL.
106.0	SCORACIOUS BASALT;FLOW BOUNDRY AT 102 FEET WITH CLAY; SAND&GRAVEL 102-103.6.
111.0	FLOW BOUNDRIES AT 107.5;109.5;110.5. DENSE CLAY AND SAND.
116.0	GRAY TO RED PALEO-ALLUVIUM; CLAY;SAND;GRAVEL AND COBBLES OF BASALTIC ORIGIN.
151.0	REDISH GRAY TO MEDIUM GRAY VESICULAR TO MASSIVE BASALT.
154.5	ONE PIECE OF CORE 3.1 FEET LONG.
159.7	SOME FRACTURES HEALED WITH QUARTZ.
166.0	ONE PIECE OF CORE 1.2 FEET LONG.
171.0	MEDIUM GRAY OLIVINE BASALT WITH QUARTZ; MASSIVE;SLIGHTLY MAGNETIC.

DEPTH	---------- COMMENT ----------
196.0	ONE PIECE OF CORE 5.0 FEET LONG.
201.0	ONE PIECE OF CORE 5.0 FEET LONG.
236.0	MASSIVE BASALT; 6 FRACTURES IN 45 FEET OF CORE.
241.0	BASALT BRECCIA WITH SAND AND COBBLES AT 237.8 FEET.
246.0	SCORACIOUS BASALT BRECCIA.
266.0	POORLY INDURATED AT 265 FEET.
271.0	POORLY TO MODERATELY INDURATED PALEO-ALLUVIUM CONGLOMERATE.
276.0	MEDIUM GRAY OLIVINE BASALT WITH QUARTZ;VESICULAR;BASALT BRECCIA AT 275.2 FEET.
281.0	BASALT BRECCIA WITH CLAY MATRIX AT 276.7-276.9;278.0-278.25
286.0	VESICULAR TO MASSIVE BASALT
291.0	SLIGHTLY VESICULAR BASALT WITH QUARTZ FILLING SOME VESSICLES.
296.0	FLOW BANDING 30 DEGREES TO CORE AXIS AT 294 FEET.
301.0	MASSIVE BASALT TO 298.3 FEET;BASALT BRECCIA BELOW.
306.0	PALEO-ALLUVIUM;GRAYISH ORANGE PINK SAND;SILT WITH GRAVEL.
311.0	PALEO-ALLUVIUM;GRAVEL OF CHERT;SANDSTONE;LIMESTONE;CHERT;QUARTZITE;GRANITICS
316.0	PALEO-ALLUVIUM;SIGNIFICANT CLAY RECOGNIZED IN DRILL CUTTINGS.
326.0	PALEO-ALLUVIUM;SANDSTONE BOULDERS UP TO 0.9 FEET IN DIAMETER.
341.0	PALEO-ALLUVIUM;WELL CEMENTED WITH $CaCO_3$.
346.0	COMPLETELY WEATHERED SANDY CLAYEY SILTSTONE
351.0	END OF HOLE.

ENGINEERING GEOLOGIC LOG
BOREHOLE: MF-121

SITE:	MINER FLAT DAM SITE	NORTHING:	1,085,645.00	DRILLING METHOD:	NQ3 TRIPLE TUBE CORE
LOCATION:	SUPAI RIDGE	EASTING:	576,785.00	DRILLING CONTRACTOR:	KELMINE EXPLORATION
BOREHOLE:	MF-121	ELEVATION:	6,075.00	START DEPTH:	0.00
START DATE:	2/ 9/86	INCLINATION:	89.9	LOGGED BY:	CHR
COMPLETION DATE:	2/12/86	BEARING:	278.5	PAGE:	1

DEPTH (ft.)	WEATH/ ALT	ROCK TYPE	RQD (%)	TOT CORE RECOVERY (%)	DIP OF FRACTURES TO CORE AXIS: 90 - 70 NO	90 - 70 RGH	90 - 70 ALT	90 - 70 TYPE	70 - 50 NO	70 - 50 RGH	70 - 50 ALT	70 - 50 TYPE	50 - 30 NO	50 - 30 RGH	50 - 30 ALT	50 - 30 TYPE	30 - 0 NO	30 - 0 RGH	30 - 0 ALT	30 - 0 TYPE	STRENGTH (psi)	SCR (%)	CM
11.5	WR	COSRFM	0.0	47.5	0	0			0	0			0	0			0	0			S3	0.0	*
15.5	WR	COSRFM	0.0	80.8	0	0			0	0			0	0			0	0			S3	0.0	
17.9	WR	COSRFM	0.0	66.7	0	0			0	0			0	0			0	0			S2	0.0	
23.1	WR	COSRFM	32.7	61.0	0	0			2	3	T	SJ	1	2	T	SJ	0	0			17,866	0.0	*
28.2	WS	BAO VM	51.6	93.7	7	3	SC	SJ	0	0			0	0			5	3	FC	SJ	20,973	22.5	*
30.0	WF	BAO VV	71.1	100.0	2	4	FC	SJ	0	0			0	0			0	0			14,758	71.1	#
40.1	WF	BAO VM	84.0	100.0	4	4	SC	SJ	0	0			0	0			0	0			24,856	64.7	*
50.3	WF	BAO VM	80.2	98.7	0	0			0	0			8	3	SC	SJ	0	0			26,099	62.0	
60.6	WF	BAOQVM	78.9	97.4	0	0			6	3	SC	SJ	5	3	FC	SJ	0	0			21,749	39.1	*
70.4	WF	BAOQVV	31.3	77.6	10	3	SC	SJ	0	0			0	0			5	3	FC	SJ	19,419	10.7	*
77.2	WF	SSMSVM	42.6	84.1	6	2	T	SJ	0	0			4	2	T	SJ	3	4	T	SJ	1,864	0.0	*
81.0	WF	SSMSFB	69.7	100.0	5	2	T	SJ	0	0			0	0			2	2	T	SJ	1,165	42.1	#
89.7	WF	SSS FX	30.2	85.6	16	2	T	SJ	2	2	T	SJ	0	0			2	2	T	SJ	1,787	0.0	*
100.2	WF	SSS FX	57.4	90.2	5	2	T	SJ	0	0			10	2	T	SJ	2	2	SI	SJ	466	34.4	*
106.5	WF	SSS FX	92.9	92.9	1	2	T	SJ	0	0			0	0			1	2	T	SJ	1,787	92.9	*
111.0	WF	SSMSFX	25.1	73.3	8	2	T	SJ	0	0			0	0			1	2	T	SJ	2,486	0.0	*
121.0	WF	SSMSFB	58.2	82.6	13	2	T	SJ	0	0			3	2	T	SJ	0	0			1,942	32.5	*
128.6	WF	SSS FL	6.6	59.2	13	2	T	SJ	0	0			0	0			4	2	T	SJ	1,165	0.0	*
137.7	WF	SSS FB	34.1	78.0	4	2	T	SJ	0	0			5	2	T	SJ	2	2	T	SJ	466	15.5	*
147.3	WF	SSS FB	48.1	91.7	7	2	T	SJ	5	2	T	SJ	0	0			0	0			1,243	26.5	*
155.0	WF	SSS FB	35.6	96.8	12	2	T	SJ	3	2	T	SJ	0	0			8	3	T	SJ	544	18.8	
164.8	WF	SSS FB	60.5	89.4	9	3	T	SJ	0	0			0	0			4	3	T	SJ	1,087	40.8	*
175.0	WF	SSS FX	53.4	90.8	11	2	T	SJ	3	2	T	SJ	0	0			3	2	T	SJ	1,787	15.1	*
185.0	WF	SSS FX	11.0	37.2	11	2	T	SJ	0	0			0	0			3	2	T	SJ	1,010	11.0	
191.0	WF	SSS FX	51.7	96.3	9	2	T	SJ	0	0			0	0			2	2	T	SJ	1,709	18.8	*

DEPTH ---------- COMMENT ----------

= TOTAL CORE RECOVERY > 100%

11.5 COLLUVIUM;WHITE TO REDDISH ORANGE SAND AND SANDSTONE TALUS BLOCKS.
23.1 SUPAI COLLUVIUM TO 20.5; VESICULAR TO MASSIVE BASALT;FLOW BANDED 60 DEGREES.
28.2 MEDIUM GRAY OLIVINE BASALT; MASSIVE TO VESICULAR.
40.1 VESICULAR BASALT;PALEOSOL AT 34.5 & 38.6; 0.3 FEET OF CLAY RECOVERED.

DEPTH	---------- COMMENT ----------
	# = TOTAL CORE RECOVERY > 100%
60.6	OLIVINE QUARTZ BASALT;SANDY CLAY PALEOSOL 0.2 FEET THICK AT 55.5 FEET.
70.4	BASALT TO 67 FEET; PALEO-COLLUVIUM 67-68.8;SANDSTONE BELOW 68.8 FEET.
77.2	WHITE TO REDDISH BROWN SANDSTONE TO SILTY SANDSTONE;FRIABLE.
89.7	CROSS BEDDED QUARTZ SANDSTONE.
100.2	IRON STAINED JOINTS 30 DEGREES TO CORE AXIS AT 98 FEET.
106.5	PALE YELLOW SANDSTONE WITH MINOR CaCO3.
111.0	MEDIUM REDDISH BROWN SILTY SANDSTONE;FINE-GRAINED;MEDIUM-GRAINED WITH DEPTH.
121.0	WHITE SANDSTONE;FINE- TO MEDIUM-GRAINED FRIABLE TO 117 FEET.'
128.6	MEDIUM REDDISH BROWN SANDSTONE;FINE-GRAINED;VERY FRIABLE.
137.7	POORLY INDURATED
147.3	PINK SANDSTONE AND SAND; VERY POORLY INDURATED.
164.8	PALE REDDISH BROWN AND WHITE SANDSTONE;FRIABLE.
175.0	CROSS BEDDED SANDSTONE.
191.0	END OF HOLE.

ENGINEERING GEOLOGIC LOG
BOREHOLE: MF-122

SITE:	MINER FLAT DAM SITE	NORTHING:	1,085,645.00	DRILLING METHOD:	NQ3 TRIPLE TUBE CORE
LOCATION:	SUPAI RIDGE	EASTING:	576,785.00	DRILLING CONTRACTOR:	KELMINE EXPLORATION
BOREHOLE:	MF-122	ELEVATION:	6,075.00	START DEPTH:	0.00
START DATE:	2/ 5/86	INCLINATION:	89.9	LOGGED BY:	CHR
COMPLETION DATE:	2/ 7/86	BEARING:	278.5	PAGE:	1

DEPTH (ft.)	WEATH/ ALT	ROCK TYPE	RQD (%)	TOT CORE RECOVERY (%)	DIP OF FRACTURES TO CORE AXIS: 90 - 70 NO	90 - 70 RGH	90 - 70 ALT	90 - 70 TYPE	70 - 50 NO	70 - 50 RGH	70 - 50 ALT	70 - 50 TYPE	50 - 30 NO	50 - 30 RGH	50 - 30 ALT	50 - 30 TYPE	30 - 0 NO	30 - 0 RGH	30 - 0 ALT	30 - 0 TYPE	STRENGTH (psi)	SCR (%)	CM	
3.0	WR	COSCMM	0.0	25.0	0	0			0	0			0	0			0	0			S3	0.0	‡	
8.0	WS	BAO VM	22.0	74.0	4	2	T	SJ	0	0			0	0			1	3	T	SJ	17,089	0.0	‡	
12.3	WS	BAOQVM	95.3	100.0	4	2	SC	SJ	3	2	SC	SJ	0	0			2	3	SC	SJ	19,419	34.9	‡	#
17.4	WS	BAO VV	33.9	98.0	7	4	SC	SJ	2	4	SC	SJ	0	0			3	4	SC	SJ	17,866	25.5	‡	
22.7	WS	BAO VV	2.6	90.6	12	3	FC	SJ	0	0			0	0			4	3	FC	SJ	20,196	0.0	‡	
27.8	WF	BAOQVM	36.1	97.1	8	3	SC	SJ	3	3	SC	SJ	0	0			5	3	FC	SJ	27,963	0.0	‡	
32.5	WF	BAOQVM	89.8	100.0	4	3	T	SJ	2	3	SC	SJ	0	0			2	2	SC	SJ	28,274	51.1		#
37.5	WM	BAO VV	45.4	87.2	5	3	FC	SJ	8	3	FC	SJ	0	0			2	3	FC	SJ	17,089	0.0	‡	
47.0	WF	BAOQVV	45.7	86.5	12	4	FC	SJ	5	3	FC	SJ	0	0			8	3	FC	SJ	19,419	24.8	‡	
57.2	WF	BAO VV	40.6	67.6	8	3	FC	SJ	3	3	FC	SJ	0	0			3	3	FC	SJ	10,564	25.6		
65.2	WF	BAO VM	75.0	95.1	10	3	SC	SJ	0	0			1	2	T	SJ	3	3	FC	SJ	15,535	65.1	‡	
76.0	WF	BAO VV	71.5	94.0	10	4	SC	SJ	0	0			2	3	SC	SJ	4	3	FC	SJ	18,642	28.9		
86.4	WS	BAO VV	55.3	96.2	12	4	T	SJ	0	0			4	3	FC	SJ	2	3	FC	SJ	16,312	28.8	‡	
96.9	WF	BAO VV	66.3	95.7	9	4	T	SJ	0	0			2	4	FC	SJ	4	3	FC	SJ	13,982	36.8		
106.6	WF	BAOQVM	57.7	97.9	10	3	SC	SJ	3	3	SC	SJ	0	0			2	4	FC	SJ	22,526	36.7	‡	
118.3	WF	BAOQVM	37.8	76.9	6	3	T	SJ	2	3	SC	SJ	4	3	SC	SJ	3	3	FC	SJ	34,178	29.4	‡	
123.0	WS	BAO VR	8.9	51.1	8	3	FC	SJ	0	0			0	0			0	0			7,768	0.0	‡	
130.1	WS	BAO VR	0.0	14.1	0	0			0	0			0	0			0	0			R2	0.0	‡	
136.8	WF	BAO VV	52.5	87.3	6	3	SC	SJ	3	3	SC	SJ	0	0			3	3	FC	SJ	29,983	19.4	‡	
139.2	WF	BAO VV	0.0	99.6	0	0			0	0			0	0			0	0			R2	0.0		
143.7	WF	BAO VS	40.0	84.4	6	3	FC	SJ	0	0			2	3	FC	SJ	2	3	FC	SJ	8,078	0.0	‡	
154.1	WF	BAO VS	31.0	63.5	10	3	FC	SJ	0	0			0	0			5	3	FC	SJ	2,330	12.3	‡	
164.8	WF	SSS FM	8.6	49.3	13	3	T	SJ	0	0			0	0			0	0			2,563	0.0	‡	
175.0	WF	SSS FM	81.1	99.0	9	3	T	SJ	0	0			0	0			2	3	T	SJ	R2	67.6	‡	

DEPTH ---------- COMMENT ----------

= TOTAL CORE RECOVERY > 100%

8.0 BASALT/TERTIARY GRAVEL COLLUVIUM;SILTY CLAYEY SAND WITH COBBLES OF BASALT.
8.0 CONTACT OF COLLUVIUM WITH BASALT AT 3.0 FEET.
12.3 MEDIUM GRAY OLIVINE BASALT WITH QUARTZ;VESICULAR AT 10 FEET.
17.4 ROPEY TEXTURE; LOST DRILL FLUID CIRCULATION AT 14 FEET.
22.7 FLOW BOUNDRY

DEPTH	---------- COMMENT ----------
	# = TOTAL CORE RECOVERY > 100%
27.8	MASSIVE BASALT BELOW 24 FEET.
37.5	FLOW BOUNDRY AT 35 FEET.
47.0	FLOW BOUNDRY WITH PALEOSOL AT 41 FEET.
65.2	MASSIVE BASALT TO 65 FEET.
86.4	VESICULAR BASALT
106.6	MASSIVE BASALT AT 104.5 FEET.
118.3	MASSIVE BASALT TO 114.2. SCORACIOUS BASALT TO BASALT BRECCIA BELOW 114.2.
123.0	FLOW BRECCIA; SCORACIOUS FRAGMENTS CEMENTED WITH CLAY.
130.1	CORE BARREL MISLATCH; SCORACIOUS BASALT FRAGMENTS RECOVERED.
136.8	SCORACIOUS TO MASSIVE BASALT.
143.7	SCORACIOUS BASALT.
154.1	SCORACIOUS BASALT TO 150.3. PALE RED TO PINK; FINE-GRAINED SANDSTONE.
164.8	AT CONTACT <.25 FEET OF PALEO-COLLUVIUM. MODERATE BROWN SANDSTONE.
175.0	PALE PINKISH YELLOW SANDSTONE; FRIABLE;>75% QUARTZ SAND. END OF HOLE.

ENGINEERING GEOLOGIC LOG
BOREHOLE: MF-123

SITE:	MINER FLAT DAM SITE	NORTHING:	1,085,307.00	DRILLING METHOD:	NQ3 TRIPLE TUBE CORE
LOCATION:	SUPAI RIDGE	EASTING:	577,018.00	DRILLING CONTRACTOR:	KELMINE EXPLORATION
BOREHOLE:	MF-123	ELEVATION:	6,113.10	START DEPTH:	0.00
START DATE:	3/13/86	INCLINATION:	90	LOGGED BY:	CHR
COMPLETION DATE:	3/22/86	BEARING:	0	PAGE:	1

DEPTH (ft.)	WEATH/ ALT	ROCK TYPE	RQD (%)	TOT CORE RECOVERY (%)	DIP OF FRACTURES TO CORE AXIS: 90 - 70 NO	90 - 70 RGH	90 - 70 ALT	90 - 70 TYPE	70 - 50 NO	70 - 50 RGH	70 - 50 ALT	70 - 50 TYPE	50 - 30 NO	50 - 30 RGH	50 - 30 ALT	50 - 30 TYPE	30 - 0 NO	30 - 0 RGH	30 - 0 ALT	30 - 0 TYPE	STRENGTH (psi)	SCR (%)	CM
53.0	WR	TGSBRB	0.0	39.4	0	0			0	0			0	0			0	0			S3	0.0	*
58.0	WS	SSS FM	20.0	61.0	5	3	T	SJ	0	0			4	6	T	SJ	8	3	T	SJ	7,379	0.0	*
58.8	WS	SSS FM	0.0	100.0	4	2	T	SJ	0	0			0	0			0	0			12,739	0.0	*
64.7	WF	SSS FM	32.4	64.7	9	4	T	SJ	0	0			8	4	T	SJ	5	3	T	SJ	4,350	0.0	*
68.5	WF	SSS FM	0.0	35.8	4	4	T	SJ	0	0			5	3	T	SJ	3	3	T	SJ	7,457	0.0	
70.4	WF	SSSCVR	0.0	48.9	3	2	T	SJ	0	0			0	0			2	3	T	SJ	5,826	0.0	*
76.2	WF	SSMCFR	0.0	58.6	19	3	T	SJ	0	0			3	3	T	SJ	3	2	T	SJ	7,146	0.0	*
80.4	WF	SSS FM	11.0	52.4	5	3	T	SJ	0	0			0	0			2	2	T	SJ	10,564	0.0	*
84.6	WF	SSS FM	0.0	59.5	5	3	T	SJ	0	0			0	0			6	2	T	SJ	7,768	0.0	
89.8	WF	SSS FM	50.6	100.0	8	2	T	SJ	0	0			3	2	T	SJ	3	2	T	SJ	9,010	50.6	*
95.2	WS	SSS FM	33.5	95.2	10	2	T	SJ	0	0			6	2	SI	SJ	5	2	SI	SJ	2,408	20.4	*
100.7	WS	SSS FM	20.7	93.6	6	2	T	SJ	0	0			6	2	SI	SJ	11	2	SI	SJ	3,029	0.0	*
106.2	WS	SSS FM	39.1	92.2	7	2	T	SJ	0	0			5	2	SI	SJ	6	2	SI	SJ	1,787	39.1	*
111.8	WS	SSS FM	55.7	91.1	5	2	T	SJ	0	0			2	2	T	SJ	3	2	SI	SJ	1,942	37.5	*
121.9	WS	SSMCFB	62.6	86.3	10	2	T	SJ	0	0			7	2	T	SJ	6	2	T	SJ	1,320	53.6	*
131.9	WF	SSS FB	23.3	68.2	25	2	T	SJ	0	0			3	2	T	SJ	5	2	T	SJ	699	18.5	*
141.9	WF	SSMSFB	6.5	17.5	4	2	T	SJ	0	0			0	0			3	2	T	SJ	777	0.0	*
151.9	WF	SSMCVB	22.0	42.5	7	2	T	SJ	0	0			3	2	T	SJ	2	2	T	SJ	1,320	18.0	
161.9	WF	SSMCVM	0.0	.2	0	0			0	0			0	0			0	0			R1	0.0	*
171.9	WF	SSMSVM	26.0	33.0	2	2	T	SJ	0	0			0	0			2	2	T	SJ	R1	26.0	*
181.9	WF	SSMSVM	0.0	0.0	0	0			0	0			0	0			0	0			R1	0.0	*
190.6	WF	SSM VB	73.0	92.0	5	2	T	SJ	0	0			0	0			7	2	T	SJ	R1	73.0	*
196.8	WF	SSS VB	12.6	33.9	5	2	T	SJ	0	0			0	0			3	2	T	SJ	R1	0.0	
202.9	WF	SSS FB	45.9	73.8	9	2	T	SJ	0	0			0	0			3	2	T	SJ	R1	45.9	
207.0	WF	SSS FM	0.0	70.7	11	2	T	SJ	0	0			0	0			0	0			R1	0.0	*

DEPTH	COMMENT
53.0	TERTIARY GRAVEL OF SAND SILT CLAY COBBLES AND GRAVEL OF GRANITICS;SANDSTONE.
58.0	TOP OF BEDROCK AT 53 FEET. WHITE TO PALE YELLOWISH ORANGE SANDSTONE.
58.8	SANDSTONE; FINE-GRAINED;POORLY LITHIFIED OR INDURATED.
64.7	MODERATE ORANGE PINK TO WHITE SANDSTONE; FINE-GRAINED.
70.4	SANDSTONE/CLAY BRECCIA.
76.2	SANDSTONE AND SILTY CLAYEY SANDSTONE BRECCIA.
80.4	MOTTLED;PALE ORANGISH PINK;WHITE AND MODERATE REDDISH BROWN SANDSTONE.

DEPTH	---------- COMMENT ----------
89.8	WHITE SANDSTONE;FINE-GRAINED;POORLY INDURATED.
95.2	IRON STAIN ON SOME FRACTURES.
100.7	MODERATELY INDURATED;IRON STAINING ON SOME FRACTURES.
106.2	MODERATE IRON STAINING.
111.8	WHITE SANDSTONE; FINE- TO MEDIUM-GRAINED;POORLY TO MODERATELY INDURATED.
121.9	WHITE SANDSTONE TO 113. INTERBEDDED SANDSTONE AND SILTY SANDSTONE;SOME CLAY.
131.9	MODERATE REDDISH BROWN SANDSTONE; FINE- TO MEDIUM-GRAINED;POORLY INDURATED.
141.9	SILTY SANDSTONE;LENTICULAR TO BEDDED;POORLY INDURATED.
161.9	VERY POOR RECOVERY.
171.9	MODERATE YELLOWISH ORANGE TO PALE REDDISH BROWN SILTY SAND(STONE).
181.9	NO RECOVERY! ROCK TYPE ASSUMED FROM ADJACENT ROCKS.
190.6	MODERATE REDDISH BROWN;YELLOWISH ORANGE AND WHITE MOTTLED SAND(STONE).
207.0	HOLE CAVED;LOST DRILL STRING; END OF HOLE!

ENGINEERING GEOLOGIC LOG
BOREHOLE: MF-124

SITE:	MINER FLAT DAM SITE	NORTHING:	1,085,430.00	DRILLING METHOD:	NQ3 TRIPLE TUBE CORE
LOCATION:	SUPAI RIDGE	EASTING:	576,820.00	DRILLING CONTRACTOR:	KELMINE EXPLORATION
BOREHOLE:	MF-124	ELEVATION:	6,080.60	START DEPTH:	0.00
START DATE:	4/ 1/86	INCLINATION:	90	LOGGED BY:	CHR
COMPLETION DATE:	4/ 4/86	BEARING:	0	PAGE:	1

DEPTH (ft.)	WEATH/ ALT	ROCK TYPE	RQD (%)	TOT CORE RECOVERY (%)	DIP OF FRACTURES TO CORE AXIS: 90 - 70 NO	90 - 70 RGH	90 - 70 ALT	90 - 70 TYPE	70 - 50 NO	70 - 50 RGH	70 - 50 ALT	70 - 50 TYPE	50 - 30 NO	50 - 30 RGH	50 - 30 ALT	50 - 30 TYPE	30 - 0 NO	30 - 0 RGH	30 - 0 ALT	30 - 0 TYPE	STRENGTH (psi)	SCR (%)	CM
23.0	WR	TGSGRB	0.0	11.3	0	0			0	0			0	0			0	0			S3	0.0	‡
24.7	WS	BAO VV	0.0	100.0	3	4	T	SJ	0	0			2	3	T	SJ	0	0			8,544	0.0	‡
28.0	WS	BAO VV	40.9	79.4	3	5	T	SJ	0	0			0	0			5	4	FC	SJ	13,671	0.0	‡
29.9	WS	BAOQVV	0.0	73.7	3	4	T	SJ	0	0			0	0			3	4	FC	SJ	18,953	0.0	
35.1	WS	BAO VV	19.8	69.8	11	4	T	SJ	0	0			0	0			6	3	SC	SJ	23,303	0.0	
40.3	WF	BAOQVV	71.9	100.0	4	3	T	SJ	0	0			2	3	SC	SJ	3	3	T	SJ	21,749	47.1	‡
45.4	WF	BAOQVM	46.1	72.9	3	4	FC	SJ	0	0			2	3	T	SJ	0	0			21,439	29.4	‡
50.2	WF	BAOQVV	89.2	100.0	6	4	SC	SJ	0	0			0	0			0	0			13,982	45.2	‡ #
55.4	WF	BAOQVM	41.2	94.6	5	3	SC	SJ	0	0			4	3	SC	SJ	4	3	SC	SJ	24,856	28.8	
60.1	WF	BAOQVM	93.6	100.0	0	0			1	3	SC	SJ	0	0			0	0			22,992	93.6	‡ #
65.1	WF	BAOQVM	87.0	98.0	1	3	T	SJ	0	0			0	0			1	3	T	SJ	22,371	87.0	
70.2	WF	BAOQVM	100.0	100.0	0	0			0	0			0	0			0	0			19,419	100.0	‡
75.3	WF	BAOQVM	94.1	98.4	3	3	SC	SJ	0	0			0	0			4	3	SC	SJ	19,264	65.1	‡
80.0	WF	BAOQVM	34.9	100.0	5	2	T	SJ	0	0			6	2	SC	SJ	3	3	FC	SJ	22,060	22.3	#
85.0	WF	BAOQVM	55.6	92.6	6	3	T	SJ	0	0			0	0			1	3	SC	SJ	17,866	22.2	‡
90.9	WS	BAO VV	64.4	87.6	6	3	T	SJ	0	0			0	0			4	3	FC	SJ	R3	47.5	‡
96.0	WS	BAOQVM	100.0	100.0	2	3	T	SJ	0	0			0	0			2	3	SC	SJ	25,245	68.6	‡ #
99.4	WS	BAO VV	67.6	100.0	5	3	SC	SJ	2	3	SC	SJ	0	0			2	2	SC	SJ	14,914	0.0	‡ #
101.3	WC	SSS FM	0.0	100.0	0	0			0	0			0	0			0	0			8,700	0.0	‡ #
106.0	WC	SSS FM	0.0	8.5	0	0			0	0			0	0			0	0			S2	0.0	‡
111.0	WC	SSS FM	0.0	0.0	0	0			0	0			0	0			0	0			S2	0.0	‡
116.0	WS	SSS FM	8.6	58.0	4	2	T	SJ	0	0			3	2	T	SJ	0	0			R1	0.0	‡
121.0	WC	SSS FM	0.0	3.0	0	0			0	0			0	0			0	0			S2	0.0	
126.0	WM	SSS FB	0.0	54.0	8	2	T	SJ	0	0			3	2	T	SJ	2	2	T	SJ	2,020	0.0	‡
131.1	WC	SSS FB	0.0	0.0	0	0			0	0			0	0			0	0			S2	0.0	‡
136.0	WS	SSS FB	0.0	0.0	0	0			0	0			0	0			0	0			S2	0.0	
141.0	WC	SSS FB	0.0	0.0	0	0			0	0			0	0			0	0			S2	0.0	
146.0	WF	SSS FB	67.0	93.2	6	2	T	SJ	0	0			6	2	T	SJ	0	0			1,243	67.0	‡
151.0	WF	SSS FB	31.2	75.4	7	2	T	SJ	0	0			5	2	T	SJ	1	2	T	SJ	1,243	24.0	‡
156.0	WC	SSS FB	0.0	0.0	0	0			0	0			0	0			0	0			S2	0.0	
161.0	WF	SSS FB	37.0	76.0	7	2	T	SJ	0	0			2	2	T	SJ	2	2	T	SJ	932	0.0	

ENGINEERING GEOLOGIC LOG
BOREHOLE: MF-124

SITE:	MINER FLAT DAM SITE	NORTHING:	1,085,430.00	DRILLING METHOD:	NQ3 TRIPLE TUBE CORE
LOCATION:	SUPAI RIDGE	EASTING:	576,820.00	DRILLING CONTRACTOR:	KELMINE EXPLORATION
BOREHOLE:	MF-124	ELEVATION:	6,080.60	START DEPTH:	0.00
START DATE:	4/ 1/86	INCLINATION:	90	LOGGED BY:	CHR
COMPLETION DATE:	4/ 4/86	BEARING:	0	PAGE:	2

DEPTH (ft.)	WEATH/ ALT	ROCK TYPE	RQD (%)	TOT CORE RECOVERY (%)	DIP OF FRACTURES TO CORE AXIS: 90 - 70 NO	90 - 70 RGH	90 - 70 ALT	90 - 70 TYPE	70 - 50 NO	70 - 50 RGH	70 - 50 ALT	70 - 50 TYPE	50 - 30 NO	50 - 30 RGH	50 - 30 ALT	50 - 30 TYPE	30 - 0 NO	30 - 0 RGH	30 - 0 ALT	30 - 0 TYPE	STRENGTH (psi)	SCR (%)	CM
166.0	WF	SSS FB	39.0	98.0	5	2	T	SJ	0	0			6	2	T	SJ	4	2	T	SJ	R1	20.0	#
171.0	WF	SSS FB	0.0	50.0	4	2	T	SJ	2	2	T	SJ	3	2	T	SJ	0	0			R1	0.0	
176.0	WF	SSS FB	9.0	50.0	2	2	T	SJ	0	0			3	2	T	SJ	0	0			R1	0.0	
180.0	WC	SSS FB	0.0	0.0	0	0			0	0			0	0			0	0			S2	0.0	#

DEPTH ---------- COMMENT ----------

= TOTAL CORE RECOVERY > 100%

23.0 TERTIARY GRAVEL OF CLAY SILT SAND GRAVEL AND COBBLES OF QUARTZITE;QUARTZ .
24.7 CONTACT WITH BASALT AT 23 FEET. VESICULAR BASALT.
28.0 MEDIUM GRAY OLIVINE BASALT. VERTICAL FRACTURES FILLED WITH SILTY CLAY.
40.3 1 TO 3.5 FOOT MASSIVE BASALT INTERVALS.
45.4 MASSIVE BASALT TO 41.7 FEET. CLAY FILLED FLOW BOUNDRY TO 43 FEET.
50.2 MASSIVE BASALT TO 46 FEET. LARGE VESICLES (0.05 FEET) BELOW 46 FEET.
60.1 MASSIVE BASALT; FLOW BANDING 60 DEGREES TO CORE AXIS.
70.2 MASSIVE BASALT; ONE PIECE OF CORE 5.1 FEET LONG.
75.3 FRACTURES 'STAINED' WITH CLAY.
90.9 FLOW BOUNDRY AT 88 FEET.
180.0 NO RECOVERY OF CORE. END OF HOLE.

ENGINEERING GEOLOGIC LOG
BOREHOLE: MF-125A

SITE:	MINER FLAT DAM SITE	NORTHING:	0	DRILLING METHOD:	NQ3 TRIPLE TUBE CORE
LOCATION:	SUPAI RIDGE	EASTING:	0	DRILLING CONTRACTOR:	KELMINE EXPLORATION
BOREHOLE:	MF-125A	ELEVATION:	0	START DEPTH:	0.00
START DATE:	4/ 5/86	INCLINATION:	90	LOGGED BY:	CHR
COMPLETION DATE:	4/ 6/86	BEARING:	0	PAGE:	1

DEPTH (ft.)	WEATH/ ALT	ROCK TYPE	RQD (%)	TOT CORE RECOVERY (%)	DIP OF FRACTURES TO CORE AXIS: 90 - 70 NO	90 - 70 RGH	90 - 70 ALT	90 - 70 TYPE	70 - 50 NO	70 - 50 RGH	70 - 50 ALT	70 - 50 TYPE	50 - 30 NO	50 - 30 RGH	50 - 30 ALT	50 - 30 TYPE	30 - 0 NO	30 - 0 RGH	30 - 0 ALT	30 - 0 TYPE	STRENGTH (psi)	SCR (%)	CM
7.0	WR	TGSBRB	0.0	3.6	0	0			0	0			0	0			0	0			S2	0.0	‡
10.0	WS	BAD VV	76.7	100.0	6	4	T	SJ	0	0			0	0			0	0			9,010	0.0	‡ ‡
14.9	WS	BAD VM	98.0	100.0	4	4	T	SJ	1	3	T	SJ	0	0			0	0			19,574	65.3	‡ ‡
20.3	WS	BAD VM	88.9	96.3	4	4	SI	SJ	0	0			0	0			0	0			20,973	44.1	‡
25.5	WS	BAD VV	51.9	100.0	5	4	T	SJ	0	0			1	3	SC	SJ	4	5	FC	SJ	14,603	21.5	‡
30.7	WS	BAD VV	62.3	99.0	5	3	SC	SJ	0	0			0	0			4	3	FC	SJ	17,089	36.2	‡
36.0	WF	BAOQVM	66.4	99.1	5	3	SC	SJ	0	0			0	0			3	3	FC	SJ	21,749	44.2	‡
41.0	WF	BAOQVM	100.0	100.0	2	3	T	SJ	1	3	T	SJ	0	0			1	3	FC	SJ	20,817	74.2	
46.0	WF	BAOQVM	98.0	98.0	0	0			0	0			0	0			0	0			20,507	98.0	‡
51.0	WF	BAOQVM	56.6	100.0	3	3	T	SJ	1	3	T	SJ	0	0			2	3	T	SJ	25,633	25.0	‡ ‡
56.0	WF	BAOQVM	100.0	100.0	1	3	T	SJ	0	0			0	0			1	2	HQ	SJ	23,924	100.0	‡ ‡
61.0	WF	BAOQVM	97.6	100.0	1	3	SC	SJ	2	3	SC	SJ	0	0			0	0			25,167	97.6	
66.0	WF	BAOQVM	100.0	100.0	1	5	T	SJ	0	0			0	0			0	0			24,701	92.2	‡ ‡
71.0	WF	BAOQVV	8.8	96.0	8	3	FC	SJ	5	3	FC	SJ	0	0			4	6	FC	SJ	18,642	0.0	‡
76.0	WM	BAD VV	12.0	100.0	7	3	FC	SJ	8	3	FC	SJ	0	0			6	4	FC	SJ	10,098	0.0	‡
81.0	WS	BAOQVV	86.4	98.0	6	4	FC	SJ	0	0			0	0			0	0			12,428	56.2	‡
86.0	WS	BAOQVM	95.6	100.0	3	3	SC	SJ	0	0			0	0			0	0			20,196	85.0	‡
91.0	WS	BAOQVM	93.0	100.0	3	4	T	SJ	0	0			0	0			0	0			19,885	93.0	‡
96.0	WF	BAOQVM	100.0	100.0	0	0			0	0			0	0			0	0			18,642	100.0	‡
101.0	WF	BAOQVM	97.0	100.0	0	0			0	0			1	3	FC	SJ	0	0			15,535	97.0	‡
111.0	WF	BAOQVM	47.2	49.4	1	4	T	SJ	0	0			1	3	SC	SJ	0	0			18,332	47.2	‡
116.0	WF	BAOQVM	42.0	80.0	0	0			0	0			0	0			0	0			20,507	20.0	‡
121.0	WS	SSMCFB	0.0	48.4	9	2	T	SJ	0	0			0	0			0	0			1,787	0.0	‡
126.0	WF	SSS FM	0.0	73.0	0	0			0	0			0	0			7	2	T	SJ	S2	0.0	‡
131.0	WF	SSS FM	0.0	72.2	8	2	T	SJ	0	0			4	2	T	SJ	3	2	T	SJ	R1	0.0	‡
136.0	WF	SSS FM	0.0	6.0	0	0			0	0			0	0			0	0			R1	0.0	‡
141.0	WF	SSS FM	0.0	62.0	0	0			0	0			0	0			0	0			1,709	0.0	‡
146.0	WF	SSS FM	0.0	6.0	0	0			0	0			0	0			0	0			R1	0.0	
151.0	WF	SSS FB	0.0	46.6	0	0			0	0			0	0			0	0			R1	0.0	‡
156.0	WF	SSS FB	66.4	78.0	0	0			0	0			2	2	T	SJ	0	0			R1	58.0	
161.0	WF	SSS FB	35.4	66.0	0	0			0	0			6	2	T	SJ	0	0			R1	20.0	

ENGINEERING GEOLOGIC LOG
BOREHOLE: MF-125A

SITE:	MINER FLAT DAM SITE	NORTHING:	0	DRILLING METHOD:	NQ3 TRIPLE TUBE CORE
LOCATION:	SUPAI RIDGE	EASTING:	0	DRILLING CONTRACTOR:	KELMINE EXPLORATION
BOREHOLE:	MF-125A	ELEVATION:	0	START DEPTH:	0.00
START DATE:	4/ 5/86	INCLINATION:	90	LOGGED BY:	CHR
COMPLETION DATE:	4/ 6/86	BEARING:	0	PAGE:	2

DEPTH (ft.)	WEATH/ ALT	ROCK TYPE	RQD (%)	TOT CORE RECOVERY (%)	DIP OF FRACTURES TO CORE AXIS: 90 - 70 NO	90 - 70 RGH	90 - 70 ALT	90 - 70 TYPE	70 - 50 NO	70 - 50 RGH	70 - 50 ALT	70 - 50 TYPE	50 - 30 NO	50 - 30 RGH	50 - 30 ALT	50 - 30 TYPE	30 - 0 NO	30 - 0 RGH	30 - 0 ALT	30 - 0 TYPE	STRENGTH (psi)	SCR (%)	CM
166.0	WF	SSS FB	20.0	72.0	7	2	T	SJ	6	2	T	SJ	0	0			0	0			R1	20.0	
170.0	WF	SSS FB	0.0	77.5	0	0			5	2	T	SJ	6	2	T	SJ	0	0			R1	0.0	#

DEPTH ---------- COMMENT ----------

= TOTAL CORE RECOVERY > 100%

7.0 TERTIARY GRAVEL OF GRAVEL AND COBBLES IN A SANDY CLAYEY SILT.
10.0 CONTACT WITH BASALT AT 7.0 FEET. MEDIUM GRAY OLIVINE BASALT;VESICULAR.
14.9 FLOW BANDING AT 12 FEET.
20.3 MEDIUM GRAY OLIVINE BASALT; MASSIVE
25.5 VESICULAR AND FLOW BOUNDRY AT 20.8 FEET.CLAY FILLED VERTICAL FRACTURE 22-24.
30.7 VESICULAR BASALT;SLIGHTLY MAGNETIC
36.0 MASSIVE BASALT
46.0 MEDIUM GRAY OLIVINE BASALT WITH QUARTZ;MASSIVE.ONE PIECE OF CORE 4.9 FEET.
51.0 VERTICAL FRACTURES DECREASE 'RQD' AND 'SCR'.
56.0 FRACTURE AT 10 DEGREES TO CORE AXIS HEALED WITH QUARTZ.
66.0 VESICULAR BELOW 65.5 FEET.
71.0 FLOW BOUNDRY BASALT STARTING AT 66 FEET.
76.0 MEDIUM GRAY VESICULAR BASALT TO 73 FEET. 'PALEO-SURFACE' STARTING AT 73.
81.0 MEDIUM REDDISH GRAY OLIVINE BASALT;VESICULAR;FLOW BANDING AT 10-20 DEGREES.
86.0 MOSTLY MASSIVE BASALT.
91.0 FLOW BANDING AT 80 DEGREES TO CORE AXIS.
96.0 MEDIUM GRAY OLIVINE BASALT WITH QUARTZ;MASSIVE;SLIGHTLY MAGNETIC.
101.0 ONE FRACTURE IN 10 FEET OF CORE.
111.0 MINOR FLOW BANDING
116.0 VESICULAR AT 111.7 FEET. SANDSTONE CONTACT AT 112.2 FEET.
121.0 PALE REDDISH ORANGE SANDSTONE;FINE-GRAINED;SILTY & CLAYEY INTERBEDS.
126.0 SAND(STONE) FINE- TO VERY FINE-GRAINED;VERY POORLY INDURATED.
131.0 GRAYISH PINK SAND(STONE);>75% QUARTZ SAND.
136.0 VERY POOR RECOVERY
141.0 MODERATE REDDISH ORANGE SAND(STONE);FINE-GRAINED;VERY POORLY INDURATED.
151.0 THINLY BEDDED SAND(STONE).
170.0 MODERATE REDDISH ORANGE SAND(STONE). END OF HOLE.

APPENDIX C

Histograms of Geologic Logs,

Fracture Distribution by Dip,

Fracture Frequence, and

Hydraulic Conductivity

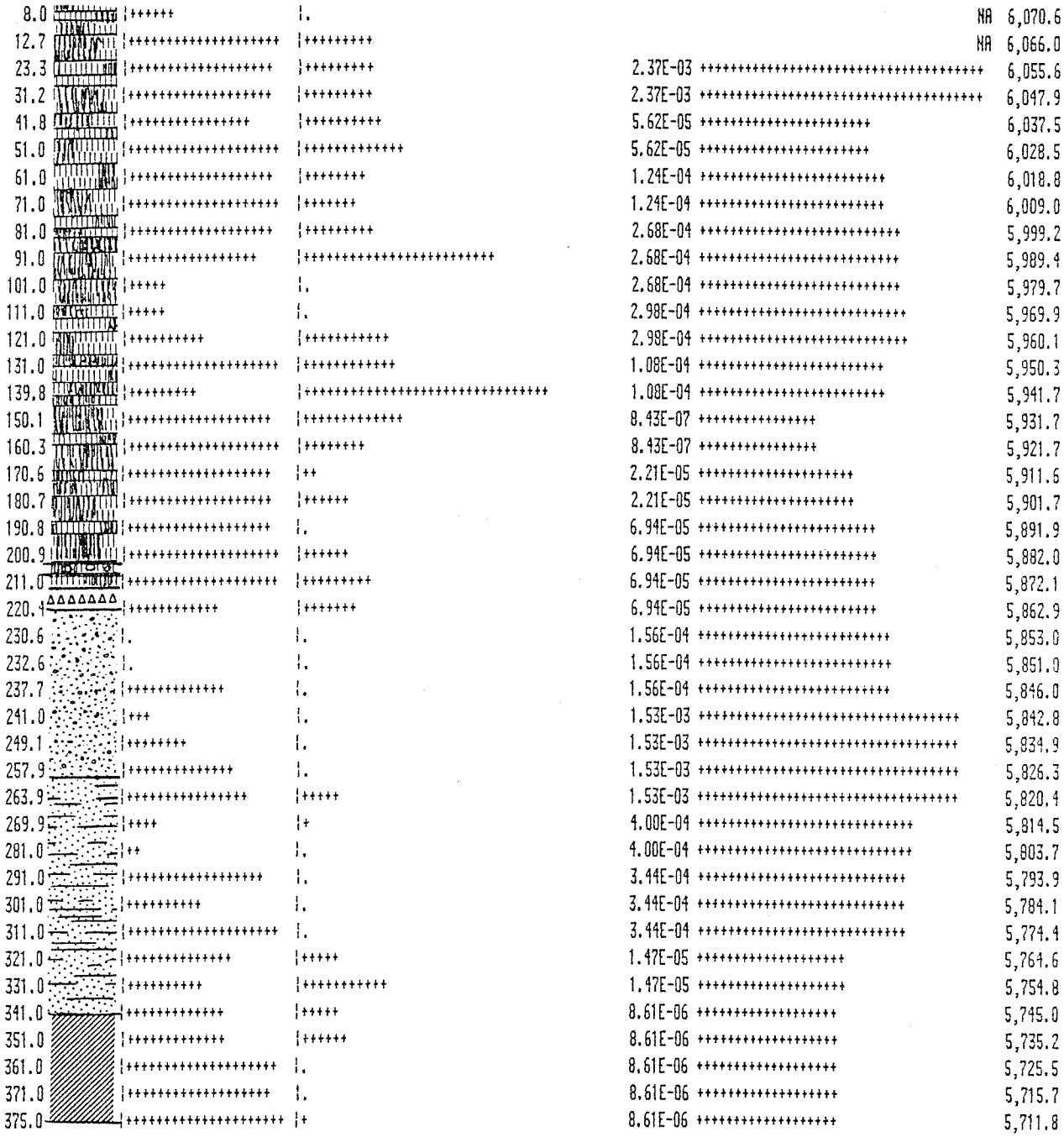
MINER FLAT DAM SITE: MF-102: ENGINEERING GEOLOGIC LOG

DEPTH	ROCK TYPE	RECOVERY 0% 100%	RQD 0% 100%	SCR 0% 100%	STRENGTH 0 40,000 psi		ELEV. (feet)
8.0		++	++	.	++++++++++++++++++	17,479	6,070.6
12.7		++++++++++++++++++++	++++++++++++++	++++++	++++++++++++++++++	17,479	6,066.0
23.3		++++++++++++++++++++	++++++++++++++	++++++++++++++	++++++++++++++++++++	19,863	6,055.6
31.2		++++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++++++++++++++++++++++++	22,723	6,047.9
41.8		++++++++++++++++	++++++++++	+++++++	++++++++++++++++++++	19,068	6,037.5
51.0		++++++++++++++++++++	++++++++++++++	+++++	++++++++++++++++++	17,479	6,028.5
61.0		++++++++++++++++++++	++++++++++++++	+++++++	++++++++++++++++++	17,797	6,018.8
71.0		++++++++++++++++++++	++++++++++++++++	++++++++++++	++++++++++++++++++++++++++++	27,331	6,009.0
81.0		++++++++++++++++++++	++++++++++++++	++++++++++	++++++++++++++++++++++	23,041	5,999.2
91.0		++++++++++++++++++	+++++	++	++++++++++++	11,123	5,989.4
101.0		+++++	.	.	++++++++++++++++++++	19,068	5,979.7
111.0		+++++	.	.	.	0	5,969.9
121.0		++++++++++	++++	.	++++++++++++++++++	17,479	5,960.1
131.0		++++++++++++++++++++	++++++++++++	+++++++++	++++++++++++++++++++++++++++++	30,191	5,950.3
139.8		+++++++++	++	.	++++	4,767	5,941.7
150.1		++++++++++++++++++++	++++++++++++++++	+++++++++	++++++++++++++++++++++++++++++++++	35,753	5,931.7
160.3		++++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++++++++++++++++++++++++++	28,602	5,921.7
170.6		++++++++++++++++++++	++++++++++++++++++++	++++++++++++++++++++	++++++++++++++++++++++++++++	30,986	5,911.6
180.7		++++++++++++++++++++	++++++++++++++++++++	++++++++++++++++++	++++++++++++++++++++++++++	29,397	5,901.7
190.8		++++++++++++++++++++	++++++++++++++++++++	++++++++++++++++++++	++++++++++++++++++++++++++++	31,780	5,891.9
200.9		++++++++++++++++++++	++++++++++++++++	++++++++++++++++	++++++++++++++++++++++++++++++++	34,958	5,882.0
211.0		++++++++++++++++++++	++++++++++++++++	++++++++++++++++	++++++++++++++++++++++++++++++++	33,369	5,872.1
220.4		++++++++++++	++++++++	+++	++++++++++++++++++++++++	25,424	5,862.9
230.6		.	.	.	.	0	5,853.0
232.6		.	.	.	.	0	5,851.0
237.7		++++++++++++++	.	.	.	0	5,846.0
241.0		+++	.	.	.	0	5,842.8
249.1		++++++++	.	.	.	0	5,834.9
257.9		++++++++++++++++	.	.	.	0	5,826.3
263.9		++++++++++++++++	++++++++	+++++	++	2,701	5,820.4
269.9		++++	+++	+++	.	953	5,814.5
281.0		++	.	.	++	2,384	5,803.7
291.0		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	.	795	5,793.9
301.0		++++++++++	++++++++++	++++++++++	.	636	5,784.1
311.0		++++++++++++++++++++	++++++++++++++++++++	++++++++++++++++++++	+	1,192	5,774.4
321.0		++++++++++++++++	+++++++	+++++++	++	2,225	5,764.6
331.0		++++++++++	++++++++	+++++++	.	715	5,754.8
341.0		++++++++++++++	++++++++	++++++++	.	874	5,745.0
351.0		++++++++++++++	++++++++++++	++++++++++++	+	1,907	5,735.2
361.0		++++++++++++++++++++	++++++++++++++++++++	++++++++++++++++++++	++++	4,290	5,725.5
371.0		++++++++++++++++++++	++++++++++++++++++++	++++++++++++++++++++	+	1,827	5,715.7
375.0		++++++++++++++++++++	++++++++++++++++++++	++++++++++++++++++++	++	2,304	5,711.8

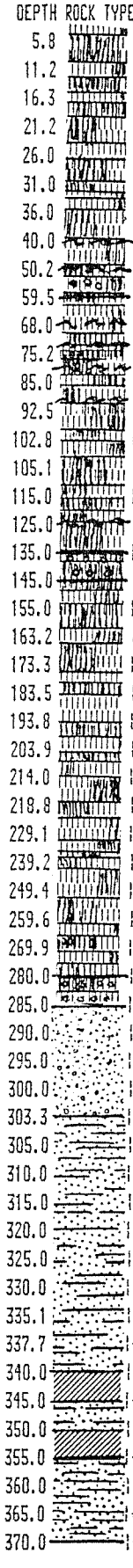
MINER FLAT DAM SITE: MF-102: FRACTURE LOG

DEPTH	RECOVERY 0% 100%	NUMBER OF FRACTURES 90-70 0 10	70-50 0 10	50-30 0 10	30-0 0 10 20	ELEV. (feet)
8.0	++++++	.	.	.	.	6,070.6
12.7	++++++++++++++++++++	+++++	.	.	++++	6,066.0
23.3	++++++++++++++++++++	++++++	.	.	+++	6,055.6
31.2	++++++++++++++++++++	+++++++	.	.	+++	6,047.9
41.8	++++++++++++++++	+++++++	.	.	+++	6,037.5
51.0	++++++++++++++++++++	+++++	++++++	.	++	6,028.5
61.0	++++++++++++++++++++	.	+++++	.	+++	6,018.8
71.0	++++++++++++++++++++	.	+++++	.	++	6,009.0
81.0	++++++++++++++++++++	.	++	.	+++++++	5,999.2
91.0	++++++++++++++++	++++++++++++	+++++	.	++++++++	5,989.4
101.0	+++++	.	.	.	.	5,979.7
111.0	+++++	.	.	.	.	5,969.9
121.0	++++++++++	++	++++	.	+++++	5,960.1
131.0	++++++++++++++++++++	+++	.	++++	+++++	5,950.3
139.8	+++++++++	++++++++++++	+++++++	++++++	++++++++	5,941.7
150.1	++++++++++++++++++++	++++++	.	++	+++++	5,931.7
160.3	++++++++++++++++++++	++++	++	.	++	5,921.7
170.6	++++++++++++++++++++	.	.	.	++	5,911.6
180.7	++++++++++++++++++++	++++	++	.	.	5,901.7
190.8	++++++++++++++++++++	.	.	.	.	5,891.9
200.9	++++++++++++++++++++	.	.	++++	++	5,882.0
211.0	++++++++++++++++++++	.	+	.	++++++++	5,872.1
220.4	++++++++++++	++++	.	.	+++	5,862.9
230.6	.	.	.	.	.	5,853.0
232.6	.	.	.	.	.	5,851.0
237.7	++++++++++++++	.	.	.	.	5,846.0
241.0	+++	.	.	.	.	5,842.8
249.1	++++++++	.	.	.	.	5,834.9
257.9	+++++++++++++++	.	.	.	.	5,826.3
263.9	++++++++++++++++	++++	.	.	+	5,820.4
269.9	++++	+	.	.	.	5,814.5
281.0	++	.	.	.	.	5,803.7
291.0	++++++++++++++++++++	.	.	.	.	5,793.9
301.0	++++++++++	.	.	.	.	5,784.1
311.0	++++++++++++++++++++	.	.	.	.	5,774.4
321.0	+++++++++++++++	+++++	.	.	.	5,764.6
331.0	++++++++++	++++++++	+++	.	.	5,754.8
341.0	++++++++++++	++++	.	.	+	5,745.0
351.0	++++++++++++++	++++	.	.	++	5,735.2
361.0	++++++++++++++++++++	.	.	.	.	5,725.5
371.0	++++++++++++++++++++	.	.	.	.	5,715.7
375.0	++++++++++++++++++++	.	+	.	.	5,711.8

MINER FLAT DAM SITE: MF-102: FRACTURES and HYDRAULIC CONDUCTIVITY



MINER FLAT DAM SITE: MF-105: ENGINEERING GEOLOGIC LOG



DEPTH	ROCK TYPE	RECOVERY 0% 100%	RQD 0% 100%	SCR 0% 100%	STRENGTH 0 40,000 psi		ELEV. (feet)
5.8		++++++++++	+++++++	.	++++++++++++++++++	19,068	6,068.3
11.2		++++++++++++++++++++	++++++++++++	++++	++++++++++++++++++++	19,068	6,063.1
16.3		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	+++++++++++++++	15,572	6,058.3
21.2		++++++++++++++++++++	++++++++++++	.	++++++++++++++++++++	22,246	6,053.6
26.0		++++++++++++++++++	++++++++++++	+++++	+++++++++++++++	15,572	6,049.1
31.0		++++++++++++++++++	+++++++++++++++	++++++++	++++++++++++++++++++++++++	25,901	6,044.3
36.0		++++++++++++++++++++	++++++++++++++++++++	++++++++++++++++++	++++++++++++++++++++	22,405	6,039.5
40.0		++++++++++++++++++++	++++++++++++++++	++++++++++	++++++++++++++++++++	21,452	6,035.7
50.2		++++++++++++++++++	++++++++++	+++	++++++++++++++++++++++++	25,901	6,026.0
59.5		++++++++++++++++++	+++++++++	+++	++++++++++++++++++++++	23,676	6,017.2
68.0		++++++++++	+	.	++++++++++++++++++	19,386	6,009.1
75.2		++++++++++++++++++	++++++++++++++	+++++++++	++++++++++++++++++	20,657	6,002.2
85.0		++++++++++++++++++	+++++++++	++++++	++++++++++++++++++	19,068	5,992.9
92.5		++++++++++++++++++	++++++++	+++	++++++++++++	13,189	5,985.8
102.8		++++++++++++++++++	++++++++++++++	++++++++++	+++++++++++++++	15,096	5,976.0
105.1		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++++++++++	11,123	5,973.8
115.0		+++++++++++++++++	+++++++	+++++++	++++++++++++++++++++	22,087	5,964.4
125.0		++++++++++++++	+++++	+++++	++++++++++++++++++	19,068	5,954.8
135.0		++++++++++++++++++	++++++++++++	++	+++++++++++++++	15,890	5,945.3
145.0		++++++++++++++++++	++++++++++++	++++++++	+++++++++++++++	15,890	5,935.8
155.0		++++++++++++++++++++	+++++++++++++++	++++++++++++	++++++++++++++++++++	23,835	5,926.3
163.2		++++++++++++++++++	++++++++	+++++	++++++++++++++++++++++	24,630	5,918.5
173.3		++++++++++++++++++	++++++++++	+++	++++++++++++++++++++++++++	28,602	5,908.9
183.5		++++++++++++++++++	+++	.	++++++++++++++++++++++++	27,967	5,899.2
193.8		++++++++++++++++++	++++++	++	++++++++++++++++++++++++++++++	32,098	5,889.4
203.9		++++++++++++++++++++	++++++++++	+++++++	++++++++++++++++++++++++++++	29,238	5,879.7
214.0		+++++++++++++++++	+++++++++++++++	+++++++	++++++++++++++++++++++++++++++	31,780	5,870.1
218.8		++++++++++++++++++	+++++++++++++++++	++++++++++++++++	++++++++++++++++++++++++++++++	32,575	5,865.6
229.1		++++++++++++++++++	+++++++++++++++++	++++++++++++++	++++++++++++++++++++++++++++++	33,369	5,855.8
239.2		++++++++++++++++++++	+++++++++++++++	+++++++++	++++++++++++++++++	21,452	5,846.1
249.4		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++++++++++++++++++++++++	27,013	5,836.4
259.6		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++++++++++++++++++++++++++++++++++	36,547	5,826.7
269.9		++++++++++++++++++	++++++++++++	++++++++++++	++++++++++++++++++++++++++++++++++	36,547	5,816.9
280.0		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++++++++++++++++++++	23,835	5,807.3
285.0		++++++++++++++++++	++++++++++++	.	+++++++++++++++	15,255	5,802.6
290.0		++++++++++	.	.	.	0	5,797.8
295.0		+++++++++++++++	.	.	.	0	5,793.0
300.0		++++++++++++	.	.	.	0	5,788.3
303.3		++++++++++	.	.	.	0	5,785.1
305.0		++++++++++++++++++++	++++++++++++++++++++	++++++++++++++++++++	+	1,589	5,783.5
310.0		++++++++++++++++++	++++++	++++	.	795	5,778.8
315.0		++++++++++++++++++	++++++++++++++++++	+++++++++	++	2,066	5,774.0
320.0		++++++++++++++++++++	++++++++++++++++++++	++++++++++++++++++++	+	1,430	5,769.2
325.0		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	+	1,430	5,764.5
330.0		+++++++++++++++	++++++++++++	++++++++++++	.	874	5,759.7
335.1		++++++++++	.	.	.	715	5,754.9
337.7		++++++++++++++++++	+++++++++++++++	+++++++++++++++	++	2,542	5,752.4
340.0		++++++++++++++++++	++++++++++++++++++	.	+++++	5,403	5,750.2
345.0		++++++++++++++++++++	++++++++++++++++++++	++++++++++++++++++++	++++++	6,594	5,745.5
350.0		++++++++++++++++++++	+++++++++++++++	++++++++++++	+	1,907	5,740.7
355.0		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	+++++	5,323	5,735.9
360.0		++++++++++++++++++++	++++++++++++++++++++	++++++++++++++++++++	+++	3,099	5,731.2
365.0		++++++++++++++++++++	++++++++++++++++++++	++++++++++++++++++++	+	1,510	5,726.4
370.0		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++	2,701	5,721.7

25-Jun-86

MINER FLAT DAM SITE: MF-105:FRACTURE LOG

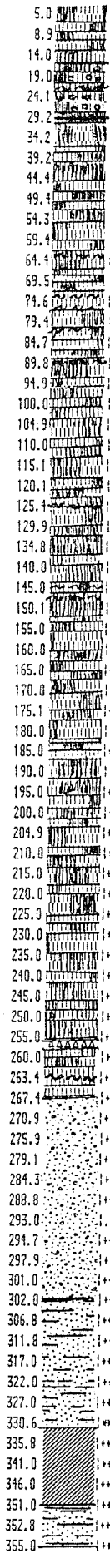
DEPTH	RECOVERY 0% 100%	NUMBER OF FRACTURES 90-70 0 10 20	70-50 0 10 20	50-30 0 10 20	30-0 0 10 20	ELEV. (feet)
5.8	++++++++++	++++++++	.	.	++++	6,068.3
11.2	++++++++++++++++++++	+++++++++	.	.	++	6,063.1
16.3	++++++++++++++++++++	++	+	.	.	6,058.3
21.2	++++++++++++++++++++	++++++	.	.	+++++	6,053.6
26.0	++++++++++++++++++++	++++++++	+	.	++	6,049.1
31.0	++++++++++++++++++++	+++++	.	++	++	6,044.3
36.0	++++++++++++++++++++	.	.	.	++	6,039.5
40.0	++++++++++++++++++++	++++	.	.	.	6,035.7
50.2	++++++++++++++++++++	++++++++	.	++++	++++++++++	6,026.0
59.5	++++++++++++++++++++	++++++++++	.	+++++	++++++	6,017.2
68.0	++++++++++	++++++++++++++	.	+++++	+++++++	6,009.1
75.2	++++++++++++++++++++	++++++++	.	+++++++	++++	6,002.2
85.0	++++++++++++++++++	++++++++++++	++	++++	++++++	5,992.9
92.5	++++++++++++++++++	+++++++++	++++	.	+++++++	5,985.8
102.8	++++++++++++++++++++	++++++++++++	.	.	+++	5,976.0
105.1	++++++++++++++++++++	.	.	.	.	5,973.8
115.0	++++++++++++++++	++++++++	+	.	+++	5,964.4
125.0	++++++++++++	++++++++++	.	.	++++	5,954.8
135.0	++++++++++++++++++++	+++++	++++++++	.	++++++	5,945.3
145.0	++++++++++++++++++++	++++++++++++++++++	.	.	+	5,935.8
155.0	++++++++++++++++++++	++++++++++++	+++	+	+	5,926.3
163.2	++++++++++++++++++	++++++++	++++	+++	+++	5,918.5
173.3	++++++++++++++++++++	++	+++++++	.	++++++	5,908.9
183.5	++++++++++++++++++++	++++++++++++++++++	+++++	++++++++++++++++	++++++++++++	5,899.2
193.8	++++++++++++++++++++	++++++++++	+++++++++	++++	+++++++++	5,889.4
203.9	++++++++++++++++++++	++++++	+++++++	.	++++	5,879.7
214.0	++++++++++++++++++	+++++++	+	.	++	5,870.1
218.8	++++++++++++++++++++	.	.	.	+	5,865.6
229.1	++++++++++++++++++++	+++++	++	.	++++	5,855.8
239.2	++++++++++++++++++++	+++++++	.	.	+++++	5,846.1
249.4	++++++++++++++++++++	.	.	.	.	5,836.4
259.6	++++++++++++++++++++	.	.	.	.	5,826.7
269.9	++++++++++++++++++++	.	.	.	++	5,816.9
280.0	++++++++++++++++++++	++	.	.	+	5,807.3
285.0	++++++++++++++++++	++++++	+++++	.	++++++++++	5,802.6
290.0	++++++++++	.	.	.	.	5,797.8
295.0	++++++++++++++++	.	.	.	.	5,793.0
300.0	++++++++++++	.	.	.	.	5,788.3
303.3	++++++++++	.	.	.	.	5,785.1
305.0	++++++++++++++++++++	.	.	.	.	5,783.5
310.0	++++++++++++++++++	.	.	+++++++++	.	5,778.8
315.0	++++++++++++++++++++	++++	.	.	.	5,774.0
320.0	++++++++++++++++++++	++	.	.	.	5,769.2
325.0	++++++++++++++++++++	+	.	.	.	5,764.5
330.0	++++++++++++++++	.	++	.	.	5,759.7
335.1	++++++++++	++++	.	++	.	5,754.9
337.7	++++++++++++++++++	.	.	++	.	5,752.4
340.0	++++++++++++++++++	++	.	.	.	5,750.2
345.0	++++++++++++++++++++	.	.	.	.	5,745.5
350.0	++++++++++++++++++++	.	.	.	++++++	5,740.7
355.0	++++++++++++++++++++	.	.	.	.	5,735.9
360.0	++++++++++++++++++++	.	.	.	.	5,731.2
365.0	++++++++++++++++++++	.	.	.	.	5,726.4
370.0	++++++++++++++++++++	.	.	.	.	5,721.7

MINER FLAT DAM SITE: MF-105: FRACTURES and HYDRAULIC CONDUCTIVITY

DEPTH	RECOVERY 0%	TOTAL NUMBER OF FRACTURES PER INTERVAL 100% 0	40	HYDRAULIC CONDUCTIVITY (cm/sec)	ELEV. (feet)
5.8	++++++++++	++++++++++++			NA 6,068.3
11.2	++++++++++++++++++++	++++++++++			NA 6,063.1
16.3	++++++++++++++++++++	+++			NA 6,058.3
21.2	++++++++++++++++++++	++++++++++	3.56E-05	++++++++++++++++++++	6,053.6
26.0	++++++++++++++++++++	++++++++++	3.56E-05	++++++++++++++++++++	6,049.1
31.0	++++++++++++++++++++	+++++++++	3.56E-05	++++++++++++++++++++	6,044.3
36.0	++++++++++++++++++++	++	3.56E-05	++++++++++++++++++++	6,039.5
40.0	++++++++++++++++++++	++++	2.10E-05	++++++++++++++++++++	6,035.7
50.2	++++++++++++++++++++	++++++++++++++++++++	2.10E-05	++++++++++++++++++++	6,026.0
59.5	++++++++++++++++++++	++++++++++++++++++++	2.10E-05	++++++++++++++++++++	6,017.2
68.0	++++++++++	++++++++++++++++++++++++++	1.06E-04	++++++++++++++++++++++++	6,009.1
75.2	++++++++++++++++++++	++++++++++++++++++	1.06E-04	++++++++++++++++++++++++	6,002.2
85.0	++++++++++++++++++	++++++++++++++++++++++++	1.06E-04	++++++++++++++++++++++++	5,992.9
92.5	++++++++++++++++++	++++++++++++++++++++	4.24E-04	++++++++++++++++++++++++++++++	5,985.8
102.8	++++++++++++++++++	++++++++++++++++	4.24E-04	++++++++++++++++++++++++++++++	5,976.0
105.1	++++++++++++++++++	.			NA 5,973.8
115.0	++++++++++++++++	++++++++++++			NA 5,964.4
125.0	++++++++++++++	++++++++++++++++			NA 5,954.8
135.0	++++++++++++++++++++	++++++++++++++++++			NA 5,945.3
145.0	++++++++++++++++++++	++++++++++++++++++			NA 5,935.8
155.0	++++++++++++++++++++	++++++++++++++++++			NA 5,926.3
163.2	++++++++++++++++++	++++++++++++++++++	2.51E-04	++++++++++++++++++++++++++++	5,918.5
173.3	++++++++++++++++++	++++++++++++++++	2.51E-04	++++++++++++++++++++++++++++	5,908.9
183.5	++++++++++++++++++	**	9.32E-05	++++++++++++++++++++++	5,899.2
193.8	++++++++++++++++++	++++++++++++++++++++++++++++++++	9.32E-05	++++++++++++++++++++++	5,889.4
203.9	++++++++++++++++++++	++++++++++++++++++	9.51E-05	++++++++++++++++++++++++	5,879.7
214.0	++++++++++++++++++	++++++++++	9.51E-05	++++++++++++++++++++++++	5,870.1
218.8	++++++++++++++++++++	+	9.51E-05	++++++++++++++++++++++++	5,865.6
229.1	++++++++++++++++++	++++++++++++	9.65E-07	++++++++++++++++	5,855.8
239.2	++++++++++++++++++++	++++++++++++	9.65E-07	++++++++++++++++	5,846.1
249.4	++++++++++++++++++	.	9.65E-07	++++++++++++++++	5,836.4
259.6	++++++++++++++++++	.	8.51E-06	++++++++++++++++++	5,826.7
269.9	++++++++++++++++++	++	8.43E-06	++++++++++++++++++	5,816.9
280.0	++++++++++++++++++	+++	1.06E-04	++++++++++++++++++++++++	5,807.3
285.0	++++++++++++++++++	++++++++++++++++++++	1.06E-04	++++++++++++++++++++++++	5,802.6
290.0	++++++++++	.	1.06E-04	++++++++++++++++++++++++	5,797.8
295.0	++++++++++++++++	.	1.06E-04	++++++++++++++++++++++++	5,793.0
300.0	++++++++++++	.	1.06E-04	++++++++++++++++++++++++	5,788.3
303.3	++++++++++	.			NA 5,785.1
305.0	++++++++++++++++++++	.	1.25E-06	++++++++++++++++	5,783.5
310.0	++++++++++++++++++	+++++++++	1.25E-06	++++++++++++++++	5,778.8
315.0	++++++++++++++++++	++++	1.25E-06	++++++++++++++++	5,774.0
320.0	++++++++++++++++++++	++	1.25E-06	++++++++++++++++	5,769.2
325.0	++++++++++++++++++	+	4.33E-06	++++++++++++++++++	5,764.5
330.0	++++++++++++++++	++	4.33E-06	++++++++++++++++++	5,759.7
335.1	++++++++++	++++++	4.33E-06	++++++++++++++++++	5,754.9
337.7	++++++++++++++++++	++	4.33E-06	++++++++++++++++++	5,752.4
340.0	++++++++++++++++++++	++	4.33E-06	++++++++++++++++++	5,750.2
345.0	++++++++++++++++++++	.	6.21E-06	++++++++++++++++++	5,745.5
350.0	++++++++++++++++++++	++++++	6.21E-06	++++++++++++++++++	5,740.7
355.0	++++++++++++++++++++	.	6.21E-06	++++++++++++++++++	5,735.9
360.0	++++++++++++++++++++	.	6.21E-06	++++++++++++++++++	5,731.2
365.0	++++++++++++++++++++	.	6.21E-06	++++++++++++++++++	5,726.4
370.0	++++++++++++++++++	.	6.21E-06	++++++++++++++++++	5,721.7

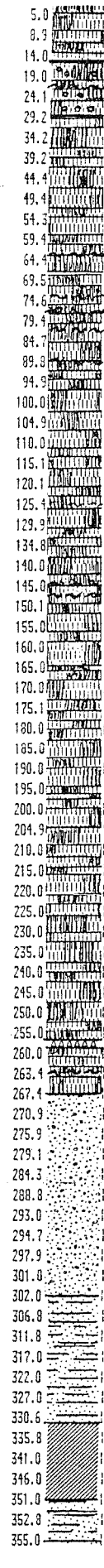
25-Jun-86

MINER FLAT DAM SITE: MF-106: ENGINEERING GEOLOGIC LOG



DEPTH	ROCK TYPE	RECOVERY 0%	RQD 0%	SCR 0%	STRENGTH 0	40,000 psi	ELEV. (feet)
5.0		+++++	+++	.	+++++++++++++++	16,844	6,068.8
8.9		+++++++++++++++++++	++++	.	++++++++++++++++++++	21,152	6,064.9
14.0		+++++++++++++++++++	+++++++++++++++++	+++++++++++++++++++	++++++++++++++++	18,274	6,059.8
19.0		++++++++++++++++	++++++++++++++	++++++++++++	++++++++++	11,123	6,054.8
24.1		++++++++++++++++	++++++++++	+++++++++	++++++++++++++++	17,479	6,049.7
29.2		+++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++++++++++++++++++++	23,438	6,044.6
34.2		++++++++++++++++++	++++++++++	+++++	++++++++++++++++++++++++++	27,490	6,039.6
39.2		+++++++++++++++++++	++++++++++++++++++	++++++++	++++++++++++++++++	21,769	6,034.6
44.4		++++++++++++++++++	++++++++++++	++++	++++++++++++++++++++++	25,424	6,029.4
49.4		++++++++++++++++++	++++++++++++++++++	++++++++++++	++++++++++++++++++	22,246	6,024.4
54.3		++++++++++++++++++++	++++++++++++++++++++	++++++++++++++++++++	++++++++++++++++++++++++	27,490	6,019.5
59.4		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	22,564	6,014.4
64.4		++++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++++++++++++++++++++++++	27,808	6,009.4
69.5		++++++++++++++++++	++++++	++++	++++++++++++++++++	20,022	6,004.3
74.6		++++++++++++++++++	++++++++++++++	++++++++++++	++++++++++++++++	18,274	5,999.2
79.4		++++++++++++++++++	++++++++++++++	+++++++	++++++++++++++++++	22,723	5,994.4
84.7		++++++++++++++++++	++++++++++++++++	+++++++++	++++++++++++++++++	20,975	5,989.1
89.8		++++++++++++++++++	++++++++++++	.	++++++++++++++++++	18,433	5,984.0
94.9		++++++++++++++++++	++++++++++++++	++++++++++	++++++++++++++++++++	23,041	5,978.9
100.0		++++++++++++++++++	++++++++++++++	++++++++++	++++++++++++++++++	19,227	5,973.8
104.9		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++++++++++++++++	17,479	5,968.9
110.0		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++++++++++++++++++++++++	28,284	5,963.8
115.1		++++++++++++++++++	++++++++++++++++	++++++++++++++	++++++++++++++++++++	23,835	5,958.7
120.1		++++++++++++++++++	++++++++++++++++	++++++	++++++++++++++++++	19,068	5,953.7
125.4		+++++	.	.	++++++++++++++++++	18,274	5,948.4
129.9		++++++++++++++++++	++++++++++++++++++	++++++++++++++	++++++++++++++++++++	23,041	5,943.9
134.8		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++++++++++++	13,507	5,939.0
140.0		++++++++++++++++++	++++++++++++++	.	++++++++++++	12,394	5,933.8
145.0		++++++++++++++++++	++++++++++++++	.	+++++++	7,945	5,928.8
150.1		++++++++++++++++++	++++++++++++++++	++++++++	++++++++++++++++	17,797	5,923.7
155.0		++++++++++++++++++	++++++++++	.	++++++++++++++++++++	23,835	5,918.8
160.0		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++++++++++++++++++++	22,564	5,913.8
165.0		++++++++++++++++++	+++++	.	++++++++++++++++++++++++	27,490	5,908.8
170.0		++++++++++++++++++	++++	.	++++++++++++++++++++++++	27,172	5,903.8
175.1		++++++++++++++++++	++++++++++	+++	++++++++++++++++++++++++++++++++++	35,753	5,898.7
180.0		++++++++++++++++++	+++++++	.	++++++++++++++++++++++	25,742	5,893.8
185.0		++++++++++++++++++	+++++++++	++++++	++++++++++++++++++	20,657	5,888.8
190.0		++++++++++++++++++	++++++++++	++++	++++++++++++++++++++++	28,602	5,883.8
195.0		++++++++++++++++++	++++++++++	++++	++++++++++++++++++++++	28,125	5,878.8
200.8		++++++++++++++++++	++++++++++++++	+++++++++++++	++++++++++++++++++++++++++++	33,528	5,873.8
204.9		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++++++++++++++++++++++	30,827	5,868.9
210.0		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++++++++++++++++++++++++	32,893	5,863.8
215.0		++++++++++++++++++	++	++++++++++++++++++++	++++++++++++++++++++++++	31,939	5,858.8
220.0		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++++++++++++++++++++++++	30,509	5,853.8
225.0		++++++++++++++++++	++++++++++++++++	++++++++++++++++	++++++++++++++++++++++++	31,939	5,848.8
230.0		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++++++++++++++++++++++++	30,827	5,843.8
235.0		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++++++++++++++++++++++++	30,509	5,838.8
240.0		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++++++++++++++++++++++++	30,191	5,833.8
245.0		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++++++++++++++++++++++++	30,191	5,828.8
250.0		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++++++++++++++++++++++++	32,734	5,823.8
255.0		++++++++++++++++++	++++++++++++++++	++++++++++++++++	++++++++++++++++++++++++	32,416	5,818.8
260.0		++++++++++++++++	+++	.	++	2,860	5,813.8
263.4		++++++++++	.	.	.	0	5,810.4
267.4		++++++++++++	.	.	.	0	5,806.4
270.9		+++++++++	.	.	.	0	5,802.9
275.9		++++++++++++	.	.	.	0	5,797.9
279.1		++++++++++	.	.	.	0	5,794.7
284.3		++++++	.	.	.	0	5,789.5
288.8		++++++++++++++	.	.	.	0	5,785.0
293.0		.	.	.	.	0	5,780.8
294.7		++++++++++	.	.	.	0	5,779.1
297.9		+++++++++	.	.	.	0	5,775.9
301.0		++++++++++	.	.	.	0	5,772.8
302.0		++++++++	.	.	.	0	5,771.8
306.8		++++++++++++++++++++	++++++++++++	+++++	+	1,700	5,767.0
311.8		++++++++++++++++++	++++++++++++++++++	++++++++++++++++	++	2,701	5,762.0
317.0		++++++++++++++++++	++++++++++++++	+++++	.	953	5,756.8
322.0		++++++++++++++++++++	++++++++++++++++++	++++++++++++++	+	1,748	5,751.8
327.0		++++++++++++++	++++++++++++	++++++++++++	+++++++	7,468	5,746.8
330.6		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	+	1,351	5,743.2
335.8		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	+++++	5,562	5,738.0
341.0		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++	2,066	5,732.8
346.0		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++	2,463	5,727.8
351.0		++++++++++++++++++++	++++++++++++++	++++++++	++++++++	8,263	5,722.8
352.8		++++++++++++++++++	++++++++++++	.	+++	3,814	5,721.0
355.0		++++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++++	4,608	5,718.8

DEPTH	ROCK TYPE	RECOVERY 0% 100%	NUMBER OF FRACTURES 90-70 0 10 20	70-50 0 10 20	50-30 0 10 20	30-0 0 10 20	ELEV. (feet)
5.0		+++++	+++	.	.	++	6,068.8
8.9		++++++++++++++++++	++++	.	++++	+++	6,064.9
14.0		++++++++++++++++++	.	.	.	++	6,059.8
19.0		++++++++++++++++	++++++	.	.	+++	6,054.8
24.1		++++++++++++++++	++++++++	.	++++	+++	6,049.7
29.2		++++++++++++++++++	+	.	.	+	6,044.6
34.2		++++++++++++++++	+++++	.	+++	+++	6,039.6
39.2		++++++++++++++++++	++	+	.	+	6,034.6
44.4		++++++++++++++++	+++++++	.	+++	+	6,029.4
49.4		++++++++++++++++	+++++	++	.	.	6,024.4
54.3		++++++++++++++++++	+	.	.	+	6,019.5
59.4		++++++++++++++++	.	.	+	.	6,014.4
64.4		++++++++++++++++++	.	.	.	+++	6,009.4
69.5		++++++++++++++++	++++++++	.	+++++	+++++++	6,004.3
74.6		++++++++++++++++	++++	.	.	++	5,999.2
79.4		++++++++++++++++++	+++++++	.	+++	++	5,994.4
84.7		++++++++++++++++	++++++++	+++	.	.	5,989.1
89.8		++++++++++++++++	++++++++++	+++++	.	+++++	5,984.0
94.9		++++++++++++++++++	+++++++	++	.	++++	5,978.9
100.0		++++++++++++++++++	++++	.	.	+	5,973.8
104.9		++++++++++++++++++	+++	.	.	.	5,968.9
110.0		++++++++++++++++++	+	.	.	.	5,963.8
115.1		++++++++++++++++++	+++	.	.	+	5,958.7
120.1		++++++++++++++++++	++++	+	.	++	5,953.7
125.4		+++++	++++++++++	.	.	+++	5,948.4
129.9		++++++++++++++++++	+++	.	.	.	5,943.9
134.8		++++++++++++++++++	+++	.	.	+	5,939.0
140.0		++++++++++++++++	+	.	.	+	5,933.8
145.0		++++++++++++++++++	++++++++++	.	.	+++	5,928.8
150.1		++++++++++++++++++	++++	.	.	++	5,923.7
155.0		++++++++++++++++++	+++++++	.	+++	++	5,918.8
160.0		++++++++++++++++++	+++	.	.	.	5,913.8
165.0		++++++++++++++++++	+++++++	++++	.	+++++	5,908.8
170.0		++++++++++++++++++	++++++++	+++++	.	+++++++	5,903.8
175.1		++++++++++++++++++	++++++++	.	.	++++	5,898.7
180.0		++++++++++++++++++	++++++++++	++++++	.	+++	5,893.8
185.0		++++++++++++++++++	++	++++	.	++++	5,888.8
190.0		++++++++++++++++++	+++++	.	+++	+++++++	5,883.8
195.0		++++++++++++++++++	+++	+++++	.	+++	5,878.8
200.0		++++++++++++++++	.	.	++	+	5,873.8
204.9		++++++++++++++++++	.	.	.	.	5,868.9
210.0		++++++++++++++++	+	.	.	.	5,863.8
215.0		++++++++++++++++++	.	.	.	.	5,858.8
220.0		++++++++++++++++	.	.	.	.	5,853.8
225.0		++++++++++++++++++	.	.	.	+	5,848.8
230.0		++++++++++++++++++	+	.	.	.	5,843.8
235.0		++++++++++++++++++	+	.	.	.	5,838.8
240.0		++++++++++++++++	.	.	.	.	5,833.8
245.0		++++++++++++++++++	.	.	.	.	5,828.8
250.0		++++++++++++++++++	.	.	.	.	5,823.8
255.0		++++++++++++++++++	++	.	+	.	5,818.8
260.0		++++++++++++++	++++++	.	.	+++++	5,813.8
263.1		++++++++++	++++++++++	++++++	.	.	5,810.4
267.4		++++++++++++	.	.	.	.	5,806.4
270.9		+++++++++	.	.	.	.	5,802.9
275.9		++++++++++++	.	.	.	.	5,797.9
279.1		++++++++++	.	.	.	.	5,794.7
284.3		++++++	.	.	.	.	5,789.5
288.8		++++++++++++++	.	.	.	.	5,785.0
293.0		.	.	.	.	.	5,780.8
294.7		++++++++++	.	.	.	.	5,779.1
297.9		+++++++++	.	.	.	.	5,775.9
301.0		++++++++++	.	.	.	.	5,772.8
302.0		++++++++	.	.	.	.	5,771.8
306.8		++++++++++++++++++	++++++++	+	.	++++++	5,767.0
311.8		++++++++++++++++++	+	.	+	.	5,762.0
317.0		++++++++++++++++	.	.	+++	++	5,756.8
322.0		++++++++++++++++++	.	.	.	+++	5,751.8
327.0		++++++++++++	.	++	.	.	5,746.8
330.6		++++++++++++++++++	.	.	+++++++	.	5,743.2
335.8		++++++++++++++++++	+++	.	.	.	5,738.0
341.0		++++++++++++++++++	+++++	.	.	.	5,732.8
346.0		++++++++++++++++++	.	++++++	.	.	5,727.8
351.0		++++++++++++++++++	+++++	.	.	+++++	5,722.8
352.8		++++++++++++++++++	.	.	+++++	.	5,721.0
355.0		++++++++++++++++++	.	.	.	.	5,718.8



DEPTH	ROCK TYPE	RECOVERY 0% 100%	TOTAL NUMBER OF FRACTURES PER INTERVAL 0 40	HYDRAULIC CONDUCTIVITY (cm/sec)	ELEV. (feet)
5.0		+++++	+++++		NA 6,068.8
8.9		+++++++++++++++++	+++++++++		NA 6,064.9
14.0		+++++++++++++++++++	++		NA 6,059.8
19.0		+++++++++++++++++	+++++++++	2.14E-05 +++++++++++++++++++	6,054.8
24.1		+++++++++++++++++	++++++++++++++	2.14E-05 +++++++++++++++++++	6,049.7
29.2		+++++++++++++++++++	++	2.14E-05 +++++++++++++++++++	6,044.6
34.2		+++++++++++++++++	+++++++++	2.14E-05 +++++++++++++++++++	6,039.6
39.2		+++++++++++++++++++	++++	1.64E-06 ++++++++++++++++	6,034.6
44.4		+++++++++++++++++	+++++++++	1.64E-06 ++++++++++++++++	6,029.4
49.4		+++++++++++++++++	+++++++	1.64E-06 ++++++++++++++++	6,024.4
54.3		+++++++++++++++++++	++	1.64E-06 ++++++++++++++++	6,019.5
59.4		+++++++++++++++++	+	1.64E-06 ++++++++++++++++	6,014.4
64.4		+++++++++++++++++++	+++	1.43E-05 +++++++++++++++++++	6,009.4
69.5		+++++++++++++++++	++++++++++++++++++	1.43E-05 +++++++++++++++++++	6,004.3
74.6		+++++++++++++++++	++++++	1.43E-05 +++++++++++++++++++	5,999.2
79.4		+++++++++++++++++++	++++++++++++	5.76E-05 ++++++++++++++++++++++	5,994.4
84.7		+++++++++++++++++	+++++++++++	5.76E-05 ++++++++++++++++++++++	5,989.1
89.8		+++++++++++++++++	++++++++++++++++++++	5.76E-05 ++++++++++++++++++++++	5,984.0
94.9		+++++++++++++++++	++++++++++++	5.76E-05 ++++++++++++++++++++++	5,978.9
100.0		+++++++++++++++++	+++++	5.76E-05 ++++++++++++++++++++++	5,973.8
104.9		+++++++++++++++++++	+++		NA 5,968.9
110.0		+++++++++++++++++++	+		NA 5,963.8
115.1		+++++++++++++++++	++++		NA 5,958.7
120.1		+++++++++++++++++	+++++++		NA 5,953.7
125.1		+++++	++++++++++++++		NA 5,948.7
129.9		+++++++++++++++++	+++	1.63E-05 +++++++++++++++++++	5,943.9
134.8		+++++++++++++++++++	++++	1.63E-05 +++++++++++++++++++	5,939.0
140.0		+++++++++++++++++	++	1.63E-05 +++++++++++++++++++	5,933.8
145.0		+++++++++++++++++++	++++++++++++++		NA 5,928.8
150.1		+++++++++++++++++	++++++	4.09E-06 ++++++++++++++++	5,923.7
155.0		+++++++++++++++++++	++++++++++++	4.09E-06 ++++++++++++++++	5,918.8
160.0		+++++++++++++++++	+++	4.09E-06 ++++++++++++++++	5,913.8
165.0		+++++++++++++++++++	+++++++++++++++	3.23E-05 ++++++++++++++++++++	5,908.8
170.0		+++++++++++++++++	++++++++++++++++++++	3.23E-05 ++++++++++++++++++++	5,903.8
175.1		+++++++++++++++++	++++++++++++	3.23E-05 ++++++++++++++++++++	5,898.7
180.0		+++++++++++++++++	++++++++++++++++++++	3.23E-05 ++++++++++++++++++++	5,893.8
185.0		+++++++++++++++++	+++++++++++	4.14E-05 +++++++++++++++++++++	5,888.8
190.0		+++++++++++++++++	+++++++++++++++	4.14E-05 +++++++++++++++++++++	5,883.8
195.0		+++++++++++++++++	++++++++++++	4.14E-05 +++++++++++++++++++++	5,878.8
200.0		+++++++++++++++++	+++	8.91E-07 ++++++++++++++++	5,873.8
204.9		+++++++++++++++++	+.	8.91E-07 ++++++++++++++++	5,868.9
210.0		+++++++++++++++++	+	8.91E-07 ++++++++++++++++	5,863.8
215.0		+++++++++++++++++	+.	8.91E-07 ++++++++++++++++	5,858.8
220.0		+++++++++++++++++	+.	4.03E-06 +++++++++++++++++	5,853.8
225.0		+++++++++++++++++	+	4.03E-06 +++++++++++++++++	5,848.8
230.0		+++++++++++++++++	+	4.03E-06 +++++++++++++++++	5,843.8
235.0		+++++++++++++++++	+	4.03E-06 +++++++++++++++++	5,838.8
240.0		+++++++++++++++++	+.	4.03E-06 +++++++++++++++++	5,833.8
245.0		+++++++++++++++++	+.	4.03E-06 +++++++++++++++++	5,828.8
250.0		+++++++++++++++++	+	4.03E-06 +++++++++++++++++	5,823.8
255.0		+++++++++++++++++	+++	4.09E-05 +++++++++++++++++++++	5,818.8
260.0		+++++++++++++++	++++++++++	4.09E-05 +++++++++++++++++++++	5,813.8
263.1		++++++++++	++++++++++++++++	4.09E-05 +++++++++++++++++++++	5,810.7
267.1		++++++++++++	+.	4.09E-05 +++++++++++++++++++++	5,806.7
270.9		+++++++++	+.	4.09E-05 +++++++++++++++++++++	5,802.9
275.9		++++++++++++	+.	1.66E-04 ++++++++++++++++++++++++++	5,797.9
279.1		+++++++++	+.	1.66E-04 ++++++++++++++++++++++++++	5,794.7
284.3		++++++	+.	1.66E-04 ++++++++++++++++++++++++++	5,789.5
288.8		+++++++++++++++	+.		NA 5,785.0
293.0		+.	+.		NA 5,780.8
294.7		++++++++++	+.		NA 5,779.1
297.9		+++++++++	+.		NA 5,775.9
301.8		++++++++++	+.		NA 5,772.0
302.0		++++++++	+.		NA 5,771.8
306.8		+++++++++++++++++++	++++++++++++++++	3.33E-07 +++++++++++++++	5,767.0
311.8		+++++++++++++++++++	++	3.33E-07 +++++++++++++++	5,762.0
317.0		+++++++++++++++++	+++++	3.33E-07 +++++++++++++++	5,756.8
322.0		+++++++++++++++++++	+++	1.55E-06 ++++++++++++++++	5,751.8
327.0		++++++++++++++	++	1.55E-06 ++++++++++++++++	5,746.8
330.6		**********	+++++++	1.55E-06 ++++++++++++++++	5,743.2
335.8		+++++++++++++++++++	+++	1.55E-06 ++++++++++++++++	5,738.0
341.0		+++++++++++++++++++	+++++	2.40E-06 ++++++++++++++++	5,732.8
346.0		+++++++++++++++++++	++++++	2.40E-06 ++++++++++++++++	5,727.8
351.0		+++++++++++++++++++	+++++++++	2.40E-06 ++++++++++++++++	5,722.8
352.8		+++++++++++++++++++	+++++	2.40E-06 ++++++++++++++++	5,721.0
355.0		+++++++++++++++++++	+.	2.40E-06 ++++++++++++++++	5,718.8

25-Jun-86

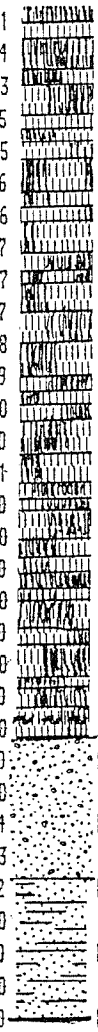
MINER FLAT DAM SITE: MF-113: ENGINEERING GEOLOGIC LOG

DEPTH	ROCK TYPE	RECOVERY 0% 100%	RQD 0% 100%	SCR 0% 100%	STRENGTH 0 40,000 psi		ELEV. (feet)
9.1						0	5,911.4
13.4						30,986	5,907.1
14.3						31,780	5,906.2
19.5						33,051	5,901.0
24.5						38,136	5,896.0
29.6						33,369	5,890.9
34.6						31,780	5,885.9
39.7						33,051	5,880.8
44.7						32,734	5,875.8
49.7						32,416	5,870.8
54.8						31,780	5,865.7
59.9						37,183	5,860.6
65.0						33,369	5,855.5
70.0						31,462	5,850.5
75.1						31,462	5,845.4
80.0						28,602	5,840.5
85.0						30,986	5,835.5
90.0						35,594	5,830.5
95.0						36,071	5,825.5
100.0						34,164	5,820.5
105.0						33,369	5,815.5
110.0						42,109	5,810.5
115.0						34,958	5,805.5
120.0						0	5,800.5
125.0						0	5,795.5
126.4						0	5,794.1
129.3						0	5,791.2
135.2						0	5,785.3
140.0						5,562	5,780.5
145.0						1,271	5,775.5
150.0						0	5,770.5
155.0						1,510	5,765.5

MINER FLAT DAM SITE: MF-113: FRACTURE LOG

DEPTH	ROCK TYPE	RECOVERY 0% 100%	NUMBER OF FRACTURES 90-70 0 10	70-50 20 0 10	50-30 20 0 10	30-0 20 0 10 20	ELEV. (feet)
9.1							5,911.4
13.4							5,907.1
14.3							5,906.2
19.5							5,901.0
24.5							5,896.0
29.6							5,890.9
34.6							5,885.9
39.7							5,880.8
44.7							5,875.8
49.7							5,870.8
54.8							5,865.7
59.9							5,860.6
65.0							5,855.5
70.0							5,850.5
75.1							5,845.4
80.0							5,840.5
85.0							5,835.5
90.0							5,830.5
95.0							5,825.5
100.0							5,820.5
105.0							5,815.5
110.0							5,810.5
115.0							5,805.5
120.0							5,800.5
125.0							5,795.5
126.4							5,794.1
129.3							5,791.2
135.2							5,785.3
140.0							5,780.5
145.0							5,775.5
150.0							5,770.5
155.0							5,765.5

MINER FLAT DAM SITE: MF-113: FRACTURES and HYDRAULIC CONDUCTIVITY



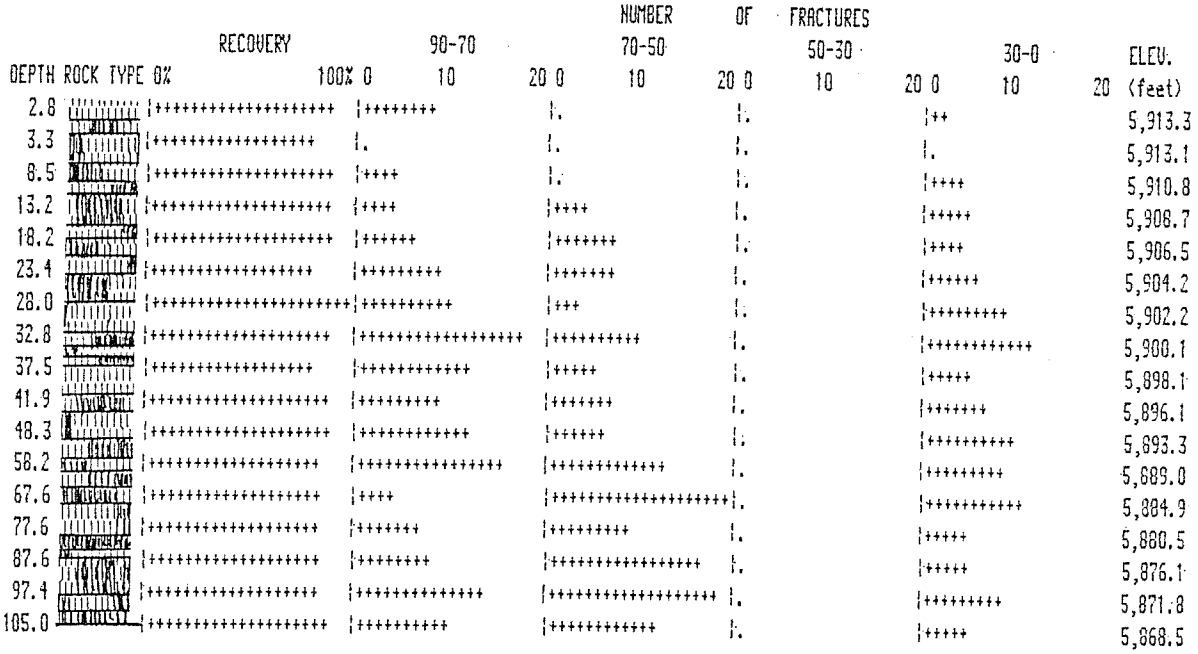
DEPTH	ROCK TYPE	RECOVERY 0%	RECOVERY 100%	TOTAL NUMBER OF FRACTURES PER INTERVAL 0	TOTAL NUMBER OF FRACTURES PER INTERVAL 40	HYDRAULIC CONDUCTIVITY (cm/sec)	ELEV.	ELEV. (feet)
9.1		.		.			NA	5,911.4
13.4		++++++++++++++++++++		+++++++++			NA	5,907.1
14.3		++++++++++++++++++++		++++			NA	5,906.2
19.5		++++++++++++++++++++		++++++++++++++++++++		1.17E-04 ++++++++++++++++++++++++		5,901.0
24.5		++++++++++++++++++++		++++++++++++++++++++		1.17E-04 ++++++++++++++++++++++++		5,896.0
29.6		++++++++++++++++++++		++++++++++++++++++++		1.17E-04 ++++++++++++++++++++++++		5,890.9
34.6		++++++++++++++++++++		++++++++++++++++++		1.17E-04 ++++++++++++++++++++++++		5,885.9
39.7		++++++++++++++++++++		+++++++++			NA	5,880.8
44.7		++++++++++++++++++++		+++++++		5.20E-08 ++++++++++++++		5,875.8
49.7		++++++++++++++++++++		+++++		5.20E-08 ++++++++++++++		5,870.8
54.8		++++++++++++++++++++		+++++++		5.20E-08 ++++++++++++++		5,865.7
59.9		++++++++++++++++++++		+++++++		5.20E-08 ++++++++++++++		5,860.6
65.0		++++++++++++++++++++		+++++++		5.20E-08 ++++++++++++++		5,855.5
70.0		++++++++++++++++++++		+++++		5.20E-08 ++++++++++++++		5,850.5
75.1		++++++++++++++++++++		+++++++		5.20E-08 ++++++++++++++		5,845.4
80.0		++++++++++++++++++++		++++		5.20E-08 ++++++++++++++		5,840.5
85.0		++++++++++++++++++++		+++		5.20E-08 ++++++++++++++		5,835.5
90.0		++++++++++++++++++++		+++		5.20E-08 ++++++++++++++		5,830.5
95.0		++++++++++++++++++++		++++		5.20E-08 ++++++++++++++		5,825.5
100.0		++++++++++++++++++++		+		5.20E-08 ++++++++++++++		5,820.5
105.0		++++++++++++++++++++		+++		5.20E-08 ++++++++++++++		5,815.5
110.0		++++++++++++++++++++		++		9.56E-06 ++++++++++++++++++		5,810.5
115.0		++++++++++++++++++++		++++++++		9.56E-06 ++++++++++++++++++		5,805.5
120.0		++++++++++		.		9.56E-06 ++++++++++++++++++		5,800.5
125.0		++++++++++++		.		3.54E-04 ++++++++++++++++++++++++++++		5,795.5
126.4		++++++++++++++++++		.		3.54E-04 ++++++++++++++++++++++++++++		5,794.1
129.3		++++++++++		.		3.54E-04 ++++++++++++++++++++++++++++		5,791.2
135.2		+++++++		.		3.54E-04 ++++++++++++++++++++++++++++		5,785.3
140.0		++++++++++++++++		++++++++++++		3.54E-04 ++++++++++++++++++++++++++++		5,780.5
145.0		++++++++++++++++		++			NA	5,775.5
150.0		.		.			NA	5,770.5
155.0		++++++++++++++++++++		++++++++++++++++++			NA	5,765.5

MINER FLAT DAM SITE: MF-117: ENGINEERING GEOLOGIC LOG

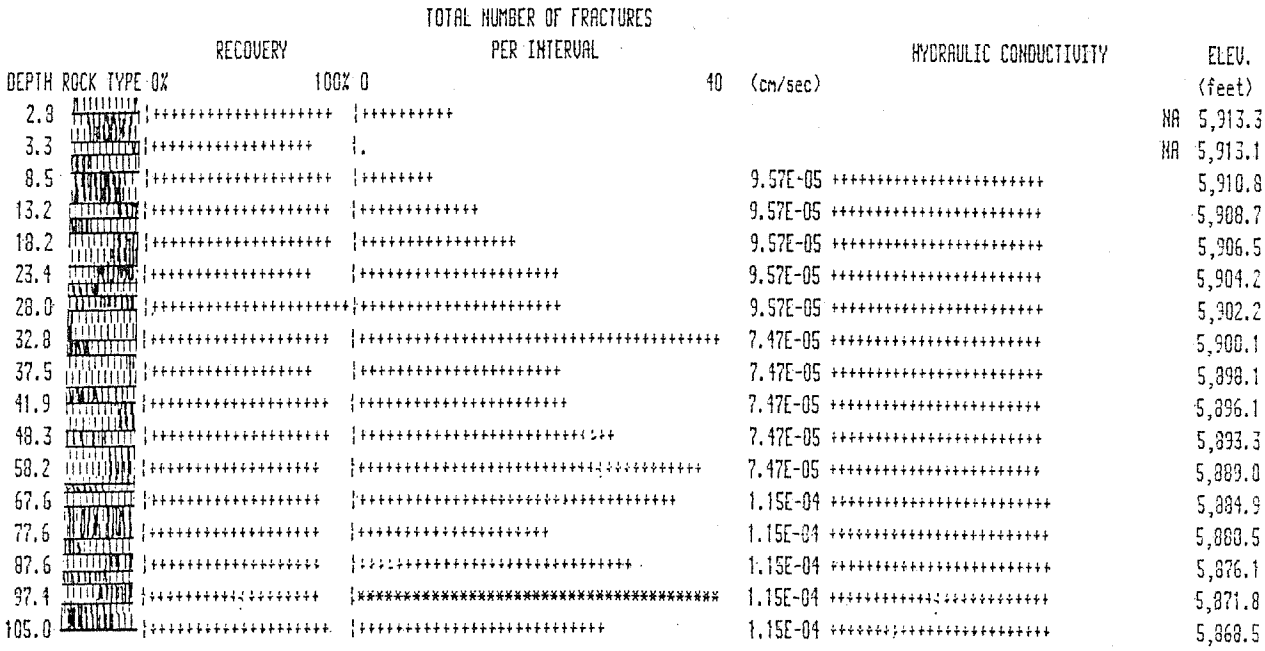
DEPTH	ROCK TYPE	RECOVERY 0% 100%	RQD 0% 100%	SCR 0% 100%	STRENGTH 0 40,000 psi		ELEV. (feet)
2.8		++++++++++++++++++++	++++++++++++	.	++++++++++++++++++++++++++++	27,013	5,913.3
3.3		++++++++++++++++++	++++++++++++++++++++	.	++++++++++++++++++++++++	25,424	5,913.1
8.5		++++++++++++++++++++	++++++++++++++++	+++	++++++++++++++++++++++++++	26,219	5,910.8
13.2		++++++++++++++++++++	++++++++++++	++++	++++++++++++++++++++++++	25,424	5,908.7
18.2		++++++++++++++++++++	++++++++	.	++++++++++++++++++++++++++++	28,602	5,906.5
23.4		++++++++++++++++++	+++	.	++++++++++++++++++++++++++++++++	31,462	5,904.2
28.8		++++++++++++++++++++++	+++++	.	++++++++++++++++++++++++++++++	30,986	5,902.2
32.8		++++++++++++++++++++	.	.	++++++++++++++++++++++++++++++++++	34,005	5,900.1
37.5		++++++++++++++++++	++	.	++++++++++++++++++++++++++++++++++	34,164	5,898.1
41.9		++++++++++++++++++++	+++++	.	++++++++++++++++++++++++++++++++++++	36,229	5,896.1
48.3		++++++++++++++++++++	++	.	++++++++++++++++++++++++++++++++++	35,594	5,893.3
58.2		++++++++++++++++++	++++	.	++++++++++++++++++++++++++++++++++	35,276	5,889.0
67.6		++++++++++++++++++++	++++	.	++++++++++++++++++++++++++++++++++	35,753	5,884.9
77.6		++++++++++++++++++	++++++++++	++++	++++++++++++++++++++++++++++++++++	36,547	5,880.5
87.6		++++++++++++++++++++	++++++++++	.	++++++++++++++++++++++++++++++++++	36,547	5,876.1
97.4		++++++++++++++++++++	++++	.	++++++++++++++++++++++++++++++++	34,005	5,871.8
105.0		++++++++++++++++++++	++++++	.	++++++++++++++++++++++++++++++++++	35,912	5,868.5

25-Jun-86

MINER FLAT DAM SITE: MF-117: FRACTURE LOG



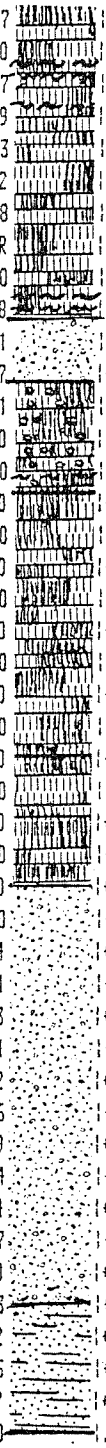
MINER FLAT DAM SITE: MF-t17: FRACTURES and HYDRAULIC CONDUCTIVITY



MINER FLAT DAM SITE: MF-118: ENGINEERING GEOLOGIC LOG

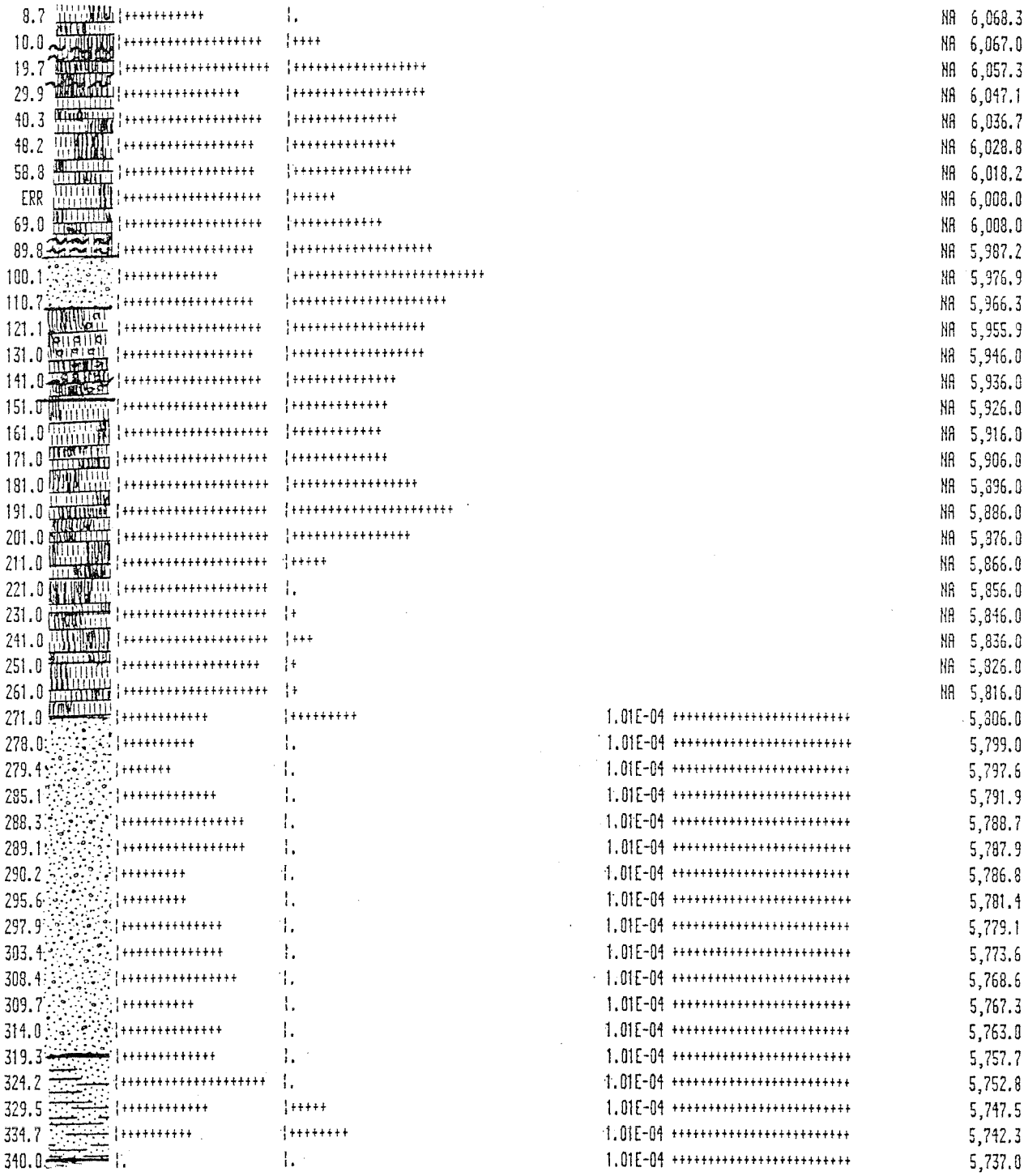
DEPTH	ROCK TYPE	RECOVERY 0% 100%	RQD 0% 100%	SCR 0% 100%	STRENGTH 0 40,000 psi		ELEV. (feet)
8.7		++++++++++	.	.	.	0	6,068.3
10.0		++++++++++++++++++	++++++++++++++	.	+++++++++	9,534	6,067.0
19.7		++++++++++++++++++++	++++++++++++++	++++++	+++++++	7,945	6,057.3
29.9		++++++++++++++++	++++++++++++	+++++++	++++++++++++++++++++	21,928	6,047.1
40.3		++++++++++++++++++	+++++++++++++++	++++++++	+++++++++++++++	14,301	6,036.7
48.2		++++++++++++++++++	++++++++++	++++++	++++++++++++++++++++	22,246	6,028.8
58.8		++++++++++++++++++	++++++++++	++++++	++++++++++++++++++++++++++++	27,013	6,018.2
ERR		++++++++++++++++++	++++++++++++++++++	++++++++++++++++	++++++++++++++++++++++++	25,265	ERR
69.0		++++++++++++++++++	++++++++++++++	++++++++++	++++++++++++++++++	20,657	6,008.0
89.8		++++++++++++++++++	++++++++++	.	++++++++++	10,646	5,987.2
100.1		++++++++++++++	++	++	++++++++++	11,123	5,976.9
110.7		++++++++++++++++++	++++++++++++	++++++++++	++++++++++++++++++	18,274	5,966.3
121.1		++++++++++++++++++++	+++++++	+++++	++++++++++++++++++++++	23,517	5,955.9
131.0		++++++++++++++++++	++++++++++	+++++++	++++++++++++++++	16,844	5,946.0
141.0		++++++++++++++++++	+++++++++++++++	++++++++++	++++++++++++	13,824	5,936.0
151.0		++++++++++++++++++++	+++++++++++++++	++++++++++++	+++++++++	9,534	5,926.0
161.0		++++++++++++++++++++	++++++++++	+++++++++	++++++++++++++++++++++	24,789	5,916.0
171.0		++++++++++++++++++++	++++++++++++	++++++	++++++++++++++++++++++	24,630	5,906.0
181.0		++++++++++++++++++++	+++++++++++++++	++++++++++	++++++++++++++++++++++++++++++++++++++	38,136	5,896.0
191.0		++++++++++++++++++++	++++++++	+++++	++++++++++++++++++++++++++++++++++++++	38,454	5,886.0
201.0		++++++++++++++++++++	++++++++++++	+++++++	++++++++++++++++++++++++++++++++++	36,547	5,876.0
211.0		++++++++++++++++++++	++++++++++++++++++++	++++++++++++++++	++++++++++++++++++++++++++++++++++++++	39,725	5,866.0
221.0		++++++++++++++++++++	++++++++++++++++++++	++++++++++++++++++++	**************************************	42,109	5,856.0
231.0		++++++++++++++++++++	+++++	+++++	++++++++++++++++++++++++++++++++++	35,753	5,846.0
241.0		++++++++++++++++++++	+++++++++++++++	+++++++++++++++	++++++++++++++++++++++++++++++++	33,846	5,836.0
251.0		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++++++++++++++++++++++++++++++++++++	37,342	5,826.0
261.0		++++++++++++++++++++	++++++++++++++++++++	++++++++++++++++++++	++++++++++++++++++++++++++++++++++++++	38,454	5,816.0
271.0		++++++++++++	++++++++	++++++	++++++++++++++++++++++++++	27,808	5,806.0
278.0		++++++++++	.	.	.	0	5,799.0
279.4		+++++++	.	.	.	0	5,797.6
285.1		++++++++++++++	.	.	.	0	5,791.9
288.3		++++++++++++++++	.	.	.	0	5,788.7
289.1		++++++++++++++++	.	.	.	0	5,787.9
290.2		+++++++++	.	.	.	0	5,786.8
295.6		+++++++++	.	.	.	0	5,781.4
297.9		+++++++++++++++	.	.	.	0	5,779.1
303.4		+++++++++++++++	.	.	.	0	5,773.6
308.4		++++++++++++++++	.	.	.	0	5,768.6
309.7		++++++++++	.	.	.	0	5,767.3
314.0		+++++++++++++++	.	.	.	0	5,763.0
319.3		++++++++++++++	.	.	.	0	5,757.7
324.2		++++++++++++++++++++	++++++++++++++++++++	++++++++++++++++++++	.	795	5,752.8
329.5		++++++++++++	++++++	++++++	+	1,271	5,747.5
334.7		++++++++++	.	.	+++	3,496	5,742.3
340.0		.	.	.	.	0	5,737.0

MINER FLAT DAM SITE: MF-118: FRACTURE LOG

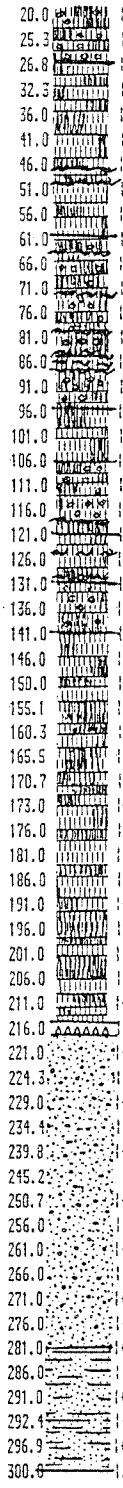


DEPTH	ROCK TYPE	RECOVERY 0% 100%	NUMBER OF FRACTURES 90-70 0 10	70-50 0 10	50-30 0 10	30-0 0 10 20	ELEV. (feet)
8.7		++++++++++	.	.	.	.	6,068.3
10.0		++++++++++++++++++	++++	.	.	.	6,067.0
19.7		++++++++++++++++++	++++++++++	++++	.	++++	6,057.3
29.9		++++++++++++++++	++++++++++	++	.	+++++	6,047.1
40.3		++++++++++++++++++	++++++++++	.	.	++++	6,036.7
48.2		++++++++++++++++++	++++++++++	.	.	++++	6,028.8
58.8		++++++++++++++++++	++++++++	++++	.	++++	6,018.2
ERR		++++++++++++++++++	++++	+	.	+	6,008.0
69.0		++++++++++++++++++	++++++++	++	.	++	5,997.6
89.8		++++++++++++++++++	+++++++++	++++++	.	++++	5,987.2
100.1		++++++++++++	++++++++	++++++++	.	++++++++++	5,976.9
110.7		++++++++++++++++++	++++++	+++++++	.	++++++++	5,966.3
121.1		++++++++++++++++++	++++++++++	++	.	+++++	5,955.9
131.0		++++++++++++++++++	++++++	+++	.	+++++++++	5,946.0
141.0		++++++++++++++++++	++++++++	+++	.	+++	5,936.0
151.0		++++++++++++++++++	++++++++++	+	.	+	5,926.0
161.0		++++++++++++++++++	+++++++	+	.	++++	5,916.0
171.0		++++++++++++++++++	++++++	++++	.	+++	5,906.0
181.0		++++++++++++++++++	+++++++++++	++	.	+++	5,896.0
191.0		++++++++++++++++++	++++++++	+++++++++	.	+++++	5,886.0
201.0		++++++++++++++++++	+++++++	+++	.	++++++	5,876.0
211.0		++++++++++++++++++	+++++	.	.	.	5,866.0
221.0		++++++++++++++++++	.	.	.	.	5,856.0
231.0		++++++++++++++++++	.	.	.	+	5,846.0
241.0		++++++++++++++++++	.	+	.	++	5,836.0
251.0		++++++++++++++++++	.	.	.	+	5,826.0
261.0		++++++++++++++++++	.	.	.	+	5,816.0
271.0		++++++++++++	+++++	.	.	++++	5,806.0
278.0		++++++++++	.	.	.	.	5,799.0
279.4		+++++++	.	.	.	.	5,797.6
285.1		++++++++++++++	.	.	.	.	5,791.9
288.3		++++++++++++++++	.	.	.	.	5,788.7
289.1		++++++++++++++++	.	.	.	.	5,787.9
290.2		+++++++++	.	.	.	.	5,786.8
295.6		+++++++++	.	.	.	.	5,781.4
297.9		+++++++++++++++	.	.	.	.	5,779.1
303.4		+++++++++++++++	.	.	.	.	5,773.6
308.4		++++++++++++++++	.	.	.	.	5,768.6
309.7		++++++++++	.	.	.	.	5,767.3
314.0		+++++++++++++++	.	.	.	.	5,763.0
319.3		++++++++++++++	.	.	.	.	5,757.7
324.2		++++++++++++++++++++	.	.	.	.	5,752.8
329.5		++++++++++++	++++	+	.	.	5,747.5
334.7		++++++++++	+++++	.	.	+++	5,742.3
340.0		.	.	.	.	.	5,737.0

MINER FLAT DAM SITE: MF-118: FRACTURES and HYDRAULIC CONDUCTIVITY



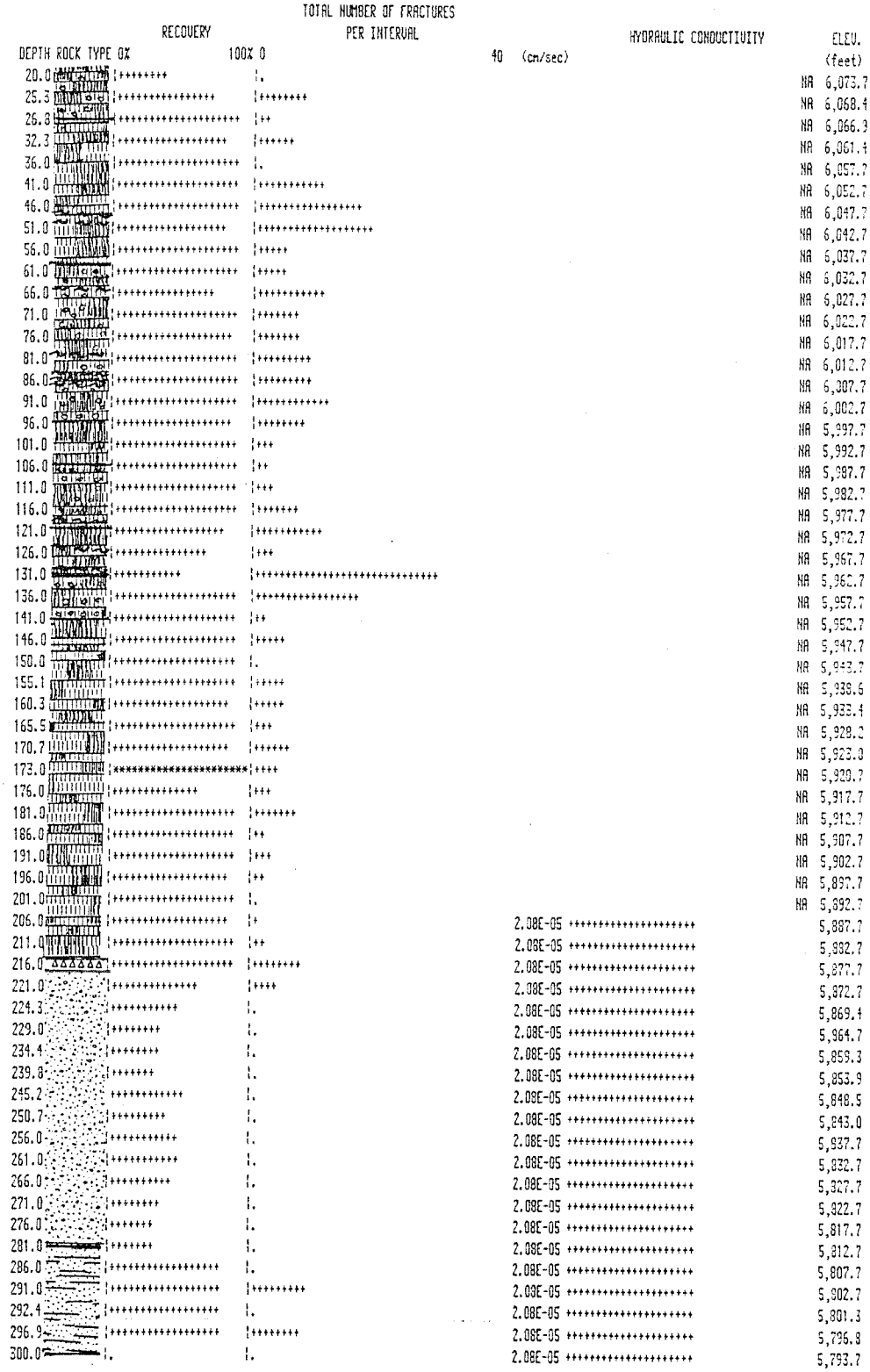
25-Jun-86 MINER FLAT DAM SITE: MF-119: ENGINEERING GEOLOGIC LOG

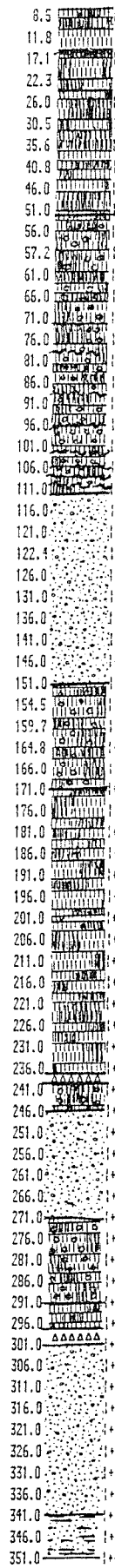


DEPTH	ROCK TYPE	RECOVERY 0% 100%	RQD 0% 100%	SCR 0% 100%	STRENGTH 0 40,000 psi		ELEV. (feet)
20.0						0	6,073.7
25.3						19,545	6,068.4
26.8						18,750	6,066.9
32.3						15,890	6,061.4
36.0						13,983	6,057.7
41.0						12,394	6,052.7
46.0						24,789	6,047.7
51.0						19,704	6,042.7
56.0						22,246	6,037.7
61.0						25,424	6,032.7
66.0						18,274	6,027.7
71.0						20,657	6,022.7
76.0						17,479	6,017.7
81.0						15,572	6,012.7
86.0						19,863	6,007.7
91.0						2,384	6,002.7
96.0						17,797	5,997.7
101.0						25,424	5,992.7
106.0						30,986	5,987.7
111.0						27,331	5,982.7
116.0						27,808	5,977.7
121.0						16,208	5,972.7
126.0						15,890	5,967.7
131.0						0	5,962.7
136.0						8,422	5,957.7
141.0						17,161	5,952.7
146.0						21,611	5,947.7
150.0						23,835	5,943.7
155.1						24,153	5,938.6
160.3						27,808	5,933.4
165.5						28,602	5,928.2
170.7						28,602	5,923.0
173.0						27,649	5,920.7
176.0						27,013	5,917.7
181.0						28,602	5,912.7
186.0						30,191	5,907.7
191.0						31,145	5,902.7
196.0						29,873	5,897.7
201.0						30,191	5,892.7
206.0						28,920	5,887.7
211.0						32,416	5,882.7
216.0						25,742	5,877.7
221.0						0	5,872.7
224.3						0	5,869.4
229.0						0	5,864.7
234.4						0	5,859.3
239.8						0	5,853.9
245.2						0	5,848.5
250.7						0	5,843.0
256.0						0	5,837.7
261.0						0	5,832.7
266.0						0	5,827.7
271.0						0	5,822.7
276.0						0	5,817.7
281.0						0	5,812.7
286.0						0	5,807.7
291.0						5,085	5,802.7
292.4						4,767	5,801.3
296.9						13,983	5,796.8
300.0						0	5,793.7

DEPTH	ROCK TYPE	RECOVERY 0%	100%	NUMBER OF FRACTURES 90-70 0	10	70-50 0	10	50-30 0	10	30-0 0	10	20	ELEV. (feet)
20.0		++++++++		.		.		.		.			6,073.7
25.3		++++++++++++++++		+++++++		.		+		.			6,068.4
26.8		++++++++++++++++++++		++		.		.		.			6,066.9
32.3		++++++++++++++++++		+++++		+		.		.			6,061.4
36.0		++++++++++++++++++++		.		.		.		.			6,057.7
41.0		++++++++++++++++++++		+++++++		++		.		++			6,052.7
46.0		++++++++++++++++++++		++++++++		++		++		++++			6,047.7
51.0		++++++++++++++++++		+++++++		++++++++		.		++++			6,042.7
56.0		++++++++++++++++++++		++++		.		.		+			6,037.7
61.0		++++++++++++++++++++		++++		.		.		+			6,032.7
66.0		++++++++++++++++		++++++		.		.		+++++			6,027.7
71.0		++++++++++++++++++++		+++++++		.		.		.			6,022.7
76.0		++++++++++++++++++		+++++++		.		.		.			6,017.7
81.0		++++++++++++++++++++		++++++		+++		.		.			6,012.7
86.0		++++++++++++++++++++		+++++++		++		.		.			6,007.7
91.0		++++++++++++++++++++		++++++++		.		++++		.			6,002.7
96.0		++++++++++++++++++++		+++++		.		+		++			5,997.7
101.0		++++++++++++++++++++		+++		.		.		.			5,992.7
106.0		++++++++++++++++++++		.		++		.		.			5,987.7
111.0		++++++++++++++++++++		++		+		.		.			5,982.7
116.0		++++++++++++++++++++		++++		+		.		++			5,977.7
121.0		++++++++++++++++++		++++++		++		.		+++			5,972.7
126.0		++++++++++++++++		+++		.		.		.			5,967.7
131.0		++++++++++		++++++++++++++++++++		.		.		++++++++++			5,962.7
136.0		++++++++++++++++++++		+++++++		+++++		.		+++++			5,957.7
141.0		++++++++++++++++++++		++		.		.		.			5,952.7
146.0		++++++++++++++++++++		++++		+		.		.			5,947.7
150.0		++++++++++++++++++++		.		.		.		.			5,943.7
155.1		++++++++++++++++++++		+++		++		.		.			5,938.6
160.3		++++++++++++++++++		++		+++		.		.			5,933.4
165.5		++++++++++++++++++++		++		+		.		.			5,928.2
170.7		++++++++++++++++++		+++++		.		.		+			5,923.0
173.0		++++++++++++++++++++		+++		+		.		.			5,920.7
176.0		++++++++++++++		++		+		.		.			5,917.7
181.0		++++++++++++++++++++		+++++		++		.		.			5,912.7
186.0		++++++++++++++++++++		+		.		.		.			5,907.7
191.0		++++++++++++++++++++		+		.		.		++			5,902.7
196.0		++++++++++++++++++		++		.		.		.			5,897.7
201.0		++++++++++++++++++++		.		.		.		.			5,892.7
206.0		++++++++++++++++++		.		.		.		+			5,887.7
211.0		++++++++++++++++++++		.		.		.		++			5,882.7
216.0		++++++++++++++++++++		++++		.		.		++++			5,877.7
221.0		++++++++++++++		++++		.		.		.			5,872.7
224.3		++++++++++		.		.		.		.			5,869.4
229.0		++++++++		.		.		.		.			5,864.7
234.1		++++++++		.		.		.		.			5,859.3
239.8		+++++++		.		.		.		.			5,853.9
245.2		++++++++++		.		.		.		.			5,848.5
250.7		+++++++++		.		.		.		.			5,843.0
256.0		++++++++++		.		.		.		.			5,837.7
261.0		++++++++++		.		.		.		.			5,832.7
266.0		+++++++++		.		.		.		.			5,827.7
271.0		++++++++		.		.		.		.			5,822.7
276.0		+++++++		.		.		.		.			5,817.7
281.0		+++++++		.		.		.		.			5,812.7
286.0		++++++++++++++++++		.		.		.		.			5,807.7
291.0		++++++++++++++++++		+++		.		+++++		.			5,802.7
292.4		++++++++++++++++++		.		.		.		.			5,801.3
296.9		++++++++++++++++++		++++		+++		.		+			5,796.8
300.0		.		.		.		.		.			5,793.7

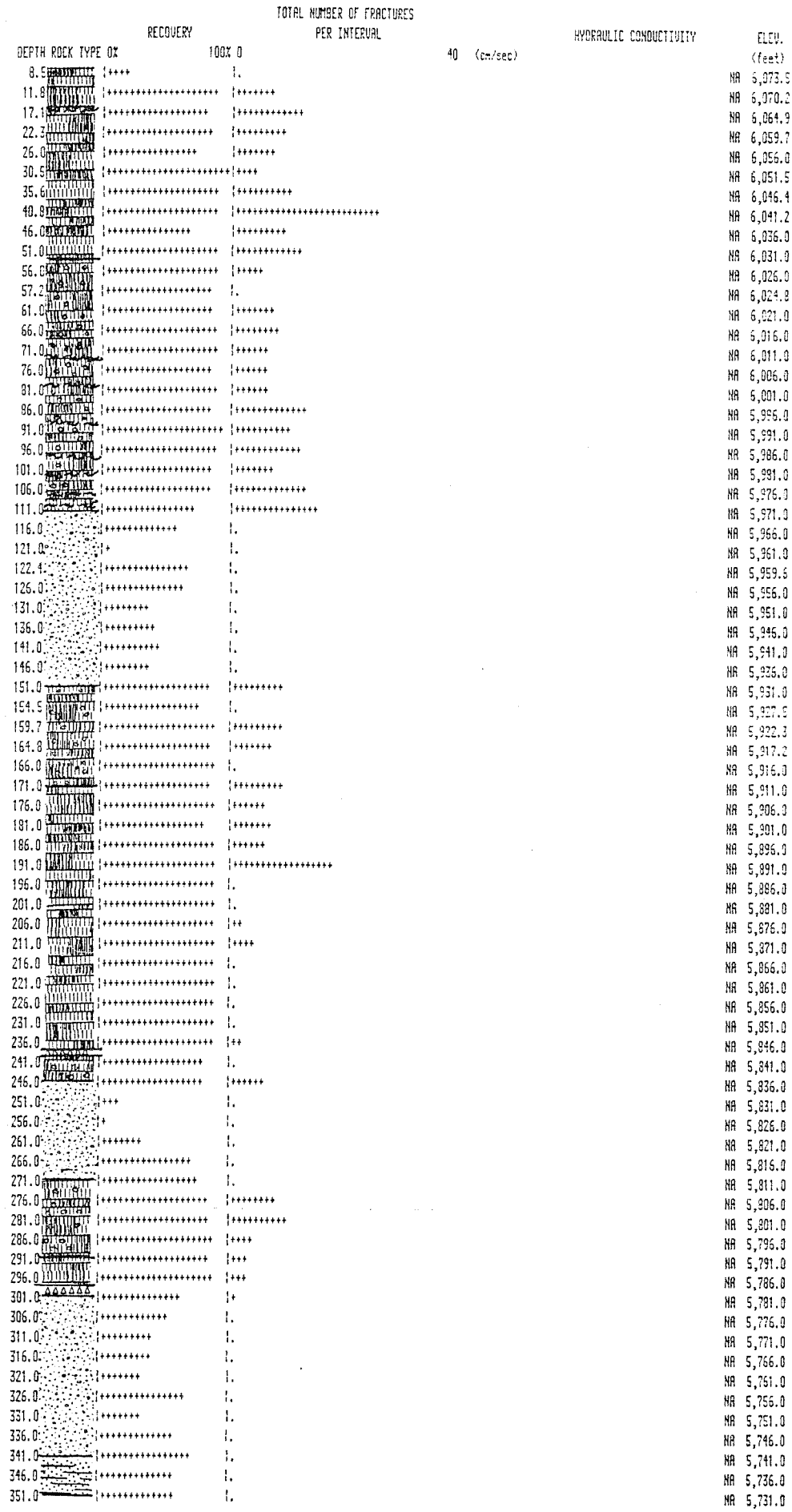
25-Jun-86 MINER FLAT DAM SITE: MF-119: FRACTURES and HYDRAULIC CONDUCTIVITY





DEPTH	ROCK TYPE	RECOVERY 0% 100%	ROD 0% 100%	SCR 0% 100%	STRENGTH 0 40,000 psi		ELEV. (feet)
8.5						0	6,073.5
11.8						22,246	6,070.2
17.1						21,293	6,064.9
22.3						19,068	6,059.7
26.0						22,246	6,056.0
30.5						19,068	6,051.5
35.6						18,274	6,046.4
40.8						34,958	6,041.2
46.0						28,602	6,036.0
51.0						23,835	6,031.0
56.0						23,041	6,026.0
57.2						20,657	6,024.8
61.0						19,386	6,021.0
66.0						24,312	6,016.0
71.0						25,742	6,011.0
76.0						20,180	6,006.0
81.0						15,572	6,001.0
86.0						7,945	5,996.0
91.0						25,742	5,991.0
96.0						15,890	5,986.0
101.0						25,106	5,981.0
106.0						14,301	5,976.0
111.0						18,750	5,971.0
116.0						0	5,966.0
121.0						0	5,961.0
122.4						0	5,959.6
126.0						0	5,956.0
131.0						0	5,951.0
136.0						0	5,946.0
141.0						0	5,941.0
146.0						0	5,936.0
151.0						36,547	5,931.0
154.5						35,753	5,927.5
159.7						31,462	5,922.3
164.8						31,462	5,917.2
166.0						28,602	5,916.0
171.0						32,575	5,911.0
176.0						38,136	5,906.0
181.0						34,958	5,901.0
186.0						31,780	5,895.0
191.0						30,191	5,891.0
196.0						31,462	5,886.0
201.0						33,687	5,881.0
206.0						34,164	5,876.0
211.0						31,780	5,871.0
216.0						32,575	5,866.0
221.0						31,780	5,861.0
226.0						31,780	5,856.0
231.0						31,462	5,851.0
236.0						37,024	5,846.0
241.0						0	5,841.0
246.0						4,767	5,836.0
251.0						0	5,831.0
256.0						0	5,826.0
261.0						0	5,821.0
266.0						0	5,816.0
271.0						0	5,811.0
276.0						32,734	5,806.0
281.0						36,547	5,801.0
286.0						39,407	5,796.0
291.0						37,342	5,791.0
296.0						38,136	5,786.0
301.0						35,753	5,781.0
306.0						0	5,776.0
311.0						0	5,771.0
316.0						0	5,766.0
321.0						0	5,761.0
326.0						0	5,756.0
331.0						0	5,751.0
336.0						0	5,746.0
341.0						0	5,741.0
346.0						0	5,736.0
351.0						0	5,731.0

DEPTH	ROCK TYPE	RECOVERY 0% 100%	NUMBER OF FRACTURES 90-70 0 10 20	70-50 0 10 20	50-30 0 10 20	30-0 0 10 20	ELEV. (feet)
8.5		|++++	|.	|.	|.	|.	6,073.5
11.8		|++++++++++++++++++++	|++++	|.	|++	|+	6,070.2
17.1		|++++++++++++++++++	|+++++	|+++	|+++	|+	6,064.9
22.3		|++++++++++++++++++++	|++++	|+++	|+	|+	6,059.7
26.0		|++++++++++++++++	|+	|++++	|.	|++	6,056.0
30.5		|++++++++++++++++++++++	|+	|+++	|.	|.	6,051.5
35.6		|++++++++++++++++++++	|++	|+++	|.	|+++++	6,046.4
40.8		|++++++++++++++++++++	|+++++++++	|++++++	|+++++	|++++++	6,041.2
46.0		|++++++++++++++++	|++++++	|+++	|.	|.	6,036.0
51.0		|++++++++++++++++++++	|+++++++	|.	|+++	|++	6,031.0
56.0		|++++++++++++++++++++	|+++	|++	|.	|.	6,026.0
57.2		|++++++++++++++++++	|.	|.	|.	|.	6,024.8
61.0		|++++++++++++++++++	|+++++++	|.	|.	|.	6,021.0
66.0		|++++++++++++++++++++	|++++++++	|.	|.	|.	6,016.0
71.0		|++++++++++++++++++++	|++++++	|.	|.	|.	6,011.0
76.0		|++++++++++++++++++	|++++++	|.	|.	|.	6,006.0
81.0		|++++++++++++++++++++	|+++	|+++	|.	|.	6,001.0
86.0		|++++++++++++++++++	|++++++++	|.	|+	|++++	5,996.0
91.0		|++++++++++++++++++++	|++++	|++	|++	|++	5,991.0
96.0		|++++++++++++++++++++	|++++++++	|++++	|.	|.	5,986.0
101.0		|++++++++++++++++++	|++++	|+	|.	|++	5,981.0
106.0		|++++++++++++++++++	|++++++	|++++	|.	|+++	5,976.0
111.0		|++++++++++++++++	|++++++++++	|.	|.	|+++++	5,971.0
116.0		|++++++++++++	|.	|.	|.	|.	5,966.0
121.0		|+	|.	|.	|.	|.	5,961.0
122.4		|++++++++++++++++	|.	|.	|.	|.	5,959.6
126.0		|++++++++++++++	|.	|.	|.	|.	5,956.0
131.0		|++++++++	|.	|.	|.	|.	5,951.0
136.0		|+++++++++	|.	|.	|.	|.	5,946.0
141.0		|++++++++++	|.	|.	|.	|.	5,941.0
146.0		|++++++++	|.	|.	|.	|.	5,936.0
151.0		|++++++++++++++++++++	|.	|+++++	|.	|+++	5,931.0
154.5		|++++++++++++++++	|.	|.	|.	|.	5,927.5
159.7		|++++++++++++++++++++	|+++++	|+++	|.	|+	5,922.3
164.3		|++++++++++++++++++	|+++++++	|.	|.	|.	5,917.7
166.0		|++++++++++++++++++++	|.	|.	|.	|.	5,916.0
171.0		|++++++++++++++++++	|+++++	|.	|+	|+++	5,911.0
176.0		|++++++++++++++++++++	|+++++	|.	|.	|+	5,906.0
181.0		|++++++++++++++++++	|++	|++++	|.	|+	5,901.0
186.0		|++++++++++++++++++++	|++++	|.	|++	|.	5,896.0
191.0		|++++++++++++++++++++	|++++++++++++++	|.	|.	|++++	5,891.0
196.0		|++++++++++++++++++++	|.	|.	|.	|.	5,886.0
201.0		|++++++++++++++++++++	|.	|.	|.	|.	5,881.0
206.0		|++++++++++++++++++++	|++	|.	|.	|.	5,876.0
211.0		|++++++++++++++++++++	|++	|++	|.	|.	5,871.0
216.0		|++++++++++++++++++++	|.	|.	|.	|.	5,866.0
221.0		|++++++++++++++++++++	|.	|.	|.	|.	5,861.0
226.0		|++++++++++++++++++++	|.	|.	|.	|.	5,956.0
231.0		|++++++++++++++++++++	|.	|.	|.	|.	5,851.0
236.0		|++++++++++++++++++++	|.	|.	|+	|+	5,846.0
241.0		|++++++++++++++++++	|.	|.	|.	|.	5,841.0
246.0		|++++++++++++++++++	|+++	|++	|.	|+	5,836.0
251.0		|+++	|.	|.	|.	|.	5,831.0
256.0		|+	|.	|.	|.	|.	5,826.0
261.0		|+++++++	|.	|.	|.	|.	5,821.0
266.0		|++++++++++++++++	|.	|.	|.	|.	5,816.0
271.0		|++++++++++++++++	|.	|.	|.	|.	5,911.0
276.0		|++++++++++++++++++++	|++++	|++++	|.	|.	5,806.0
281.0		|++++++++++++++++++++	|+++++	|.	|+++	|++	5,801.0
286.0		|++++++++++++++++++++	|+	|++	|.	|+	5,796.0
291.0		|++++++++++++++++++++	|++	|+	|.	|.	5,791.0
296.0		|++++++++++++++++++++	|+	|+	|.	|+	5,786.0
301.0		|++++++++++++++++	|+	|.	|.	|.	5,781.0
306.0		|++++++++++++	|.	|.	|.	|.	5,776.0
311.0		|+++++++++	|.	|.	|.	|.	5,771.0
316.0		|+++++++++	|.	|.	|.	|.	5,766.0
321.0		|+++++++	|.	|.	|.	|.	5,761.0
326.0		|++++++++++++++++	|.	|.	|.	|.	5,756.0
331.0		|+++++++	|.	|.	|.	|.	5,751.0
336.0		|++++++++++++++	|.	|.	|.	|.	5,746.0
341.0		|++++++++++++++++++	|.	|.	|.	|.	5,741.0
346.0		|++++++++++++++	|.	|.	|.	|.	5,736.0
351.0		|++++++++++++++	|.	|.	|.	|.	5,731.0


TOTAL NUMBER OF FRACTURES
PER INTERVAL
RECOVERY
HYDRAULIC CONDUCTIVITY
DEPTH ROCK TYPE 0% 100% 0 40 (cm/sec) ELEV. (feet)
8.5 NA 6,073.5
11.8 NA 6,070.2
17.1 NA 6,064.9
22.3 NA 6,059.7
26.0 NA 6,056.0
30.5 NA 6,051.5
35.6 NA 6,046.4
40.8 NA 6,041.2
46.0 NA 6,036.0
51.0 NA 6,031.0
56.0 NA 6,026.0
57.2 NA 6,024.8
61.0 NA 6,021.0
66.0 NA 6,016.0
71.0 NA 6,011.0
76.0 NA 6,006.0
81.0 NA 6,001.0
86.0 NA 5,996.0
91.0 NA 5,991.0
96.0 NA 5,986.0
101.0 NA 5,981.0
106.0 NA 5,976.0
111.0 NA 5,971.0
116.0 NA 5,966.0
121.0 NA 5,961.0
122.1 NA 5,959.6
126.0 NA 5,956.0
131.0 NA 5,951.0
136.0 NA 5,946.0
141.0 NA 5,941.0
146.0 NA 5,936.0
151.0 NA 5,931.0
154.5 NA 5,927.5
159.7 NA 5,922.3
164.8 NA 5,917.2
166.0 NA 5,916.0
171.0 NA 5,911.0
176.0 NA 5,906.0
181.0 NA 5,901.0
186.0 NA 5,896.0
191.0 NA 5,891.0
196.0 NA 5,886.0
201.0 NA 5,881.0
206.0 NA 5,876.0
211.0 NA 5,871.0
216.0 NA 5,866.0
221.0 NA 5,861.0
226.0 NA 5,856.0
231.0 NA 5,851.0
236.0 NA 5,846.0
241.0 NA 5,841.0
246.0 NA 5,836.0
251.0 NA 5,831.0
256.0 NA 5,826.0
261.0 NA 5,821.0
266.0 NA 5,816.0
271.0 NA 5,811.0
276.0 NA 5,806.0
281.0 NA 5,801.0
286.0 NA 5,796.0
291.0 NA 5,791.0
296.0 NA 5,786.0
301.0 NA 5,781.0
306.0 NA 5,776.0
311.0 NA 5,771.0
316.0 NA 5,766.0
321.0 NA 5,761.0
326.0 NA 5,756.0
331.0 NA 5,751.0
336.0 NA 5,746.0
341.0 NA 5,741.0
346.0 NA 5,736.0
351.0 NA 5,731.0

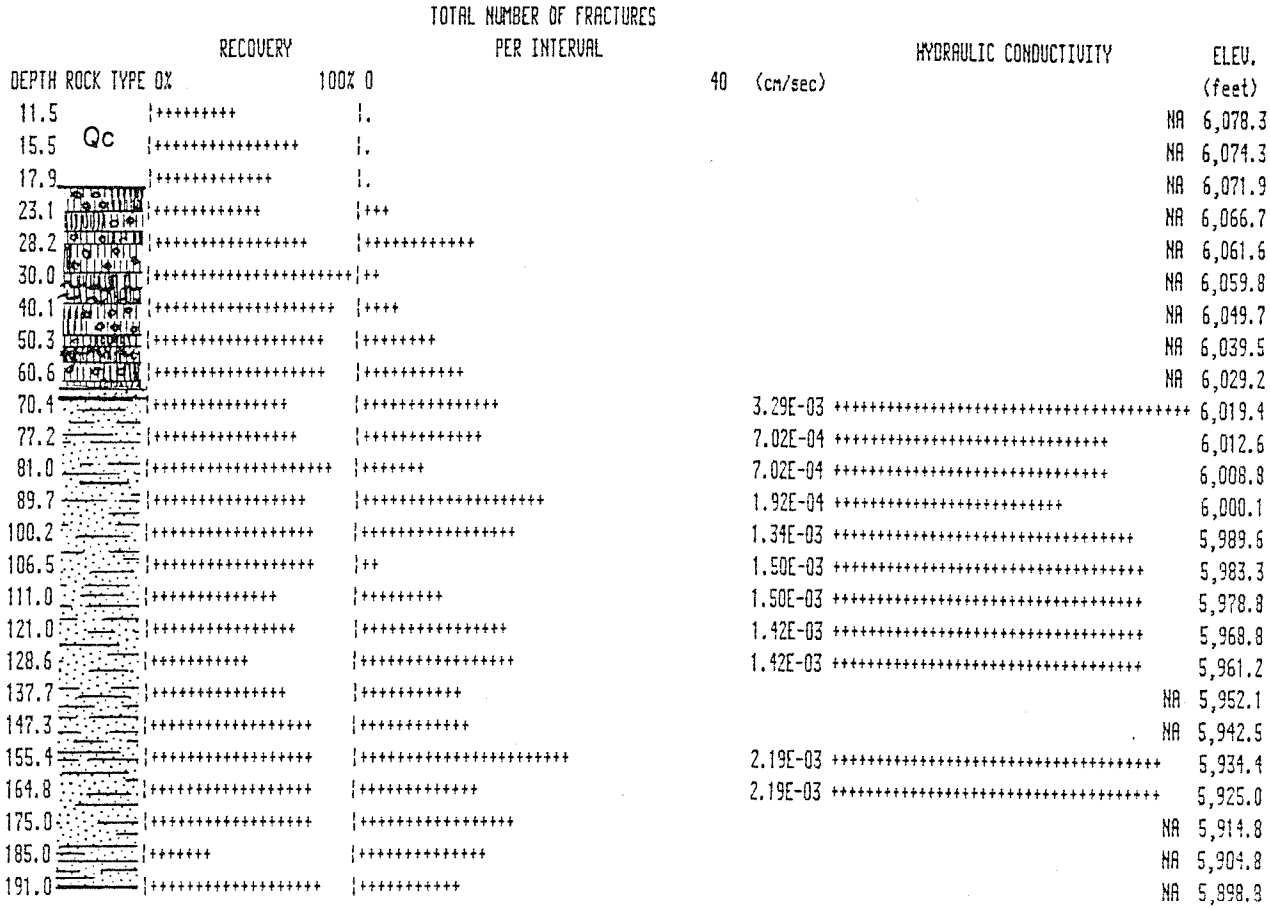
MINER FLAT DAM SITE: MF-121: ENGINEERING GEOLOGIC LOG

DEPTH	ROCK TYPE	RECOVERY 0% 100%	RQD 0% 100%	SCR 0% 100%	STRENGTH 0 40,000 psi		ELEV. (feet)
11.5	Qc	+++++++++	.	.	.	0	6,078.3
15.5		+++++++++++++++++	.	.	.	0	6,074.3
17.9		+++++++++++++++	.	.	.	0	6,071.9
23.1		+++++++++++++	++++++	.	+++++++++++++++++++	18,274	6,066.7
28.2		++++++++++++++++++	++++++++++	++++	++++++++++++++++++++++	21,452	6,061.6
30.0		++++++++++++++++++++++	+++++++++++++++	+++++++++++++++	+++++++++++++++	15,096	6,059.8
40.1		++++++++++++++++++++	++++++++++++++++	++++++++++++	++++++++++++++++++++++++++	25,424	6,049.7
50.3		++++++++++++++++++++	++++++++++++++++	++++++++++++	++++++++++++++++++++++++++	26,695	6,039.5
60.6		++++++++++++++++++++	+++++++++++++++	+++++++	++++++++++++++++++++++	22,246	6,029.2
70.4		+++++++++++++++++	++++++	++	+++++++++++++++++++	19,863	6,019.4
77.2		+++++++++++++++++	++++++++	.	+	1,907	6,012.6
81.0		++++++++++++++++++++	++++++++++++	++++++++	+	1,192	6,008.8
89.7		++++++++++++++++++	++++++	.	+	1,827	6,000.1
100.2		++++++++++++++++++	++++++++++	++++++	.	477	5,989.6
106.5		++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	+	1,827	5,983.3
111.0		+++++++++++++++	+++++	.	++	2,542	5,978.8
121.0		++++++++++++++++	++++++++++	++++++	+	1,986	5,968.8
128.6		++++++++++	+	.	+	1,192	5,961.2
137.7		+++++++++++++++	++++++	+++	.	477	5,952.1
147.3		++++++++++++++++++	+++++++++	+++++	+	1,271	5,942.5
155.4		++++++++++++++++++	++++++	+++	.	556	5,934.4
164.8		++++++++++++++++++	++++++++++++	++++++++	+	1,112	5,925.0
175.0		++++++++++++++++++	++++++++++	+++	+	1,827	5,914.8
185.0		+++++++	++	++	+	1,033	5,904.8
191.0		++++++++++++++++++++	++++++++++	+++	+	1,748	5,898.8

MINER FLAT DAM SITE: MF-121: FRACTURE LOG

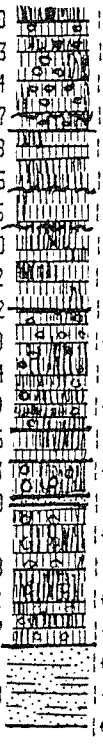
DEPTH	ROCK TYPE	RECOVERY 0% 100%	NUMBER OF FRACTURES 90-70 0 10 20	70-50 0 10 20	50-30 0 10 20	30-0 0 10 20	ELEV. (feet)
11.5		+++++++++	.	.	.	.	6,078.3
15.5	Qc	++++++++++++++++	.	.	.	.	6,074.3
17.9		+++++++++++++	.	.	.	.	6,071.9
23.1		+++++++++++	.	++	+	.	6,066.7
28.2		++++++++++++++++	+++++++	.	.	+++++	6,061.6
30.0		++++++++++++++++++++	++	.	.	.	6,059.8
40.1		++++++++++++++++++++	++++	.	.	.	6,049.7
50.3		++++++++++++++++++++	.	.	++++++++	.	6,039.5
60.6		++++++++++++++++++++	.	++++++	+++++	.	6,029.2
70.4		++++++++++++++++	++++++++++	.	.	+++++	6,019.4
77.2		++++++++++++++++	++++++	.	++++	+++	6,012.6
81.0		++++++++++++++++++++	+++++	.	.	++	6,008.8
89.7		++++++++++++++++	++++++++++++++++	++	.	++	6,000.1
100.2		++++++++++++++++++	+++++	.	++++++++++	++	5,989.6
106.5		++++++++++++++++++	+	.	.	+	5,983.3
111.0		+++++++++++++++	++++++++	.	.	+	5,978.8
121.0		++++++++++++++++	++++++++++++++	.	+++	.	5,968.8
128.6		++++++++++	++++++++++++++	.	.	++++	5,961.2
137.7		+++++++++++++++	++++	.	+++++	++	5,952.1
147.3		++++++++++++++++++	+++++++	+++++	.	.	5,942.5
155.4		++++++++++++++++++	++++++++++++	+++	.	++++++++	5,934.4
164.8		++++++++++++++++++	+++++++++	.	.	++++	5,925.0
175.0		++++++++++++++++++	++++++++++	+++	.	+++	5,914.8
185.0		+++++++	++++++++++	.	.	+++	5,904.8
191.0		++++++++++++++++++	+++++++++	.	.	++	5,898.8

MINER FLAT DAM SITE: MF-121: FRACTURES and HYDRAULIC CONDUCTIVITY



25-Jun-86

MINER FLAT DAM SITE: MF-122: ENGINEERING GEOLOGIC LOG



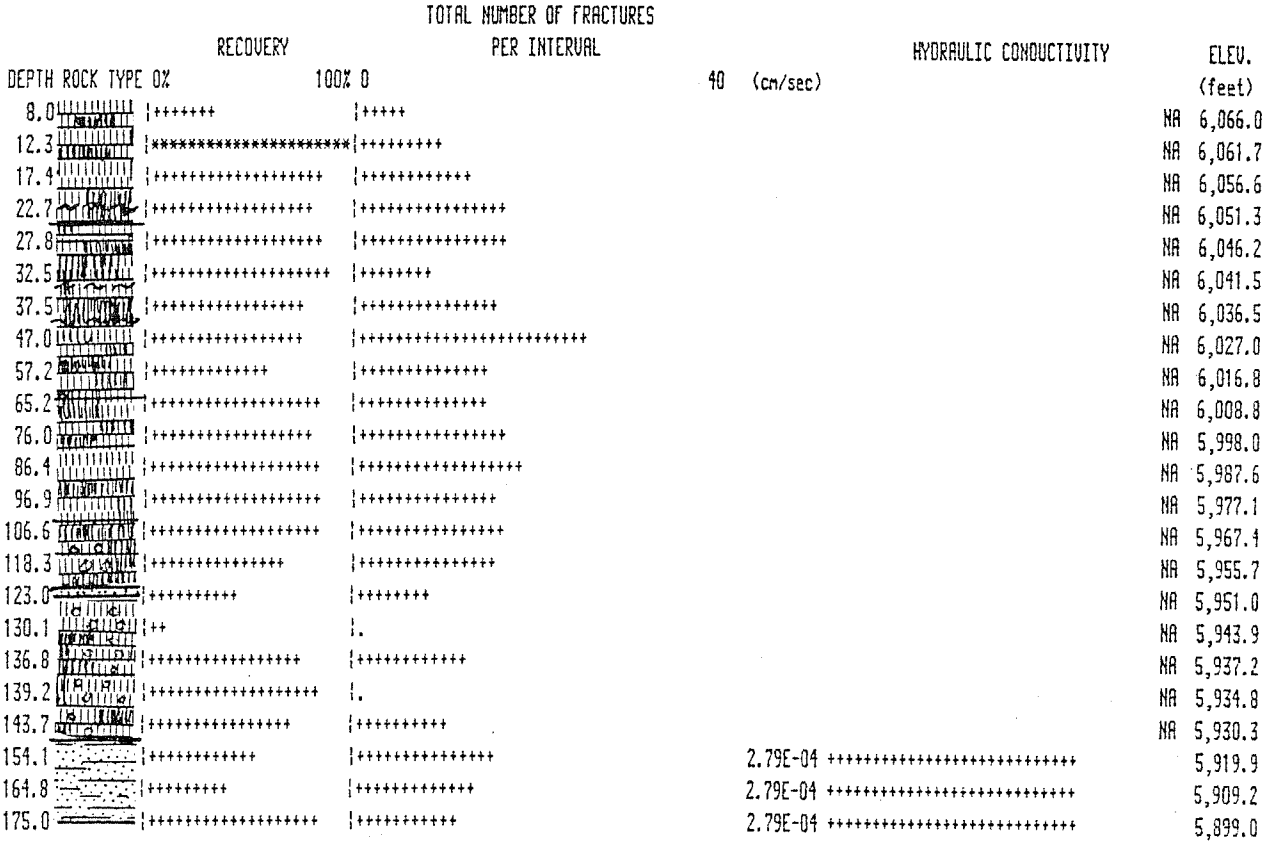
DEPTH	ROCK TYPE	RECOVERY 0% 100%	RQD 0% 100%	SCR 0% 100%	STRENGTH 0 40,000 psi		ELEV. (feet)
8.0						17,479	6,066.0
12.3						19,863	6,061.7
17.4						18,274	6,056.6
22.7						20,657	6,051.3
27.8						28,602	6,046.2
32.5						28,920	6,041.5
37.5						18,909	6,036.5
47.0						19,863	6,027.0
57.2						10,805	6,016.8
65.2						15,890	6,008.8
76.0						19,068	5,998.0
86.4						16,685	5,987.6
96.9						14,301	5,977.1
106.6						23,041	5,967.4
118.3						34,958	5,955.7
123.0						7,945	5,951.0
130.1						0	5,943.9
136.8						30,668	5,937.2
139.2						0	5,934.8
143.7						8,263	5,930.3
154.1						2,384	5,919.9
164.8						2,622	5,909.2
175.0						0	5,899.0

25-Jun-86

MINER FLAT DAM SITE: MF-122: FRACTURE LOG

DEPTH	ROCK TYPE	RECOVERY 0% 100%	NUMBER OF FRACTURES 90-70 0 10	70-50 0 10	50-30 0 10	30-0 0 10 20	ELEV. (feet)
8.0		|+++++++	|++++	|.	|.	|+	6,066.0
12.3		|**********	|++++	|+++	|.	|++	6,061.7
17.4		|++++++++++++++++++	|+++++++	|++	|.	|+++	6,056.6
22.7		|++++++++++++++++++	|++++++++++++	|.	|.	|++++	6,051.3
27.8		|++++++++++++++++++	|++++++++	|+++	|.	|+++++	6,046.2
32.5		|++++++++++++++++++	|++++	|++	|.	|++	6,041.5
37.5		|++++++++++++++++	|+++++	|++++++++	|.	|++	6,036.5
47.0		|++++++++++++++++	|++++++++++++	|+++++	|.	|++++++++	6,027.0
57.2		|++++++++++++++	|++++++++	|+++	|.	|+++	6,016.8
65.2		|++++++++++++++++++	|++++++++++	|.	|+	|+++	6,008.8
76.0		|++++++++++++++++	|++++++++++	|.	|++	|++++	5,998.0
86.4		|++++++++++++++++++	|++++++++++++	|.	|++++	|++	5,987.6
96.9		|++++++++++++++++++	|+++++++++	|.	|++	|++++	5,977.1
106.6		|++++++++++++++++++	|++++++++++	|+++	|.	|+++	5,967.4
118.3		|++++++++++++++++	|++++++	|++	|++++	|+++	5,955.7
123.0		|++++++++++	|++++++++	|.	|.	|.	5,951.0
130.1		|++	|.	|.	|.	|.	5,943.9
136.8		|++++++++++++++++	|++++++	|+++	|.	|+++	5,937.2
139.2		|++++++++++++++++++	|.	|.	|.	|.	5,934.8
143.7		|++++++++++++++++	|++++++	|.	|++	|++	5,930.3
154.1		|++++++++++++	|++++++++++	|.	|.	|+++++	5,919.9
164.8		|+++++++++	|++++++++++++++	|.	|.	|.	5,909.2
175.0		|++++++++++++++++++	|+++++++++	|.	|.	|++	5,899.0

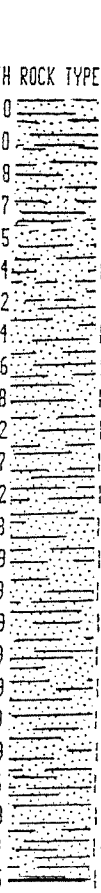
MINER FLAT DAM SITE: MF-122: FRACTURES and HYDRAULIC CONDUCTIVITY



MINER FLAT DAM SITE: MF-123: ENGINEERING GEOLOGIC LOG

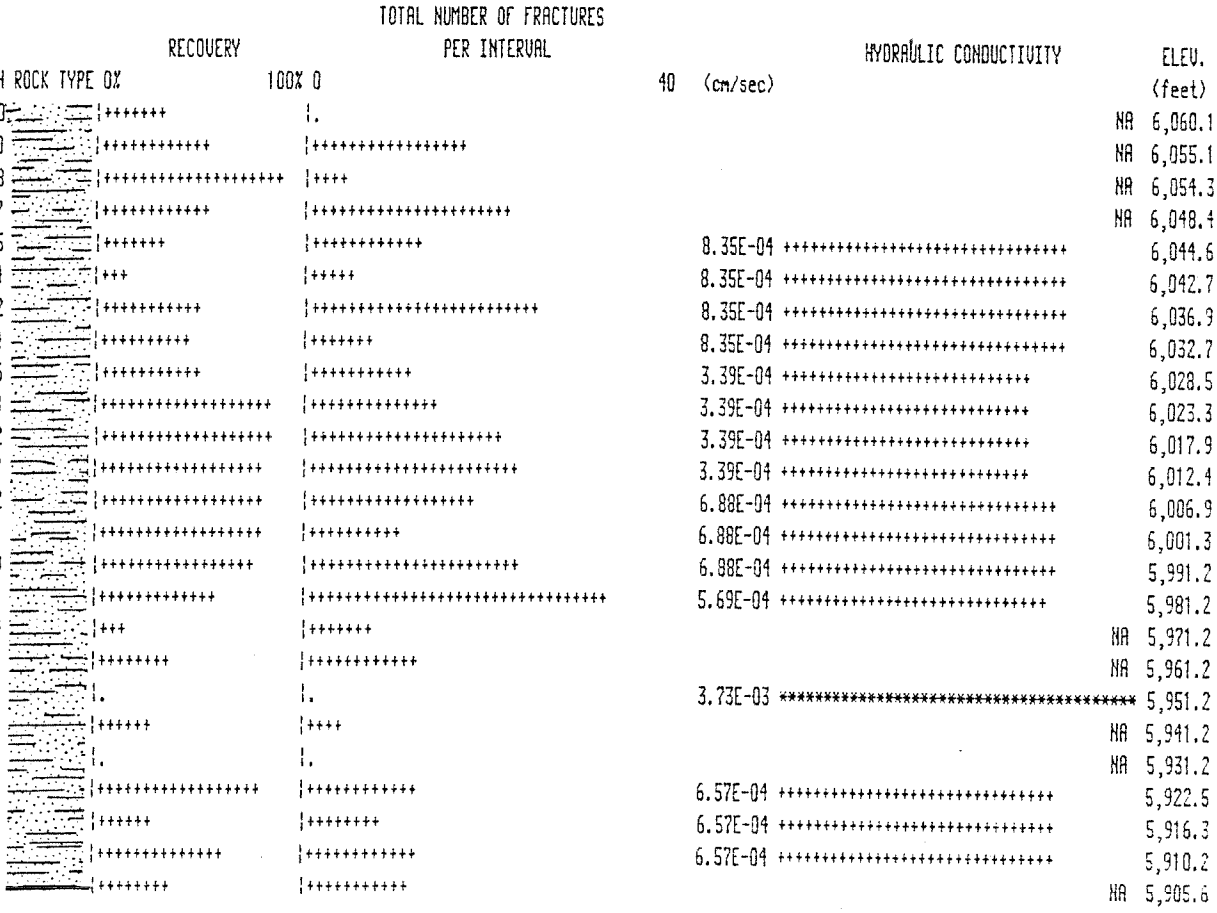
DEPTH	ROCK TYPE	RECOVERY 0% 100%	RQD 0% 100%	SCR 0% 100%	STRENGTH 0 40,000 psi	ELEV. (feet)
53.0					0	6,060.1
58.0					7,548	6,055.1
58.8					13,030	6,054.3
64.7					4,449	6,048.4
68.5					7,627	6,044.6
70.4					5,959	6,042.7
76.2					7,309	6,036.9
80.4					10,805	6,032.7
84.6					7,945	6,028.5
89.8					9,216	6,023.3
95.2					2,463	6,017.9
100.7					3,099	6,012.4
106.2					1,827	6,006.9
111.8					1,986	6,001.3
121.9					1,351	5,991.2
131.9					715	5,981.2
141.9					795	5,971.2
151.9					1,351	5,961.2
161.9					0	5,951.2
171.9					0	5,941.2
181.9					0	5,931.2
190.6					0	5,922.5
196.8					0	5,916.3
202.9					0	5,910.2
207.5					0	5,905.6

MINER FLAT DAM SITE: MF-123: FRACTURE LOG

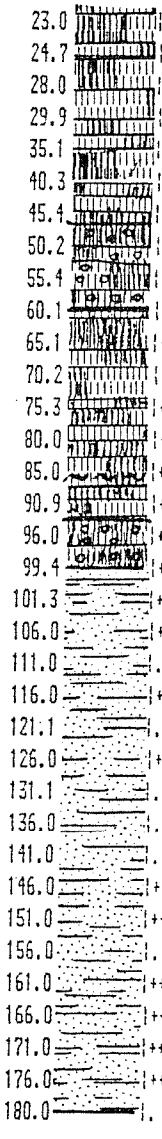


DEPTH	ROCK TYPE	RECOVERY 0%	100%	NUMBER OF FRACTURES 90-70 0	10	20	70-50 10	50-30 20	0	10	30-0 20	0	10	20	ELEV. (feet)
53.0		+++++++		.		.		.			.				6,060.1
58.0		++++++++++++		+++++		.		++++			++++++++				6,055.1
58.8		++++++++++++++++++++		++++		.		.			.				6,054.3
64.7		++++++++++++		+++++++++		.		++++++++			+++++				6,048.4
68.5		+++++++		++++		.		+++++			+++				6,044.6
70.4		+++		+++		.		.			++				6,042.7
76.2		++++++++++++		++++++++++++++++++		.		+++			+++				6,036.9
80.4		++++++++++		+++++		.		.			++				6,032.7
84.6		++++++++++++		+++++		.		.			++++++				6,028.5
89.8		++++++++++++++++++		++++++++		.		+++			+++				6,023.3
95.2		++++++++++++++++++		++++++++++		.		++++++			+++++				6,017.9
100.7		++++++++++++++++++		++++++		.		++++++			++++++++++				6,012.4
106.2		++++++++++++++++++		+++++++		.		+++++			++++++				6,006.9
111.8		++++++++++++++++++		+++++		.		++			+++				6,001.3
121.9		++++++++++++++++++		++++++++++		.		+++++++			++++++				5,991.2
131.9		++++++++++++		**********		.		+++			+++++				5,981.2
141.9		+++		++++		.		.			+++				5,971.2
151.9		++++++++		+++++++		.		+++			++				5,961.2
161.9		.		.		.		.			.				5,951.2
171.9		++++++		++		.		.			++				5,941.2
181.9		.		.		.		.			.				5,931.2
190.6		++++++++++++++++++		+++++		.		.			+++++++				5,922.5
196.8		++++++		+++++		.		.			+++				5,916.3
202.9		++++++++++++		+++++++++		.		.			+++				5,910.2
207.5		++++++++		++++++++++		.		.			.				5,905.6

MINER FLAT DAM SITE: MF-123: FRACTURES and HYDRAULIC CONDUCTIVITY



MINER FLAT DAM SITE: MF-124: ENGINEERING GEOLOGIC LOG



DEPTH	ROCK TYPE	RECOVERY 0% 100%	RQD 0% 100%	SCR 0% 100%	STRENGTH 0 100%	40,000 psi	ELEV. (feet)
23.0		++	.	.	.	0	6,057.6
24.7		++++++++++++++++++++	.	.	++++++++	8,740	6,055.9
28.0		++++++++++++++++	++	.	++++++++++++++	13,983	6,052.6
29.9		++++++++++++++	.	.	++++++++++++++++++++	19,386	6,050.7
35.1		++++++++++++++	+++	.	++++++++++++++++++++++++	23,835	6,045.5
40.3		++++++++++++++++++++	+++++++++++++++	+++++++++	++++++	6,356	6,040.3
45.4		++++++++++++++	+++++++++	+++++	++++++++++++++++++++	21,928	6,035.2
50.2		++++++++++++++++++++++	++++++++++++++++++	+++++++++	++++++++++++++	14,301	6,030.4
55.4		++++++++++++++++++	++++++++	+++++	++++++++++++++++++++++++++	25,424	6,025.2
60.1		++++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++++++++++++++++++++++++	23,517	6,020.5
65.1		++++++++++++++++++++	++++++++++++++++++	++++++++++++++++++	++++++++++++++++++++++	22,882	6,015.5
70.2		++++++++++++++++++++	++++++++++++++++++++	++++++++++++++++++++	++++++++++++++++++	19,863	6,010.4
75.3		++++++++++++++++++	++++++++++++++++++	++++++++++++++	++++++++++++++++++	19,704	6,005.3
80.0		++++++++++++++++++++	++++++	++++	++++++++++++++++++++++	22,564	6,000.6
85.0		++++++++++++++++++	++++++++++++	++++	++++++++++++++++++	18,274	5,995.6
90.9		++++++++++++++++++	++++++++++++	+++++++++	.	0	5,989.7
96.0		++++++++++++++++++++	++++++++++++++++++++	++++++++++++++	++++++++++++++++++++++++	24,232	5,984.6
99.4		++++++++++++++++++++	++++++++++++++	.	++++++++++++++++	15,255	5,981.2
101.3		++++	.	.	++++++++	8,898	5,979.3
106.0		+	.	.	.	0	5,974.6
111.0		.	.	.	.	0	5,969.6
116.0		++++++++++++	+	.	.	0	5,964.6
121.1		.	.	.	.	0	5,959.5
126.0		++++++++++++	.	.	++	2,066	5,954.6
131.1		.	.	.	.	0	5,949.5
136.0		.	.	.	.	0	5,944.6
141.0		.	.	.	.	0	5,939.6
146.0		++++++++++++++++++	++++++++++++++	++++++++++++++	+	1,271	5,934.6
151.0		++++++++++++++++	++++++	++++	+	1,271	5,929.6
156.0		.	.	.	.	0	5,924.6
161.0		++++++++++++++++	+++++++	.	.	953	5,919.6
166.0		++++++++++++++++++++	+++++++	++++	.	0	5,914.6
171.0		++++++++++	.	.	.	0	5,909.6
176.0		++++++++++	+	.	.	0	5,904.6
180.0		.	.	.	.	0	5,900.6

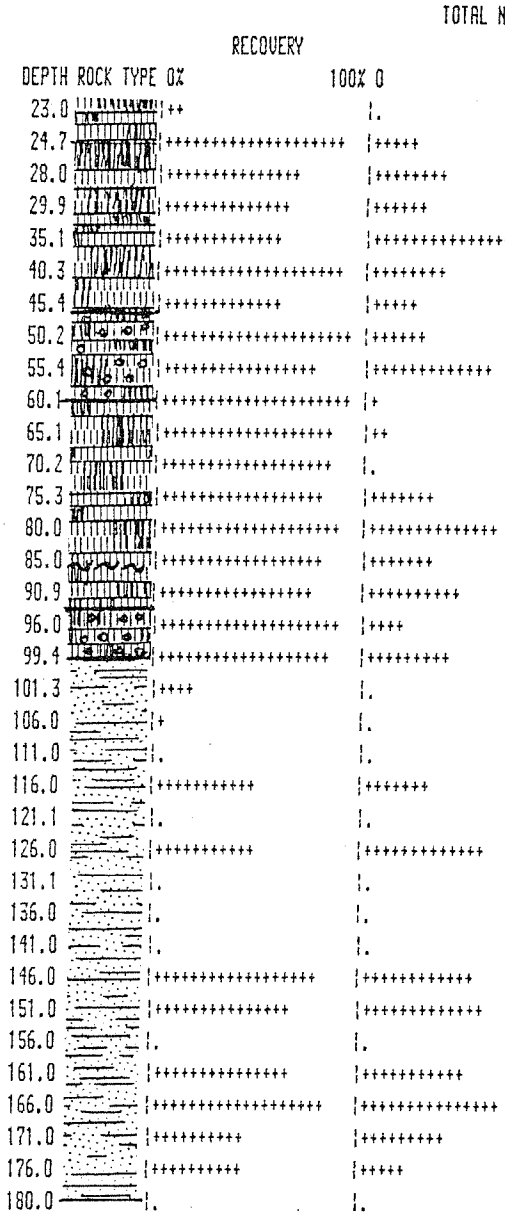
25-Jun-86

MINER FLAT DAM SITE: MF-124: FRACTURE LOG

DEPTH	ROCK TYPE	RECOVERY 0% 100%	NUMBER OF FRACTURES 90-70 0 10 20	70-50 0 10 20	50-30 0 10 20	30-0 0 10 20	ELEV. (feet)
23.0		++	.	.	.	.	6,057.6
24.7		++++++++++++++++++++	+++	.	++	.	6,055.9
28.0		++++++++++++++++	+++	.	.	+++++	6,052.6
29.9		++++++++++++++	+++	.	.	+++	6,050.7
35.1		++++++++++++++	++++++++++++	.	.	++++++	6,045.5
40.3		++++++++++++++++++++	++++	.	++	++	6,040.3
45.4		++++++++++++++	+++	.	++	.	6,035.2
50.2		++++++++++++++++++++	++++++	.	.	.	6,030.4
55.4		++++++++++++++++++	+++++	.	++++	++++	6,025.2
60.1		++++++++++++++++++++	.	+	.	.	6,020.5
65.1		++++++++++++++++++++	+	.	.	+	6,015.5
70.2		++++++++++++++++++++	.	.	.	.	6,010.4
75.3		++++++++++++++++++	+++	.	.	++++	6,005.3
80.0		++++++++++++++++++++	+++++	.	++++++	+++	6,000.6
85.0		++++++++++++++++++	++++++	.	.	+	5,995.6
90.9		++++++++++++++++++	++++++	.	.	++++	5,989.7
96.0		++++++++++++++++++++	++	.	.	++	5,984.6
99.4		++++++++++++++++++++	+++++	++	.	++	5,981.2
101.3		++++	.	.	.	.	5,979.3
106.0		+	.	.	.	.	5,974.6
111.0		.	.	.	.	.	5,969.6
116.0		++++++++++	++++	.	+++	.	5,964.6
121.1		.	.	.	.	.	5,959.5
126.0		++++++++++	++++++++	.	+++	++	5,954.6
131.1		.	.	.	.	.	5,949.5
136.0		.	.	.	.	.	5,944.6
141.0		.	.	.	.	.	5,939.6
146.0		++++++++++++++++++	++++++	.	++++++	.	5,934.6
151.0		++++++++++++++++	+++++++	.	+++++	+	5,929.6
156.0		.	.	.	.	.	5,924.6
161.0		++++++++++++++++	+++++++	.	++	++	5,919.6
166.0		++++++++++++++++++++	+++++	.	++++++	++++	5,914.6
171.0		++++++++++	++++	++	+++	.	5,909.6
176.0		++++++++++	++	.	+++	.	5,904.6
180.0		.	.	.	.	.	5,900.6

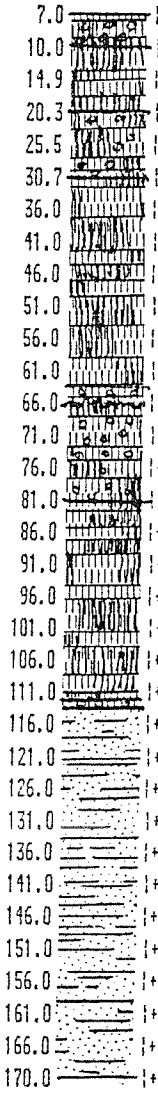
25-Jun-86

MINER FLAT DAM SITE: MF-124: FRACTURES and HYDRAULIC CONDUCTIVITY



HYDRAULIC CONDUCTIVITY 40 (cm/sec)		ELEV. (feet)
		NA 6,057.6
		NA 6,055.9
		NA 6,052.6
		NA 6,050.7
		NA 6,045.5
		NA 6,040.3
		NA 6,035.2
		NA 6,030.4
		NA 6,025.2
		NA 6,020.5
		NA 6,015.5
		NA 6,010.4
		NA 6,005.3
1.82E-04	++++++++++++++++++++++++++	6,000.6
1.82E-04	++++++++++++++++++++++++++	5,995.6
1.82E-04	++++++++++++++++++++++++++	5,989.7
		NA 5,984.6
1.72E-03	++++++++++++++++++++++++++++++++++++	5,981.2
1.72E-03	++++++++++++++++++++++++++++++++++++	5,979.3
1.72E-03	++++++++++++++++++++++++++++++++++++	5,974.6
1.72E-03	++++++++++++++++++++++++++++++++++++	5,969.6
1.72E-03	++++++++++++++++++++++++++++++++++++	5,964.6
		NA 5,959.5
		NA 5,954.6
		NA 5,949.5
		NA 5,944.6
		NA 5,939.6
		NA 5,934.6
		NA 5,929.6
		NA 5,924.6
		NA 5,919.6
		NA 5,914.6
		NA 5,909.6
		NA 5,904.6
		NA 5,900.6

MINER FLAT DAM SITE: MF-125A: ENGINEERING GEOLOGIC LOG



DEPTH	ROCK TYPE	RECOVERY 0% 100%	RQD 0% 100%	SCR 0% 100%	STRENGTH 0 40,000 psi		ELEV. (feet)
7.0						0	6,058.0
10.0						9,216	6,055.0
14.9						20,022	6,050.1
20.3						21,452	6,044.7
25.5						14,937	6,039.5
30.7						17,479	6,034.3
36.0						22,246	6,029.0
41.0						21,293	6,024.0
46.0						20,975	6,019.0
51.0						26,219	6,014.0
56.0						24,471	6,009.0
61.0						25,742	6,004.0
66.0						25,265	5,999.0
71.0						19,068	5,994.0
76.0						10,329	5,989.0
81.0						12,712	5,984.0
86.0						20,657	5,979.0
91.0						20,339	5,974.0
96.0						19,068	5,969.0
101.0						15,890	5,964.0
106.0						17,479	5,959.0
111.0						18,750	5,954.0
116.0						20,975	5,949.0
121.0						1,827	5,944.0
126.0						0	5,939.0
131.0						0	5,934.0
136.0						0	5,929.0
141.0						1,748	5,924.0
146.0						0	5,919.0
151.0						0	5,914.0
156.0						0	5,909.0
161.0						0	5,904.0
166.0						0	5,899.0
170.0						0	5,895.0

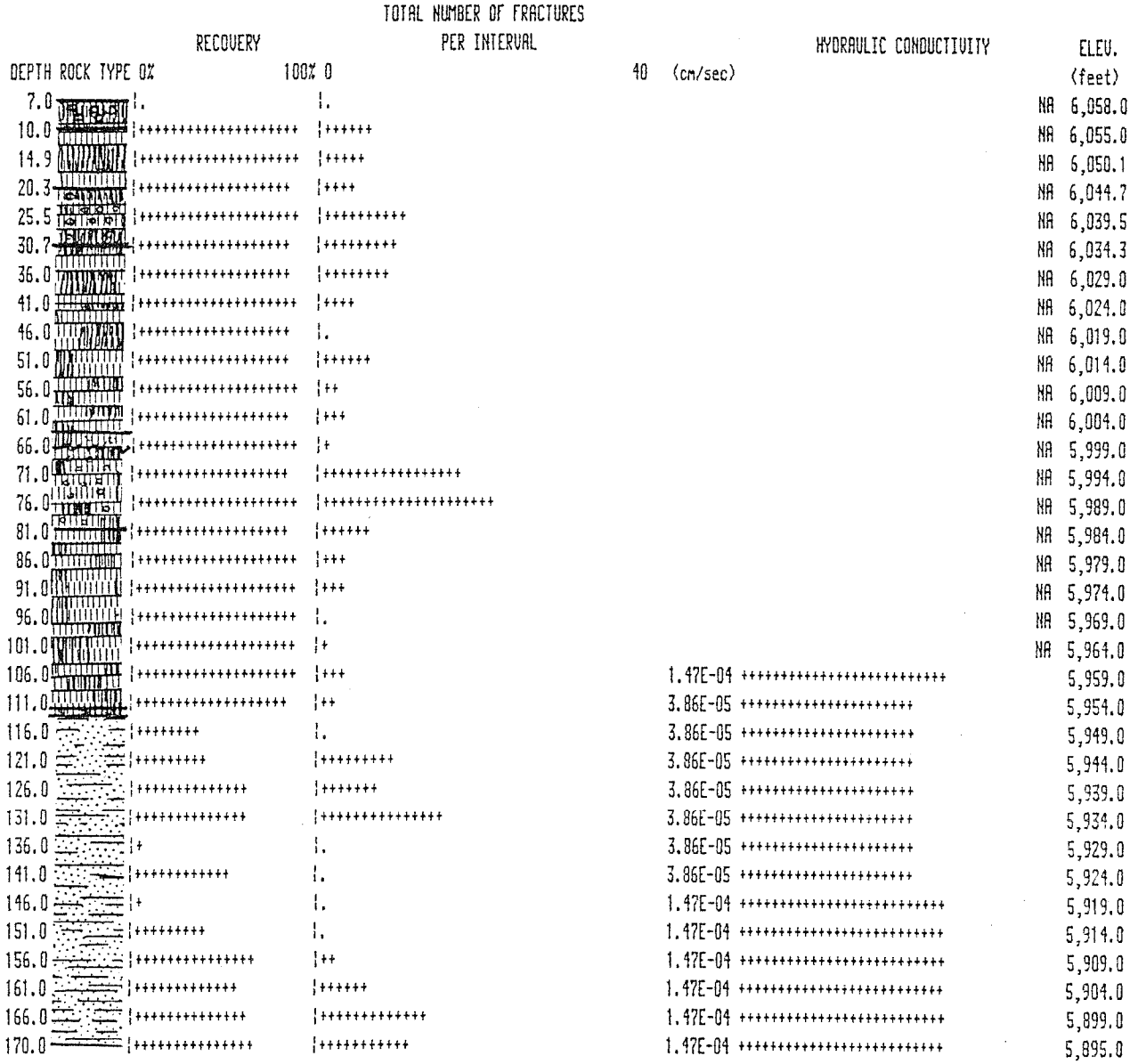
25-Jun-86

MINER FLAT DAM SITE: MF-125A: FRACTURE LOG

DEPTH	RECOVERY 0% 100%	NUMBER OF FRACTURES 90-70 0 10 20	70-50 0 10 20	50-30 0 10 20	30-0 0 10 20	ELEV. (feet)
7.0						6,058.0
10.0						6,055.0
14.9						6,050.1
20.3						6,044.7
25.5						6,039.5
30.7						6,034.3
36.0						6,029.0
41.0						6,024.0
46.0						6,019.0
51.0						6,014.0
56.0						6,009.0
61.0						6,004.0
66.0						5,999.0
71.0						5,994.0
76.0						5,989.0
81.0						5,984.0
86.0						5,979.0
91.0						5,974.0
96.0						5,969.0
101.0						5,964.0
106.0						5,959.0
111.0						5,954.0
116.0						5,949.0
121.0						5,944.0
126.0						5,939.0
131.0						5,934.0
136.0						5,929.0
141.0						5,924.0
146.0						5,919.0
151.0						5,914.0
156.0						5,909.0
161.0						5,904.0
166.0						5,899.0
170.0						5,895.0

25-Jun-86

MINER FLAT DAM SITE: MF-125A: FRACTURES and HYDRAULIC CONDUCTIVITY



APPENDIX D

Basic Data, Packer Tests

MINER FLAT DAM SITE: HYDRAULIC CONDUCTIVITIES: BOREHOLE MF-102

BOREHOLE:	TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
MF-102	22.0	41.8	4.3	165.3	-77.9	22-Jan-86

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
20	17.500	17.400	17.333	17.425	17.500	NA	NA	NA	17.43	22.6	2.14E-03	ROCK TYPE:
25	19.300	19.250	19.200	19.200	19.260	NA	NA	NA	19.24	21.6	2.47E-03	BASALT
30	20.700	20.650	20.733	20.625	20.600	20.650	20.613	20.625	20.65	22.6	2.53E-03	
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	35.5	NA	
										AVERAGE	2.37E-03	(cm/sec)

	TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
	40.9	51.0	4.3	165.3	-77.9	23-Jan-86

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
32	0.850	0.950	0.950	0.975	0.933	0.980	NA	NA	0.94	123.0	2.12E-05	ROCK TYPE:
48	3.450	3.500	3.617	3.763	3.880	4.398	4.833	5.475	4.11	156.6	7.27E-05	BASALT
24	4.300	4.300	4.333	4.250	4.240	4.040	4.000	NA	4.21	101.0	1.15E-04	
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	49.2	NA	
										AVERAGE	5.62E-05	(cm/sec)

	TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
	59.1	81.0	4.3	165.3	-77.9	23-Jan-86

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
22	3.500	3.318	3.258	3.288	3.240	3.140	NA	NA	3.29	121.3	7.51E-05	ROCK TYPE:
44	7.200	7.100	7.067	5.300	7.060	7.120	NA	NA	6.81	165.0	1.14E-04	BASALT
66	11.600	11.600	11.400	11.400	11.360	11.320	11.280	11.200	11.40	199.5	1.58E-04	
33	9.000	8.600	8.367	8.250	8.180	8.080	NA	NA	8.41	134.8	1.73E-04	
										AVERAGE	1.24E-04	(cm/sec)

	TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
	81.5	101.0	4.3	165.3	-77.9	24-Jan-86

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
26	8.900	8.750	8.633	8.537	8.520	8.490	NA	NA	8.64	138.6	1.73E-04	ROCK TYPE:
52	18.200	18.150	18.133	18.100	18.120	18.150	18.160	18.240	18.16	149.7	3.36E-04	BASALT
43	16.700	16.700	16.667	16.625	16.700	16.600	16.600	16.610	16.65	138.8	3.32E-04	
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	93.5	NA	
										AVERAGE	2.68E-04	(cm/sec)

MINER FLAT DAM SITE: HYDRAULIC CONDUCTIVITIES: BOREHOLE MF-102

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
81.3	121.0	4.3	165.3	-77.9	24-Jan-86

PRESSURE (psi)	TIME (min) 1	2	3	4	5	10	15	20	AVERAGE FLOW (gpm)	HEAD (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	
30	11.500	11.650	11.667	11.575	11.260	11.250	NA	NA	11.48	146.3	2.17E-04	ROCK TYPE:
60	20.500	20.400	20.400	20.400	20.400	20.380	20.367	20.380	20.40	161.5	3.50E-04	BASALT
45	18.200	18.200	18.167	18.125	18.140	18.100	18.047	18.000	18.12	143.4	3.50E-04	
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	103.2	NA	
											AVERAGE	
											2.98E-04	(cm/sec)

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
121.2	139.8	4.3	165.3	-77.9	24-Jan-86

PRESSURE (psi)	TIME (min) 1	2	3	4	5	10	15	20	AVERAGE FLOW (gpm)	HEAD (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	
30	2.700	2.650	2.667	2.663	2.670	2.670	NA	NA	2.67	199.7	3.70E-05	ROCK TYPE:
40	18.800	18.500	18.333	18.350	18.320	18.100	17.867	17.750	18.25	159.7	3.17E-04	BASALT
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	131.9	NA	
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	131.9	NA	
											AVERAGE	
											1.08E-04	(cm/sec)

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
141.5	160.3	4.3	165.3	-77.9	25-Jan-86

PRESSURE (psi)	TIME (min) 1	2	3	4	5	10	15	20	AVERAGE FLOW (gpm)	HEAD (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	
90	0.100	0.125	0.125	0.113	0.120	0.100	0.103	0.090	0.11	359.7	8.43E-07	ROCK TYPE:
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	151.8	NA	BASALT
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	151.8	NA	
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	151.8	NA	
											AVERAGE	
											8.43E-07	(cm/sec)

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
140.7	180.7	4.3	165.3	-77.9	25-Jan-86

PRESSURE (psi)	TIME (min) 1	2	3	4	5	10	15	20	AVERAGE FLOW (gpm)	HEAD (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	
30	1.250	1.200	1.183	1.169	1.140	1.165	NA	NA	1.18	230.4	1.42E-05	ROCK TYPE:
60	2.500	2.475	2.467	2.450	2.430	2.390	NA	NA	2.45	298.7	2.27E-05	BASALT
90	3.450	3.400	3.433	3.475	3.500	3.530	3.500	3.460	3.47	366.8	2.62E-05	
45	2.600	2.900	2.750	2.688	2.670	2.615	NA	NA	2.70	263.8	2.84E-05	
											AVERAGE	
											2.21E-05	(cm/sec)

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
181.5	220.4	4.3	165.3	-77.9	25-Jan-86

PRESSURE (psi)	TIME (min) 1	2	3	4	5	10	15	20	AVERAGE FLOW (gpm)	HEAD (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	
30	6.500	6.400	6.200	6.150	6.140	6.080	NA	NA	6.25	262.1	6.60E-05	ROCK TYPE:
60	8.400	8.300	8.300	8.275	8.280	8.280	NA	NA	8.31	325.5	7.06E-05	BASALT
90	10.300	10.150	10.133	10.125	10.100	9.980	9.887	9.835	10.06	388.5	7.17E-05	
45	7.400	7.350	7.333	7.400	7.450	7.340	NA	NA	7.38	293.7	6.96E-05	
											AVERAGE	
											6.94E-05	(cm/sec)

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
211.7	237.7	4.3	165.3	-77.9	26-Jan-86

PRESSURE (psi)	TIME (min) 1	2	3	4	5	10	15	20	AVERAGE FLOW (gpm)	HEAD (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	
30	6.000	6.150	6.333	6.450	6.520	6.740	NA	NA	6.37	227.0	7.77E-05	ROCK TYPE:
60	16.000	16.200	16.233	16.250	16.200	16.500	16.687	16.825	16.36	252.3	1.80E-04	COLLUVIUM
80	20.000	20.350	20.333	20.250	20.260	20.270	NA	NA	20.24	271.6	2.06E-04	
45	16.500	16.350	16.267	16.250	16.260	16.200	NA	NA	16.30	218.0	2.07E-04	
											AVERAGE	
											1.56E-04	(cm/sec)

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
212.8	263.9	4.3	165.3	-77.9	27-Jan-86

PRESSURE (psi)	TIME (min) 1	2	3	4	5	10	15	20	AVERAGE FLOW (gpm)	HEAD (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	
20	29.000	29.000	29.000	29.000	29.000	NA	NA	NA	29.00	52.6	1.53E-03	ROCK TYPE:
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	165.9	NA	COLLUVIUM
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	165.9	NA	
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	165.9	NA	
											AVERAGE	
											1.53E-03	(cm/sec)

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
260.5	281.0	4.3	165.3	-77.9	27-Jan-86

PRESSURE (psi)	TIME (min) 1	2	3	4	5	10	15	20	AVERAGE FLOW (gpm)	HEAD (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	
15.7	19.100	19.200	19.300	19.300	19.200	18.900	18.800	18.700	19.06	131.8	4.00E-04	ROCK TYPE:
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	165.9	NA	SANDSTONE
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	165.9	NA	
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	165.9	NA	
											AVERAGE	
											4.00E-04	(cm/sec)

MINER FLAT DAM SITE: HYDRAULIC CONDUCTIVITIES: BOREHOLE MF-102

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
291.5	311.0	4.3	165.3	-77.9	28-Jan-86

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
30	18.500	18.150	18.100	18.075	18.060	NA	NA	NA	18.18	171.1	2.94E-04	ROCK TYPE:
30	20.400	20.600	20.433	20.300	20.400	26.350	NA	NA	21.41	146.9	4.03E-04	SANDSTONE
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	165.9	NA	
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	165.9	NA	
										AVERAGE		
										3.44E-04	(cm/sec)	

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
311.3	331.0	4.3	165.3	-77.9	29-Jan-86

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
30	1.300	1.375	1.433	1.450	1.440	1.405	NA	NA	1.40	234.8	1.65E-05	ROCK TYPE:
60	NA	NA	NA	NA	NA	NA	NA	NA	NA	304.5	NA	GYPSUM/
90	2.200	2.188	2.125	2.112	2.090	1.985	1.957	1.940	2.07	372.9	1.54E-05	SANDSTONE
45	1.275	1.275	1.217	1.175	1.160	1.165	NA	NA	1.21	269.6	1.24E-05	
										AVERAGE		
										1.47E-05	(cm/sec)	

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
321.6	375.0	4.3	165.3	-77.9	29-Jan-86

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
30	0.800	0.775	0.767	0.756	0.780	0.805	NA	NA	0.78	235.1	9.19E-06	ROCK TYPE:
60	1.350	1.350	1.333	1.325	1.290	1.180	NA	NA	1.30	304.2	1.19E-05	GYPSUM/
90	1.500	1.500	1.483	1.475	1.470	1.445	1.400	1.370	1.46	373.4	1.08E-05	SANDSTONE
45	0.400	0.400	0.435	0.462	0.480	0.550	NA	NA	0.45	269.8	4.66E-06	
										AVERAGE		
										8.61E-06	(cm/sec)	

BOREHOLE:	TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
105	17.2	40.0	4.2	158.0	-72.1	08-Dec-85

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
15	0.650	0.650	0.633	0.625	0.620	0.610	NA	NA	0.63	66.0	2.35E-05	ROCK TYPE:
20	1.050	1.050	1.050	1.050	1.050	1.045	NA	NA	1.05	77.4	3.35E-05	BASALT
30	2.400	2.325	2.300	2.300	2.280	2.350	2.230	2.220	2.30	99.6	5.71E-05	
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	31.4	NA	
											AVERAGE	
											3.56E-05	(cm/sec)

	TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
	39.3	59.5	4.2	158.0	-72.1	08-Dec-85

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
15	0.400	0.375	0.383	0.363	0.360	0.345	NA	NA	0.37	85.8	1.05E-05	ROCK TYPE:
30	1.050	0.988	1.033	1.025	1.020	1.025	NA	NA	1.02	120.3	2.09E-05	BASALT
45	2.050	2.050	2.067	2.050	2.060	2.010	2.037	1.975	2.04	154.3	3.26E-05	
22	1.100	1.125	1.133	1.125	1.120	1.085	NA	NA	1.12	101.8	2.71E-05	
											AVERAGE	
											2.10E-05	(cm/sec)

	TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
	59.5	85.00	5.00	158.0	-72.1	13-Dec-85

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
25	4.200	4.150	4.167	4.175	4.180	4.160	NA	NA	4.17	127.9	8.05E-05	ROCK TYPE:
50	7.500	7.500	7.467	7.450	7.400	7.350	NA	NA	7.43	178.1	1.03E-04	BASALT
75	10.867	10.800	10.767	10.775	10.760	10.750	10.747	10.750	10.78	223.9	1.19E-04	
37	7.700	7.700	7.667	7.650	7.620	7.570	NA	NA	7.64	147.4	1.28E-04	
											AVERAGE	
											1.06E-04	(cm/sec)

	TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
	90.8	102.80	5.00	158.0	-72.1	13-Dec-85

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
30	18.000	18.250	17.900	17.750	17.700	17.895	NA	NA	17.90	104.2	4.24E-04	ROCK TYPE:
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.1	NA	BASALT
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.1	NA	
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.1	NA	
											AVERAGE	
											4.24E-04	(cm/sec)

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
159.5	183.5	5.0	160.6	-72.1	16-Dec-85

PRESSURE (psi)	TIME (min) 1	2	3	4	5	10	15	20	AVERAGE FLOW (gpm)	HEAD (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	
30	19.700	19.500	19.567	19.650	19.760	10.66	NA	NA	17.83	175.8	2.51E-04	ROCK TYPE:
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	168.2	NA	BASALT
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	168.2	NA	
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	168.2	NA	
										AVERAGE		
										2.51E-04	(cm/sec)	

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
179.5	203.5	5.0	158.0	-72.1	18-Dec-85

PRESSURE (psi)	TIME (min) 1	2	3	4	5	10	15	20	AVERAGE FLOW (gpm)	HEAD (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	
30	6.800	6.650	6.667	6.381	6.760	6.930	NA	NA	6.70	247.4	6.69E-05	ROCK TYPE:
50	12.500	12.500	12.533	12.500	12.560	NA	NA	NA	12.52	271.8	1.14E-04	BASALT
25	9.700	9.750	9.71	9.725	9.700	9.690	9.700	9.715	9.71	226.1	1.06E-04	
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	187.2	NA	
										AVERAGE		
										9.32E-05	(cm/sec)	

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
201.5	229.1	5.0	158.0	-72.1	18-Dec-85

PRESSURE (psi)	TIME (min) 1	2	3	4	5	10	15	20	AVERAGE FLOW (gpm)	HEAD (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	
30	6.400	6.350	6.400	6.381	6.420	6.570	NA	NA	6.42	270.8	5.86E-05	ROCK TYPE:
45	12.500	12.350	12.433	12.375	12.420	12.440	NA	NA	12.42	283.3	1.08E-04	BASALT
60	13.917	16.750	16.667	16.700	16.900	16.750	NA	NA	16.28	296.8	1.36E-04	
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	209.9	NA	
										AVERAGE		
										9.51E-05	(cm/sec)	

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
221.5	249.4	5.0	158.0	-72.1	18-Dec-85

PRESSURE (psi)	TIME (min) 1	2	3	4	5	10	15	20	AVERAGE FLOW (gpm)	HEAD (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	
30	0.250	0.250	0.225	0.225	0.230	0.230	NA	NA	0.24	298.3	1.95E-06	ROCK TYPE:
60	0.275	0.237	0.217	0.188	0.155	0.080	NA	NA	0.19	367.6	1.29E-06	BASALT
90	0.062	0.063	NA	0.088	0.090	NA	0.037	0.040	0.06	437.0	3.57E-07	
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	229.1	NA	
										AVERAGE		
										9.65E-07	(cm/sec)	

MINER FLAT DAM SITE: HYDRAULIC CONDUCTIVITIES: BOREHOLE MF-105

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
222.0	280.0	5.0	158.0	-72.1	18-Dec-85

PRESSURE (psi)	TIME (min) 1	2	3	4	5	10	15	20	AVERAGE FLOW (gpm)	HEAD (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	
30	0.750	0.875	0.950	0.988	1.010	1.055	NA	NA	0.94	313.0	7.41E-06	ROCK TYPE:
60	1.350	1.350	1.333	1.300	1.280	1.255	NA	NA	1.31	382.1	8.48E-06	BASALT
90	1.600	1.600	1.617	1.625	1.630	1.645	1.650	1.653	1.63	451.2	8.91E-06	
45	1.250	1.275	1.283	1.275	1.260	NA	NA	NA	1.27	347.4	9.02E-06	
											AVERAGE	
											8.43E-06	(cm/sec)

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
278.6	300.0	5.0	158.0	-72.1	07-Jan-86

PRESSURE (psi)	TIME (min) 1	2	3	4	5	10	15	20	AVERAGE FLOW (gpm)	HEAD (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	
30	4.600	4.600	4.700	4.800	5.680	7.450	NA	NA	5.31	218.9	5.99E-05	ROCK TYPE:
60	14.600	14.700	14.733	14.925	15.040	15.360	NA	NA	14.89	250.5	1.47E-04	GRAVEL
90	19.800	19.650	19.700	19.675	19.545	17.600	19.320	19.005	19.53	289.5	1.67E-04	
45	0.833	0.727	13.600	13.650	13.600	13.520	NA	13.450	8.48	244.8	8.56E-05	
											AVERAGE	
											1.06E-04	(cm/sec)

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
305.0	320.0	5.0	158.0	-72.1	07-Jan-86

PRESSURE (psi)	TIME (min) 1	2	3	4	5	10	15	20	AVERAGE FLOW (gpm)	HEAD (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	
90	0.200	0.200	0.200	0.175	0.180	0.175	0.167	0.168	0.18	363.2	1.25E-06	ROCK TYPE:
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	155.4	NA	SANDSTONE
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	155.4	NA	
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	155.4	NA	
											AVERAGE	
											1.25E-06	(cm/sec)

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
306.5	340.0	5.0	158.0	-72.1	07-Jan-86

PRESSURE (psi)	TIME (min) 1	2	3	4	5	10	15	20	AVERAGE FLOW (gpm)	HEAD (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	
60	0.525	0.525	0.542	0.550	0.540	0.510	NA	NA	0.53	293.9	4.47E-06	ROCK TYPE:
90	0.675	0.638	0.633	0.625	0.630	0.595	0.575	0.565	0.62	363.2	4.20E-06	SANDSTONE
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	155.4	NA	
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	155.4	NA	
											AVERAGE	
											4.33E-06	(cm/sec)

MINER FLAT DAM SITE: HYDRAULIC CONDUCTIVITIES: BOREHOLE MF-105

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
306.4	370.0	5.0	158.0	-72.1	08-Jan-86

PRESSURE (psi)	TIME (min) 1	2	3	4	5	10	15	20	AVERAGE FLOW (gpm)	HEAD (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	
30	1.000	0.950	0.850	0.713	0.680	0.530	NA	NA	0.79	224.5	8.66E-06	ROCK TYPE:
60	0.700	0.545	0.658	0.650	0.640	0.610	NA	NA	0.63	293.9	5.33E-06	SANDSTONE
90	0.800	0.775	0.767	0.763	0.770	0.760	0.74	0.728	0.76	363.1	5.19E-06	
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	155.4	NA	
											AVERAGE	
											6.21E-06	(cm/sec)

BOREHOLE:	TOP	BOTTOM	GAUGE HT.		H2O LEVEL	INCLIN.	DATE
MF-106	16.4	39.2	4.2		148.4	-89.35	19-Nov-85

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
12	0.50	0.45	0.33	0.35	0.34	0.32	0.31	NA	0.37	59.7	1.54E-05	ROCK TYPE:
20	0.80	0.75	0.67	0.65	0.60	0.54	NA	NA	0.67	78.1	2.11E-05	BASALT
30	2.00	1.50	1.60	1.38	1.30	1.21	1.18	1.17	1.42	100.9	3.47E-05	
15	0.60	0.53	0.50	0.48	0.46	0.44	NA	NA	0.50	66.6	1.86E-05	
											AVERAGE	
											2.14E-05	(cm/sec)

	TOP	BOTTOM	GAUGE HT.		H2O LEVEL	INCLIN.	DATE
	37.6	59.4	4.2		148.4	-89.35	19-Nov-85

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
15	NA	NA	NA	NA	NA	NA	NA	NA	NA	87.3	NA	ROCK TYPE:
30	0.00	0.03	0.03	0.03	0.04	NA	NA	NA	0.02	122.0	4.46E-07	BASALT
50	0.38	0.34	0.33	0.31	0.30	0.29	NA	NA	0.32	168.2	4.77E-06	
25	0.10	0.10	0.10	0.10	0.09	0.08	NA	NA	0.09	110.4	2.09E-06	
											AVERAGE	
											1.64E-06	(cm/sec)

	TOP	BOTTOM	GAUGE HT.		H2O LEVEL	INCLIN.	DATE
	58.7	79.4	4.2		148.4	-89.35	20-Nov-85

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
25	0.00	NA	NA	NA	NA	NA	NA	NA	NA	131.0	NA	ROCK TYPE:
50	0.85	0.83	0.80	NA	0.78	0.77	NA	NA	NA	188.7	NA	BASALT
75	1.75	1.59	1.52	1.49	1.47	1.42	1.42	1.42	1.51	246.0	1.51E-05	
37	1.15	0.90	0.83	0.80	0.78	0.75	NA	NA	0.87	158.5	1.35E-05	
											AVERAGE	
											1.43E-05	(cm/sec)

	TOP	BOTTOM	GAUGE HT.		H2O LEVEL	INCLIN.	DATE
	78.7	100.0	4.2		148.4	-89.4	20-Nov-85

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
30	0.77	0.73	0.67	0.64	0.61	0.58	NA	NA	0.66	162.7	1.01E-05	ROCK TYPE:
60	4.50	4.00	3.83	3.73	3.66	3.51	NA	NA	3.94	228.9	4.26E-05	BASALT
90	14.80	14.75	15.33	16.13	16.40	17.09	17.20	NA	15.96	251.7	1.57E-04	
45	11.00	11.60	11.50	11.42	11.40	11.25	NA	NA	11.36	171.9	1.63E-04	
											AVERAGE	
											5.76E-05	(cm/sec)

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
127.3	140.0	4.2	148.4	-89.35	21-Nov-85

PRESSURE (psi)	TIME (min) 1	2	3	4	5	10	15	20	AVERAGE FLOW (gpm)	HEAD (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	
33	0.65	0.65	0.58	0.61	0.61	0.58	NA	NA	0.61	214.0	7.09E-06	ROCK TYPE:
66	2.60	3.45	4.37	5.25	6.08	NA	NA	NA	4.35	286.4	3.75E-05	BASALT
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	137.8	NA	
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	137.8	NA	
											AVERAGE	
											1.63E-05	(cm/sec)

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
150.7	160.0	4.2	148.4	-89.35	21-Nov-85

PRESSURE (psi)	TIME (min) 1	2	3	4	5	10	15	20	AVERAGE FLOW (gpm)	HEAD (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	
30	0.17	0.18	0.15	0.14	0.13	0.14	NA	NA	0.15	228.8	1.62E-06	ROCK TYPE:
60	0.35	0.36	0.37	0.36	0.36	0.36	NA	NA	0.36	298.1	2.98E-06	BASALT
90	1.15	1.13	1.10	1.10	1.11	1.11	1.11	1.12	1.11	367.2	7.50E-06	
45	0.85	0.83	0.82	0.81	0.80	NA	NA	NA	0.82	263.3	7.70E-06	
											AVERAGE	
											4.09E-06	(cm/sec)

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
159.6	180.0	4.2	148.4	-89.35	24-Nov-85

PRESSURE (psi)	TIME (min) 1	2	3	4	5	10	15	20	AVERAGE FLOW (gpm)	HEAD (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	
30	1.00	1.08	1.08	1.10	1.10	1.12	NA	NA	1.08	243.0	1.10E-05	ROCK TYPE:
60	2.80	2.80	2.83	2.85	2.85	2.88	NA	NA	2.84	310.9	2.25E-05	BASALT
90	8.90	9.10	9.30	9.45	9.60	10.03	10.33	10.57	9.66	363.2	6.57E-05	
45	7.30	7.20	7.20	7.20	7.20	NA	NA	NA	7.22	267.4	6.67E-05	
											AVERAGE	
											3.23E-05	(cm/sec)

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
179.3	200.0	4.2	148.4	-89.35	24-Nov-85

PRESSURE (psi)	TIME (min) 1	2	3	4	5	10	15	20	AVERAGE FLOW (gpm)	HEAD (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	
30	2.20	2.10	2.10	2.08	2.06	2.01	NA	NA	2.09	262.2	1.97E-05	ROCK TYPE:
60	5.00	5.00	5.00	5.00	5.00	4.98	NA	NA	5.00	327.3	3.77E-05	BASALT
90	10.00	10.00	10.00	10.00	10.12	10.36	9.81	10.57	10.11	381.3	6.55E-05	
45	7.00	7.00	7.00	7.05	7.04	7.02	NA	NA	7.02	287.8	6.03E-05	
											AVERAGE	
											4.14E-05	(cm/sec)

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN	DATE
198.9	220.0	4.2	148.4	-89.35	25-Nov-85

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
30	NA	NA	NA	NA	NA	NA	NA	NA	NA	282.9	NA	ROCK TYPE:
60	NA	NA	NA	NA	NA	NA	NA	NA	NA	352.2	NA	BASALT
90	0.20	0.18	0.16	0.16	0.16	0.13	0.12	0.11	0.15	421.5	8.91E-07	
45	NA	NA	NA	NA	NA	NA	NA	NA	NA	317.6	NA	
											AVERAGE	
											8.91E-07	(cm/sec)

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
216.7	260.0	4.2	148.4	-89.35	25-Nov-85

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
30	0.55	0.52	0.51	0.50	0.49	0.46	NA	NA	0.51	311.8	4.81E-06	ROCK TYPE:
60	0.60	0.65	0.63	0.63	0.63	0.61	NA	NA	0.62	381.0	4.05E-06	BASALT
90	0.88	0.88	0.87	0.88	0.86	0.85	0.84	0.84	0.86	450.3	4.72E-06	
45	0.50	0.45	0.50	0.49	0.48	0.47	NA	NA	0.48	346.4	3.44E-06	
											AVERAGE	
											4.03E-06	(cm/sec)

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
254.9	270.9	4.2	148.4	-89.35	02-Dec-85

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
30	0.95	0.98	1.02	1.04	1.05	1.06	NA	NA	1.01	221.7	1.13E-05	ROCK TYPE:
60	3.70	3.70	3.77	3.78	3.80	3.80	NA	NA	3.76	288.2	3.22E-05	GRAVEL
90	11.00	11.15	11.20	11.25	11.38	12.13	12.38	12.58	11.63	333.7	8.62E-05	
45	8.83	8.64	8.57	8.58	9.00	NA	NA	NA	8.72	241.2	8.94E-05	
											AVERAGE	
											4.09E-05	(cm/sec)

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
255.1	284.3	4.2	148.4	-89.35	02-Dec-85

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
30	12.31	12.50	12.53	12.47	12.48	11.60	NA	NA	12.32	191.9	1.59E-04	ROCK TYPE:
60	15.30	15.25	15.30	15.32	15.30	15.34	15.35	15.51	15.34	245.2	1.55E-04	GRAVEL
80	19.50	19.60	19.67	19.75	19.80	20.00	NA	NA	19.72	262.2	1.86E-04	
45	NA	NA	NA	NA	NA	NA	NA	NA	NA	256.5	NA	
											AVERAGE	
											1.66E-04	(cm/sec)

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN	DATE
306.5	317.0	4.2	148.4	-89.35	04-Dec-85

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
30	0.15	0.13	0.09	0.07	0.06	0.03	NA	NA	0.09	221.9	9.61E-07	ROCK TYPE:
60	NA	NA	0.01	0.01	0.02	NA	NA	NA	0.01	291.2	1.16E-07	SANDSTONE
90	NA	NA	NA	NA	NA	NA	NA	NA	NA	360.5	NA	
45	NA	NA	NA	NA	NA	NA	NA	NA	NA	256.5	NA	
										AVERAGE		
										3.33E-07	(cm/sec)	

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
305.8	335.8	4.2	148.4	-89.35	04-Dec-85

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
30	0.08	0.13	0.14	0.15	0.15	0.15	NA	NA	0.13	221.9	1.47E-06	ROCK TYPE:
60	0.40	0.26	0.18	0.20	0.18	0.17	NA	NA	0.23	291.2	1.96E-06	SANDSTONE
90	0.25	0.20	0.18	0.19	0.18	0.18	0.17	0.16	0.19	360.5	1.29E-06	
45	NA	NA	NA	NA	NA	NA	NA	NA	NA	256.5	NA	
										AVERAGE		
										1.55E-06	(cm/sec)	

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
307.5	355.0	4.2	148.4	-89.35	05-Dec-85

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
30	0.35	0.48	0.37	0.34	0.31	0.25	NA	NA	0.35	221.9	3.88E-06	ROCK TYPE:
60	0.30	0.23	0.22	0.21	0.21	0.19	NA	NA	0.22	291.2	1.91E-06	SANDSTONE
90	0.25	0.30	0.30	0.30	0.31	0.29	0.28	0.27	0.29	360.5	1.97E-06	
45	0.29	0.25	0.23	0.23	0.22	0.20	NA	NA	0.23	256.5	2.26E-06	
										AVERAGE		
										2.40E-06	(cm/sec)	

MINER FLAT DAM SITE: HYDRAULIC CONDUCTIVITIES: BOREHOLE MF-113

BOREHOLE:	TOP	BOTTOM	GAUGE HT.		H2O LEVEL	INCLIN.	DATE
MF-113	16.9	34.6	3.5		-4.5	-89.7	26-Feb-86

PRESSURE				TIME	(min)				AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
23	1.450	1.350	1.317	1.288	1.270	1.190	NA	NA	1.31	51.8	7.67E-05	ROCK TYPE:
46	3.050	2.900	2.817	2.788	2.770	2.690	NA	NA	2.84	103.6	8.29E-05	BASALT
70	7.400	7.400	7.433	7.525	7.600	7.980	8.400	8.615	7.79	148.4	1.59E-04	
35	4.600	4.600	4.567	4.550	4.560	4.520	NA	NA	4.57	75.5	1.83E-04	
										AVERAGE		
											1.17E-04	(cm/sec)

	TOP	BOTTOM	GAUGE HT.		H2O LEVEL	INCLIN.	DATE
	45.0	115.0	3.5		-4.5	-89.7	26-Feb-86

PRESSURE				TIME	(min)				AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
30	NA	NA	NA	NA	NA	NA	NA	NA	NA	152.8	NA	ROCK TYPE:
60	NA	NA	NA	NA	NA	NA	NA	NA	NA	222.1	NA	BASALT
90	NA	NA	NA	NA	NA	NA	NA	NA	0.01	291.4	5.20E-08	
45	NA	NA	NA	NA	NA	NA	NA	NA	NA	187.4	NA	
										AVERAGE		
										LESS THAN	5.20E-08	(cm/sec)

	TOP	BOTTOM	GAUGE HT.		H2O LEVEL	INCLIN.	DATE
	107.6	120.0	3.5		-4.5	-89.7	27-Feb-86

PRESSURE				TIME	(min)				AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
30	0.350	0.325	0.292	0.288	0.280	0.240	NA	NA	0.30	68.3	1.31E-05	ROCK TYPE:
60	0.700	0.650	0.633	0.625	0.600	0.545	NA	NA	0.63	137.5	1.38E-05	PALEO-
90	0.950	0.925	0.883	0.835	0.810	0.725	0.670	0.628	0.80	206.8	1.18E-05	ALLUVIUM
45	0.150	0.137	0.142	0.138	0.125	0.109	NA	NA	0.13	102.9	3.93E-06	
										AVERAGE		
											9.56E-06	(cm/sec)

	TOP	BOTTOM	GAUGE HT.		H2O LEVEL	INCLIN.	DATE
	108.2	140.0	3.5		-4.5	-89.7	27-Feb-86

PRESSURE				TIME	(min)				AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
30	9.400	9.050	8.900	8.700	8.540	8.080	NA	NA	8.78	52.8	5.03E-04	ROCK TYPE:
60	12.700	12.700	12.533	12.450	12.300	11.740	NA	NA	12.40	107.2	3.50E-04	PALEO-
90	16.600	16.250	16.267	16.250	16.320	16.000	15.720	15.500	16.11	156.2	3.12E-04	ALLUVIUM
45	8.600	8.500	8.400	8.350	8.300	8.140	NA	NA	8.38	88.8	2.86E-04	
										AVERAGE		
											3.54E-04	(cm/sec)

MINER FLAT DAM SITE: HYDRAULIC CONDUCTIVITIES: BOREHOLE MF-117

BOREHOLE:	TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
MF-117	8.0	28.0	-1.0	35	-26	08-Mar-86

PRESSURE	TIME (min)								AVERAGE		HYDRAULIC	
(psi)	1	2	3	4	5	10	15	20	FLOW (gpm)	HEAD (feet)	CONDUCTIVITY (cm/sec)	
40	0.550	0.550	0.533	0.525	0.520	0.505	NA	NA	0.54	99.2	1.48E-05	ROCK TYPE:
60	2.600	3.425	3.767	4.025	4.168	4.574	NA	NA	3.60	142.8	6.92E-05	BASALT
90	12.300	13.150	13.767	14.325	14.800	16.430	NA	NA	13.67	178.0	2.11E-04	
50	12.800	12.750	12.767	12.750	12.740	12.590	NA	NA	12.76	90.2	3.88E-04	
											AVERAGE	
											9.57E-05	(cm/sec)

	TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
	33.0	58.2	-1.0	-39.9075	-26	09-Mar-86

PRESSURE	TIME (min)								AVERAGE		HYDRAULIC	
(psi)	1	2	3	4	5	10	15	20	FLOW (gpm)	HEAD (feet)	CONDUCTIVITY (cm/sec)	
30	1.600	1.550	1.517	1.488	1.450	1.370	NA	NA	1.50	50.3	8.16E-05	ROCK TYPE:
60	3.250	3.150	3.100	3.048	3.020	2.960	NA	NA	3.09	118.1	7.18E-05	BASALT
90	5.000	4.950	4.950	4.975	4.980	4.960	4.920	4.910	4.96	184.3	7.38E-05	
45	2.200	2.200	2.200	2.212	2.220	2.230	NA	NA	2.21	84.4	7.19E-05	
											AVERAGE	
											7.47E-05	(cm/sec)

	TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
	34.4	105.0	-1.0	-39.9075	-26	09-Mar-86

PRESSURE	TIME (min)								AVERAGE		HYDRAULIC	
(psi)	1	2	3	4	5	10	15	20	FLOW (gpm)	HEAD (feet)	CONDUCTIVITY (cm/sec)	
30	2.450	2.400	2.367	2.338	2.320	2.270	NA	NA	2.36	49.6	1.30E-04	ROCK TYPE:
60	4.800	4.700	4.667	4.675	4.680	4.600	NA	NA	4.69	115.6	1.11E-04	BASALT
90	7.050	7.000	6.967	6.950	6.920	6.840	6.827	6.770	6.92	179.7	1.06E-04	
45	3.500	3.425	3.400	3.413	3.420	3.445	NA	NA	3.43	83.0	1.14E-04	
											AVERAGE	
											1.15E-04	(cm/sec)

27-Jun-86 MINER FLAT DAM SITE: HYDRAULIC CONDUCTIVITIES: BOREHOLE MF-118

BOREHOLE:	TOP	BOTTOM	GAUGE HT.		H2O LEVEL	INCLIN.	DATE
MF-118	266.0	324.2	5.0		138.4	-89.5	15-Jan-86

PRESSURE (psi)	TIME (min) 1	2	3	4	5	10	15	20	AVERAGE FLOW (gpm)	HEAD (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	
28	12.400	12.550	12.657	12.625	12.680	NA	NA	NA	12.63	176.6	8.17E-05	ROCK TYPE:
50	18.500	18.850	19.100	19.250	19.360	19.650	NA	NA	19.24	187.2	1.17E-04	GRAVEL
40	19.000	19.000	19.333	19.500	19.600	NA	NA	NA	19.29	163.8	1.34E-04	
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	143.4	NA	
											AVERAGE	
											1.09E-04	(cm/sec)

27-Jun-86 MINER FLAT DAM SITE: HYDRAULIC CONDUCTIVITIES: BOREHOLE MF-119

BOREHOLE:	TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
MF-119	206.7	300.0	3.5	155.1	-89.9	15-Jan-86

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
30	NA	NA	NA	NA	NA	0.010	NA	NA	0.01	227.9	3.37E-08	ROCK TYPE:
63	6.100	5.875	5.714	5.663	5.580	5.380	NA	NA	5.72	297.4	1.47E-05	PALEO-
92	11.900	12.143	12.233	12.325	12.400	12.810	13.120	13.275	12.53	340.1	2.83E-05	COLLUVIUM/
50	7.500	7.400	7.417	7.425	7.380	7.330	NA	NA	7.41	263.0	2.16E-05	SANDSTONE
											AVERAGE	
											2.08E-05	(cm/sec)

MINER FLAT DAM SITE: HYDRAULIC CONDUCTIVITIES: BOREHOLE MF-121

BOREHOLE:	TOP	BOTTOM	GAUGE HT.		H2O LEVEL	INCLIN.	DATE
MF-121	64.0	70.0	4.6		168.2	-89.8	23-Feb-86

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
20	17.500	17.500	17.533	17.600	17.600	17.860	NA	NA	17.60	45.7	2.69E-03	ROCK TYPE:
40	22.000	21.500	21.667	21.750	21.800	21.700	NA	NA	21.74	53.4	2.84E-03	PALEO-
60	26.000	26.500	26.333	26.500	26.400	26.500	26.467	26.450	26.39	48.2	3.82E-03	COLLUVIUM
30	21.000	21.000	21.000	21.250	21.200	21.100	NA	NA	21.09	36.7	4.01E-03	
											AVERAGE	
											3.29E-03	(cm/sec)

	TOP	BOTTOM	GAUGE HT.		H2O LEVEL	INCLIN.	DATE
	71.9	81.0	4.3		168.2	-89.8	12-Feb-86

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
25	5.500	5.500	5.533	5.600	5.640	6.020	NA	NA	5.63	133.3	2.95E-04	ROCK TYPE:
50	17.800	17.600	NA	17.950	18.060	18.500	NA	NA	17.98	120.9	1.04E-03	SANDSTONE
75	NA	NA	NA	NA	NA	NA	NA	NA	NA	254.0	NA	
37	8.000	17.700	17.667	17.650	17.700	17.824	17.920	17.990	16.56	102.7	1.13E-03	
											AVERAGE	
											7.02E-04	(cm/sec)

	TOP	BOTTOM	GAUGE HT.		H2O LEVEL	INCLIN.	DATE
	91.4	111.0	4.3		168.2	-89.8	12-Feb-86

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
30	17.800	18.100	18.233	18.450	18.600	19.220	NA	NA	18.40	95.8	1.34E-03	ROCK TYPE:
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	105.5	NA	SANDSTONE
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	105.5	NA	
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	105.5	NA	
											AVERAGE	
											1.34E-03	(cm/sec)

	TOP	BOTTOM	GAUGE HT.		H2O LEVEL	INCLIN.	DATE
	98.0	111.0	4.3		168.2	-89.8	12-Feb-86

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
30	19.300	19.200	19.167	19.350	19.500	19.850	NA	NA	19.39	90.2	1.50E-03	ROCK TYPE:
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	108.8	NA	SANDSTONE
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	108.8	NA	
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	108.8	NA	
											AVERAGE	
											1.50E-03	(cm/sec)

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
80.0	86.0	4.3	168.2	-89.8	23-Feb-86

PRESSURE (psi)	TIME (min) 1	2	3	4	5	10	15	20	AVERAGE FLOW (gpm)	HEAD (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	
30	3.000	2.950	2.900	2.887	2.849	2.680	NA	NA	2.88	156.1	1.29E-04	ROCK TYPE:
60	4.600	4.550	4.500	4.425	4.330	4.080	NA	NA	4.41	223.3	1.38E-04	SANDSTONE
80	5.250	5.250	5.200	5.100	5.060	4.900	4.933	7.460	5.39	267.4	1.41E-04	
40	11.700	11.650	11.600	11.625	11.600	11.570	NA	NA	11.62	149.9	5.42E-04	
											AVERAGE	
											1.92E-04	(cm/sec)

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
120.0	126.0	4.3	168.2	-89.8	23-Feb-86

PRESSURE (psi)	TIME (min) 1	2	3	4	5	10	15	20	AVERAGE FLOW (gpm)	HEAD (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	
30	19.000	19.000	19.000	19.000	19.000	18.900	NA	NA	18.98	112.4	1.18E-03	ROCK TYPE:
60	25.000	25.200	25.000	NA	25.000	25.083	NA	NA	25.06	119.5	1.47E-03	SANDSTONE
90	28.000	29.000	29.333	29.500	29.600	29.700	29.800	29.800	29.34	136.8	1.50E-03	
45	23.000	23.500	23.333	23.250	23.400	23.200	NA	NA	23.28	104.5	1.56E-03	
											AVERAGE	
											1.42E-03	(cm/sec)

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
160.0	166.0	4.3	168.2	-89.8	22-Feb-86

PRESSURE (psi)	TIME (min) 1	2	3	4	5	10	15	20	AVERAGE FLOW (gpm)	HEAD (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	
30	16.500	16.500	16.500	20.750	33.440	NA	NA	NA	20.74	135.9	1.07E-03	ROCK TYPE:
60	22.000	22.000	22.333	22.439	45.600	NA	NA	NA	26.87	138.2	1.36E-03	SANDSTONE
90	27.857	27.500	27.667	34.750	55.800	41.900	37.267	27.950	35.09	98.1	2.50E-03	
45	25.000	25.000	28.667	31.500	50.600	NA	NA	NA	32.15	35.5	6.33E-03	
											AVERAGE	
											2.19E-03	(cm/sec)

TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
162.0	191.0	4.3	168.2	-89.8	21-Feb-86

PRESSURE (psi)	TIME (min) 1	2	3	4	5	10	15	20	AVERAGE FLOW (gpm)	HEAD (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	
40	34.000	34.000	34.000	33.750	34.000	34.000	NA	NA	33.96	4.0	5.98E-02	ROCK TYPE:
60	37.000	37.000	37.333	37.250	37.200	37.300	NA	NA	37.18	3.1	8.31E-02	SANDSTONE
90	27.857	36.500	38.333	39.000	39.600	41.444	NA	NA	37.12	380.0		

MINER FLAT DAM SITE: HYDRAULIC CONDUCTIVITIES: BOREHOLE MF-122

BOREHOLE:	TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
MF-122	150.0	175.0	4.3	152.8	-89.9	08-Feb-86

PRESSURE (psi)	TIME (min) 1	2	3	4	5	10	15	20	AVERAGE FLOW (gpm)	HEAD (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	
30	18.500	18.550	18.633	18.675	18.700	19.000	19.200	NA	18.79	158.0	2.73E-04	ROCK TYPE:
38	20.500	20.500	20.333	20.375	20.400	20.450	20.467	20.500	20.43	164.3	2.85E-04	PALEO-
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	157.1	NA	COLLUVIUM
0	NA	NA	NA	NA	NA	NA	NA	NA	NA	157.1	NA	
											AVERAGE	
											2.79E-04	(cm/sec)

MINER FLAT DAM SITE: HYDRAULIC CONDUCTIVITIES: BOREHOLE MF-123

BOREHOLE:	TOP	BOTTOM	GAUGE HT.		H2O LEVEL	INCLIN.	DATE
MF-123	67.8	80.4	5.3	)	208	-90	20-Mar-86

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
20	12.400	12.200	12.250	12.500	12.660	12.970	NA	NA	12.50	94.7	5.23E-04	ROCK TYPE:
40	20.500	20.300	20.200	20.250	20.260	20.250	NA	NA	20.29	92.3	8.71E-04	SANDSTONE
60	25.000	25.000	25.000	25.000	25.000	25.000	25.133	25.250	25.05	98.1	1.01E-03	
30	20.000	19.500	19.667	19.750	19.600	19.600	NA	NA	19.69	73.8	1.06E-03	
											AVERAGE	
											8.35E-04	(cm/sec)

BOREHOLE:	TOP	BOTTOM	GAUGE HT.		H2O LEVEL	INCLIN.	DATE
	80.6	100.7	5.3	)	208	-90	20-Mar-86

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
20	6.500	6.350	6.333	6.250	6.200	6.040	NA	NA	6.28	134.1	1.86E-04	ROCK TYPE:
40	8.300	8.400	8.433	8.450	8.440	8.560	NA	NA	8.43	174.0	1.92E-04	SANDSTONE
60	20.200	20.650	20.867	20.950	20.960	21.870	22.193	22.290	21.25	147.6	5.70E-04	
30	17.500	17.600	17.500	17.425	17.400	17.160	NA	NA	17.43	106.2	6.51E-04	
											AVERAGE	
											3.39E-04	(cm/sec)

BOREHOLE:	TOP	BOTTOM	GAUGE HT.		H2O LEVEL	INCLIN.	DATE
	102.6	121.9	5.3	)	208	-90	21-Mar-86

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
30	9.100	9.500	10.500	12.500	13.900	17.240	NA	NA	12.12	157.8	3.05E-04	ROCK TYPE:
60	26.400	26.500	26.667	26.500	26.600	26.600	NA	NA	26.54	121.9	8.63E-04	SANDSTONE
90	31.000	31.500	31.333	31.250	31.200	31.300	NA	NA	31.26	140.7	8.81E-04	
45	25.000	25.000	25.000	25.000	25.000	24.900	NA	NA	24.98	102.2	9.68E-04	
											AVERAGE	
											6.88E-04	(cm/sec)

BOREHOLE:	TOP	BOTTOM	GAUGE HT.		H2O LEVEL	INCLIN.	DATE
	123.0	126.0	5.3	)	208	-90	21-Mar-86

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
30	14.600	14.550	14.567	14.600	14.560	14.370	NA	NA	14.54	150.7	3.82E-04	ROCK TYPE:
60	19.500	19.350	19.267	19.250	19.280	19.280	NA	NA	19.32	181.1	4.23E-04	SANDSTONE
90	27.000	27.500	27.667	28.000	28.200	28.900	NA	NA	27.88	157.7	7.00E-04	
45	24.000	23.800	23.800	23.750	23.720	23.590	NA	NA	23.78	101.6	9.27E-04	
											AVERAGE	
											5.69E-04	(cm/sec)

TOP	BOTTOM	GAUGE HT.		H2O LEVEL	INCLIN.	DATE
153.0	159.0	5.3	>	208	-90	00-Jan-00

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
30	30.000	29.500	29.667	29.750	29.800	29.800	NA	NA	29.75	26.8	4.39E-03	ROCK TYPE:
60	34.000	34.500	34.667	34.500	34.615	NA	NA	NA	34.46	31.9	4.28E-03	SANDSTONE
90	38.000	38.000	37.667	37.750	37.800	NA	NA	NA	37.84	51.2	2.93E-03	
45	32.000	31.500	31.667	31.750	31.600	NA	NA	NA	31.70	35.6	3.53E-03	
											AVERAGE	
										LESS THAN	3.73E-03	(cm/sec)

TOP	BOTTOM	GAUGE HT.		H2O LEVEL	INCLIN.	DATE
183.0	202.9	5.3	>	208	-90	22-Mar-86

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
40	25.000	25.000	25.000	25.000	25.000	25.200	NA	NA	25.03	170.9	5.80E-04	ROCK TYPE:
73	30.000	30.000	30.333	30.250	30.400	30.300	NA	NA	30.21	194.0	6.17E-04	SANDSTONE
103	35.000	35.500	35.333	35.250	35.400	35.500	NA	NA	35.33	201.6	6.94E-04	
58	30.000	30.000	30.333	30.250	30.200	30.200	NA	NA	30.16	159.9	7.47E-04	
											AVERAGE	
										LESS THAN	6.57E-04	(cm/sec)

BOREHOLE:	TOP	BOTTOM	GAUGE HT.		H2O LEVEL	INCLIN.	DATE					
MF-124	78.0	90.9	5.3		159.75	-90	02-Apr-86					
									AVERAGE		HYDRAULIC	
PRESSURE				TIME	(min)				FLOW	HEAD	CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
25	14.750	13.800	12.833	12.000	11.260	8.476	NA	NA	12.19	118.1	4.01E-04	ROCK TYPE:
50	8.000	7.750	7.733	7.625	7.600	7.360	NA	NA	7.68	193.3	1.55E-04	BASALT
80	12.800	12.900	12.233	12.100	12.000	11.770	11.700	11.865	12.17	245.2	1.93E-04	
40	4.300	4.200	4.217	4.200	4.220	4.190	NA	NA	4.22	178.4	9.20E-05	
											AVERAGE	
											1.82E-04	(cm/sec)

	TOP	BOTTOM	GAUGE HT.		H2O LEVEL	INCLIN.	DATE					
	0.0	0.0	5.3		159.75	-90	02-Apr-86					
	GS	NG.							AVERAGE		HYDRAULIC	
PRESSURE				TIME	(min)				FLOW	HEAD	CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
30	9.500	9.000	NA	6.950	6.500	5.855	NA	NA	7.71	62.6	4.80E-04	ROCK TYPE:
68	24.000	22.500	22.667	23.000	23.200	23.500	NA	NA	23.14	59.6	1.51E-03	SANDSTONE
96	29.000	28.500	28.667	28.571	28.600	28.700	29.000	29.450	28.81	69.5	1.61E-03	
54	25.000	24.500	24.667	24.750	24.800	24.800	NA	NA	24.75	12.9	7.46E-03	
											AVERAGE	
											1.72E-03	(cm/sec)

MINER FLAT DAM SITE: HYDRAULIC CONDUCTIVITIES: BOREHOLE MF-125A

BOREHOLE:	TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
MF-125A	108.0	141.1	6.5	153.17	-90	06-Apr-86

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
33	1.350	1.350	1.283	1.238	1.190	0.840	NA	NA	1.21	207.0	1.07E-05	ROCK TYPE:
63	4.500	4.400	4.267	4.150	NA	4.000	NA	NA	4.26	272.8	2.85E-05	PALEO-
93	16.000	15.700	15.667	15.750	15.800	15.700	15.533	15.400	15.69	297.7	9.61E-05	CONTACT
45	9.300	9.250	9.233	9.125	9.080	8.680	NA	NA	9.11	218.3	7.61E-05	
											AVERAGE	
											3.86E-05	(cm/sec)

	TOP	BOTTOM	GAUGE HT.	H2O LEVEL	INCLIN.	DATE
	107.7	170.0	6.5	153.17	-90	07-Apr-86

PRESSURE	TIME (min)								AVERAGE FLOW	HEAD	HYDRAULIC CONDUCTIVITY	
(psi)	1	2	3	4	5	10	15	20	(gpm)	(feet)	(cm/sec)	
31	9.700	NA	10.300	10.425	10.480	10.644	NA	NA	10.31	210.1	8.95E-05	ROCK TYPE:
65	19.500	19.400	19.433	19.375	19.400	19.300	NA	NA	19.40	237.0	1.49E-04	SANDSTONE
100	26.000	26.500	26.333	26.500	26.600	26.600	26.733	26.816	26.51	256.8	1.88E-04	
45	19.000	19.500	NA	19.750	19.608	19.600	NA	NA	19.49	190.1	1.87E-04	
											AVERAGE	
											1.47E-04	(cm/sec)

APPENDIX E

Basic Data, Goodman Jack Tests

GOODMAN JACK: DEFORMATION MODULI: MINER FLAT DAM SITE

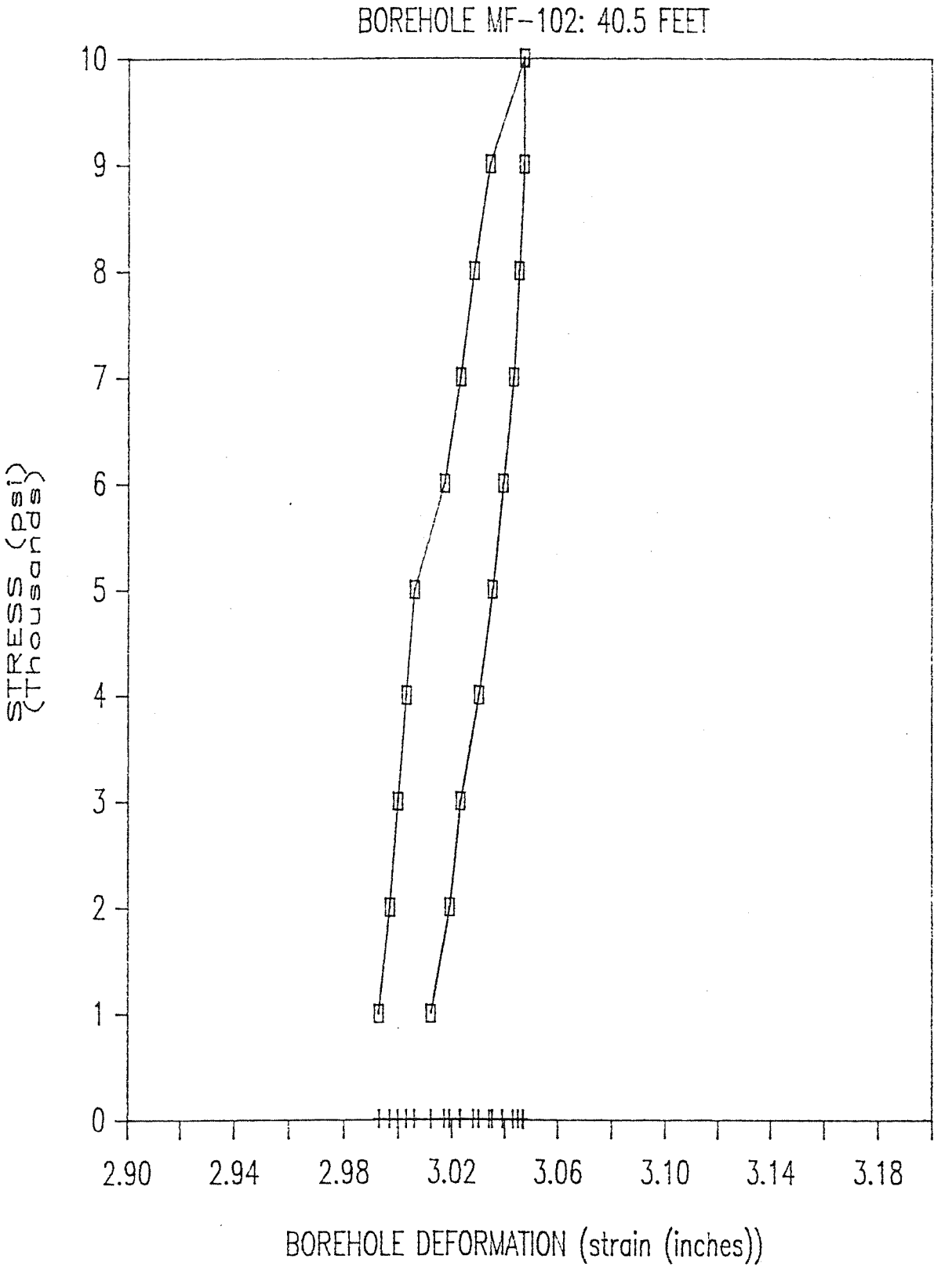
MF-102	80.5 FT		DIAMETER	DIAMETER			EXTEND	
PRESSURE	NEAR	FAR	NEAR	FAR			E(near)	E(far)
1,000	-0.007	-0.008	2.994	2.993			0.25	0.26
2,000	-0.003	-0.002	2.998	2.999			0.82	0.59
3,000	0.017	0.036	3.018	3.035			0.17	0.09
4,000	0.028	0.051	3.029	3.050			0.31	0.23
5,000	0.036	0.061	3.037	3.059			0.42	0.35
6,000	0.046	0.072	3.047	3.070			0.34	0.31
7,000	0.054	0.081	3.055	3.079			0.43	0.38
8,000	0.062	0.089	3.062	3.087			0.43	0.42
9,000	0.068	0.096	3.068	3.094	AVERAGE	DEFORMATION	0.58	0.48
10,000	0.075	0.106	3.075	3.104	(10^6 psi)	MODULUS	0.50	0.33
10,000	0.075	0.106	3.075	3.104	0.42	0.34	RETRACT	
9,000	0.068	0.096	3.068	3.094			0.50	3.3E-01
8,000	0.071	0.104	3.071	3.102			1.16	3.3E-01
7,000	0.069	0.102	3.069	3.100			1.74	4.2E-01
6,000	0.065	0.098	3.065	3.096			0.87	1.7E+00
5,000	0.061	0.093	3.062	3.091			0.87	8.3E-01
4,000	0.057	0.089	3.058	3.087			0.86	6.7E-01
3,000	0.052	0.084	3.053	3.082			0.69	8.4E-01
2,000	0.046	0.077	3.047	3.075	AVERAGE	RECOVERY	0.57	6.8E-01
1,000	0.037	0.066	3.038	3.064	(10^6 psi)	MODULUS	0.38	4.9E-01
					0.85	0.70		

MF-102	160.5 FEET		DIAMETER	DIAMETER			EXTEND	
PRESSURE	NEAR	FAR	NEAR	FAR			E(near)	E(far)
1,000	-0.011	-0.011	2.989	2.990			0.38	0.33
2,000	-0.006	-0.006	2.995	2.995			0.66	0.70
3,000	-0.003	-0.002	2.998	2.999			1.10	0.88
4,000	-0.001	0.000	3.000	3.001			1.65	1.76
5,000	0.001	0.002	3.002	3.003			1.65	1.76
6,000	0.003	0.005	3.004	3.005			1.65	1.17
7,000	0.005	0.007	3.006	3.007			1.66	1.76
8,000	0.007	0.010	3.008	3.010			1.66	1.17
9,000	0.010	0.012	3.011	3.012	AVERAGE	DEFORMATION	1.11	1.76
10,000	0.012	0.014	3.013	3.014	(10^6 psi)	MODULUS	1.67	1.76
10,000	0.012	0.014	3.013	3.014	1.32	1.31	RETRACT	
9,000	0.012	0.014	3.013	3.014			ERR	ERR
8,000	0.011	0.014	3.012	3.014			ERR	ERR
7,000	0.010	0.013	3.011	3.013			3.34	ERR
6,000	0.008	0.011	3.009	3.011			3.33	3.52
5,000	0.006	0.009	3.007	3.009			1.66	1.76
4,000	0.004	0.007	3.005	3.007			1.66	1.76
3,000	0.002	0.004	3.003	3.005			1.66	1.76
2,000	-0.001	0.002	3.000	3.003	AVERAGE	RECOVERY	1.66	1.17
1,000	-0.006	-0.002	2.995	2.999	(10^6 psi)	MODULUS	1.10	1.76
					2.06	1.96		

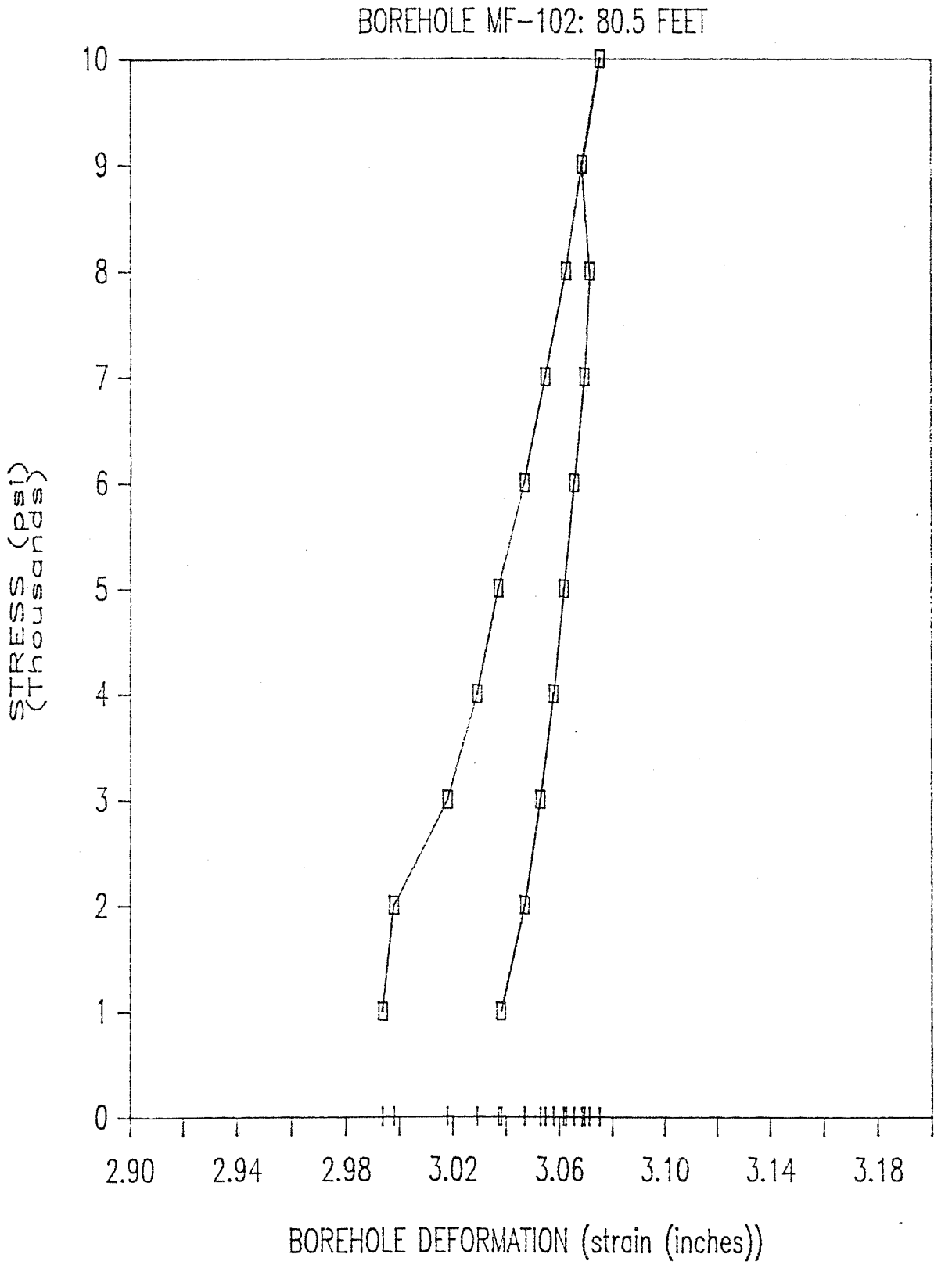
GOODMAN JACK: DEFORMATION MODULI: MINER FLAT DAM SITE

MF-102 40.5 FEET			DIAMETER	DIAMETER			EXTEND	
PRESSURE	NEAR	FAR	NEAR	FAR			E(near)	E(far)
1,000	-0.008	-0.014	2.993	2.987			0.27	0.46
2,000	-0.004	-0.009	2.997	2.992			0.82	0.70
3,000	-0.001	-0.005	3.000	2.996			1.10	0.88
4,000	0.002	-0.001	3.003	3.000			1.10	0.88
5,000	0.005	0.003	3.006	3.004			1.10	0.88
6,000	0.016	0.015	3.017	3.015			0.30	0.29
7,000	0.022	0.022	3.023	3.022			0.56	0.50
8,000	0.027	0.028	3.028	3.028			0.67	0.59
9,000	0.033	0.036	3.034	3.035	AVERAGE	DEFORMATION	0.56	0.44
10,000	0.046	0.048	3.047	3.047	(10^6 psi)	MODULUS	0.26	0.29
10,000	0.046	0.048	3.047	3.047	0.68	0.59	RETRACT	
9,000	0.046	0.048	3.047	3.047			ERR	ERR
8,000	0.044	0.045	3.045	3.044			ERR	ERR
7,000	0.042	0.042	3.043	3.041			1.71	1.16
6,000	0.038	0.038	3.039	3.037			1.71	1.16
5,000	0.034	0.034	3.035	3.033			0.85	0.87
4,000	0.029	0.027	3.030	3.027			0.85	0.87
3,000	0.022	0.018	3.023	3.018			0.68	0.50
2,000	0.018	0.013	3.019	3.013	AVERAGE	RECOVERY	0.48	0.39
1,000	0.011	0.004	3.012	3.005	(10^6 psi)	MODULUS	0.84	0.70
					1.02	0.81		

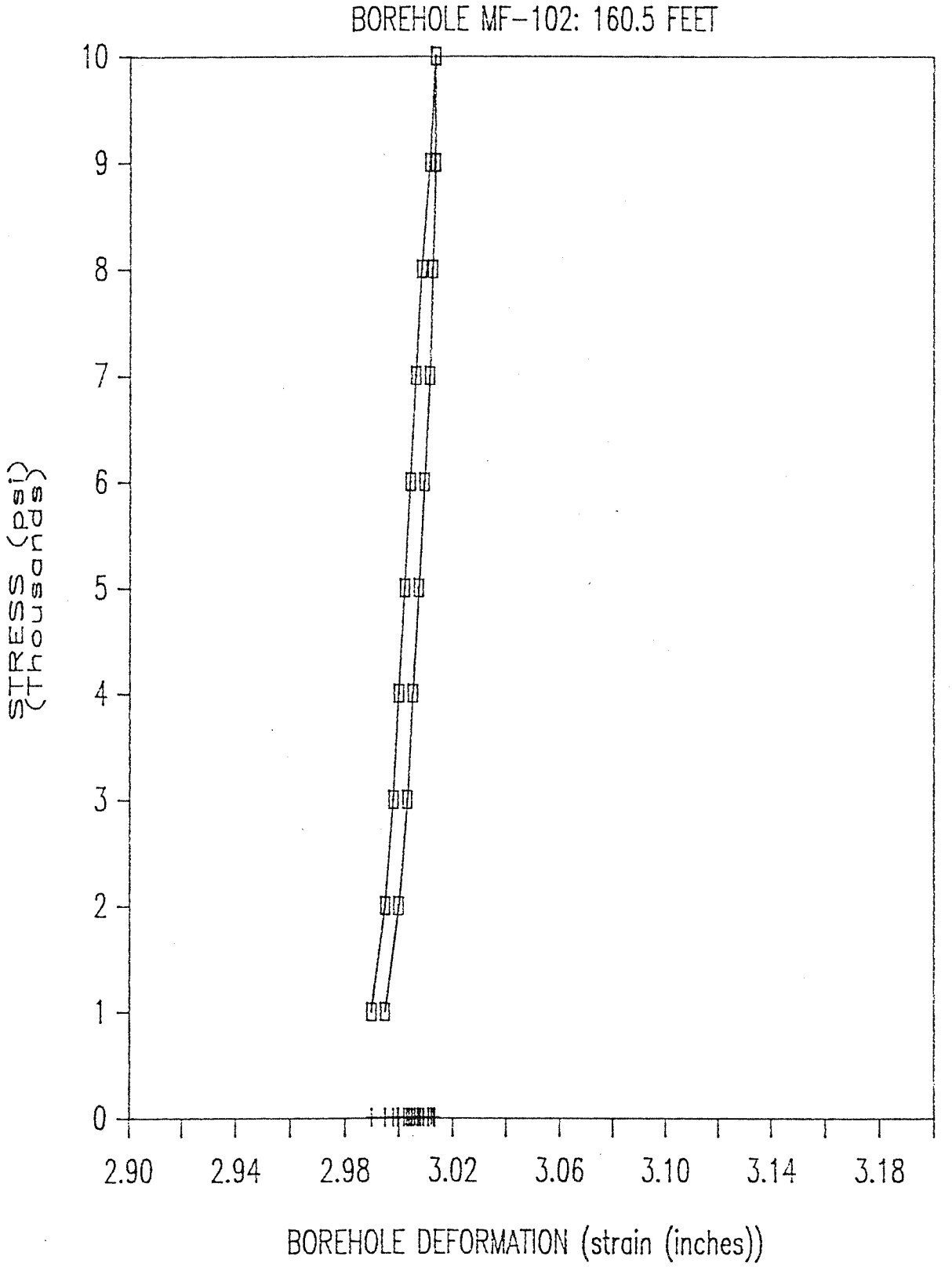
DEFORMATION MODULAE: MINER FLAT DAM



DEFORMATION MODULAE: MINER FLAT DAM



DEFORMATION MODULAE: MINER FLAT DAM



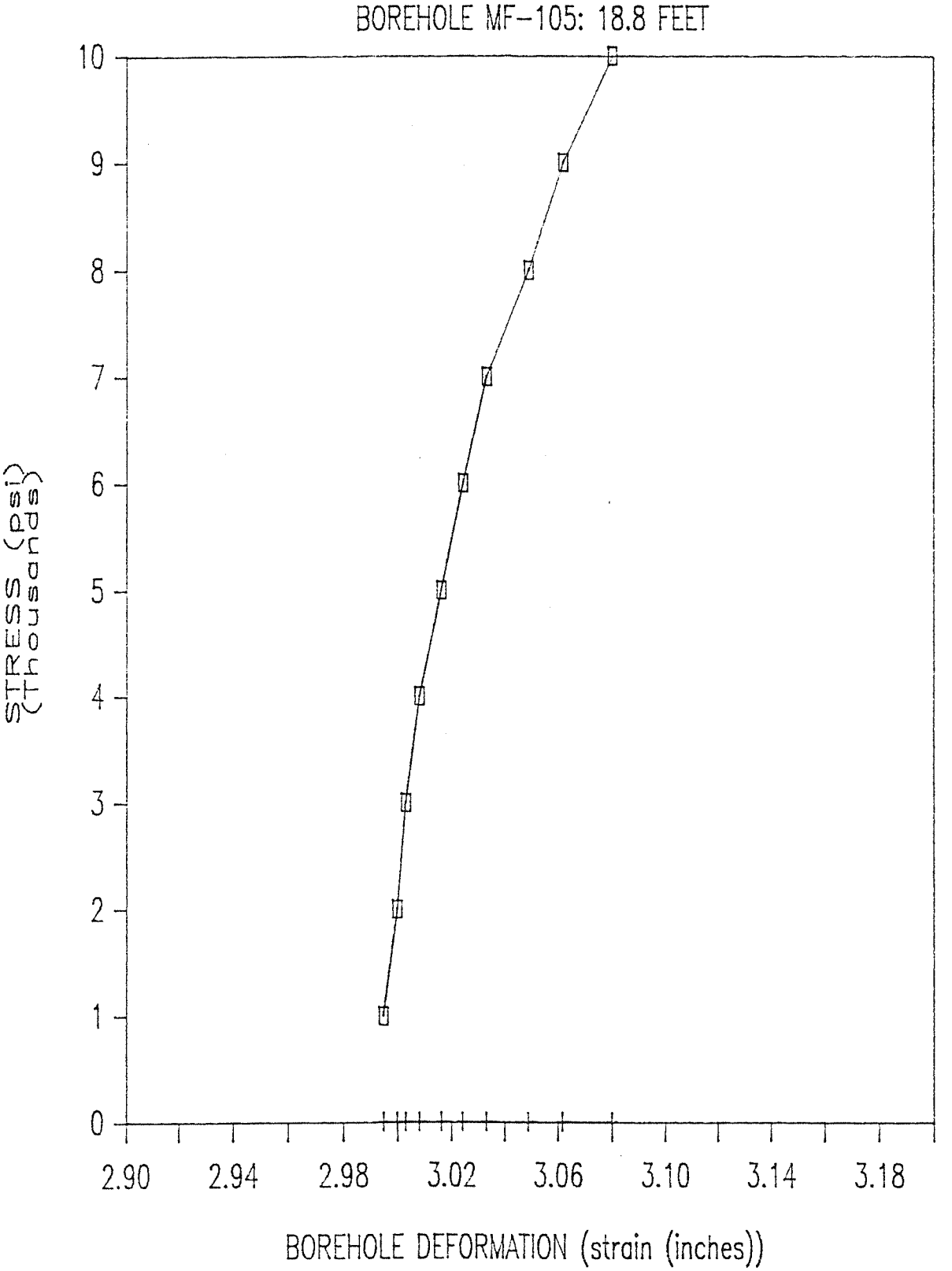
GOODMAN JACK: DEFORMATION MODULI: MINER FLAT DAM SITE

MF-105 18.8 FEET			DIAMETER	DIAMETER			EXTEND	
PRESSURE	NEAR	FAR	NEAR	FAR			E(near)	E(far)
1,000	-0.006	-0.011	2.995	2.990			0.23	0.33
2,000	-0.001	-0.004	3.000	2.997			0.66	0.50
3,000	0.002	0.003	3.003	3.004			1.10	0.50
4,000	0.007	0.013	3.008	3.013			0.66	0.35
5,000	0.015	0.027	3.016	3.027			0.42	0.25
6,000	0.023	0.047	3.024	3.046			0.42	0.17
7,000	0.032	0.080	3.033	3.078			0.38	0.10
8,000	0.048	0.096	3.049	3.094			0.21	0.21
9,000	0.061	0.107	3.062	3.105	AVERAGE	DEFORMATION	0.26	0.30
10,000	0.080	0.127	3.080	3.126	(10^6 psi)	MODULUS	0.18	0.16
					0.45	0.29		

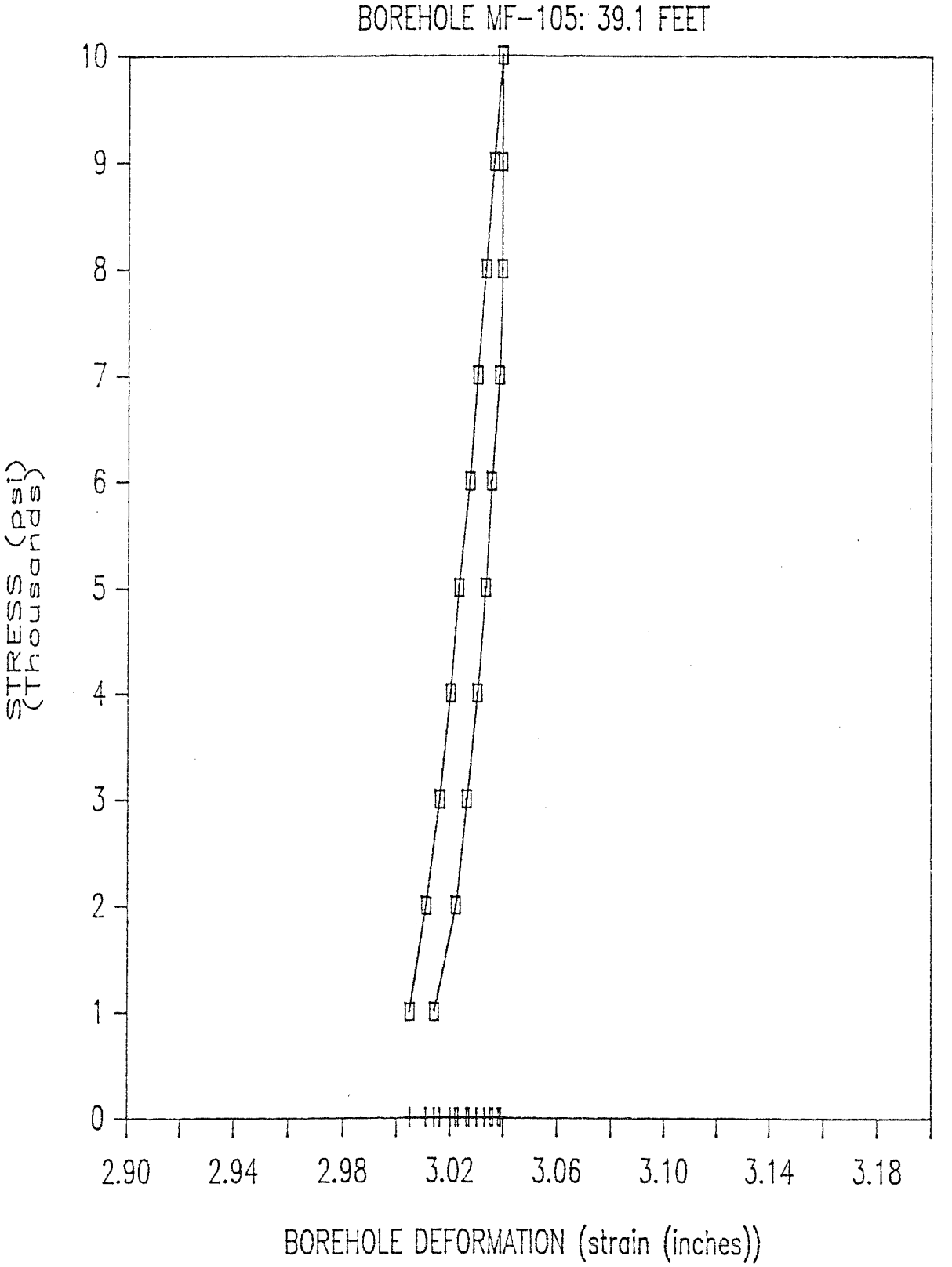
MF-105 39.1 FEET			DIAMETER	DIAMETER			EXTEND	
PRESSURE	NEAR	FAR	NEAR	FAR			E(near)	E(far)
1,000	0.004	0.021	3.005	3.021			0.14	0.08
2,000	0.010	0.030	3.011	3.029			0.55	0.39
3,000	0.015	0.036	3.016	3.035			0.67	0.58
4,000	0.019	0.042	3.020	3.041			0.84	0.58
5,000	0.022	0.047	3.023	3.046			1.12	0.70
6,000	0.026	0.053	3.027	3.052			0.84	0.58
7,000	0.029	0.058	3.030	3.057			1.13	0.69
8,000	0.032	0.063	3.033	3.061			1.13	0.69
9,000	0.035	0.068	3.036	3.066	AVERAGE	DEFORMATION	1.13	0.69
10,000	0.038	0.072	3.039	3.070	(10^6 psi)	MODULUS	1.13	0.86
10,000	0.038	0.072	3.039	3.070	0.87	0.58	RETRACT	
9,000	0.038	0.072	3.039	3.070			ERR	ERR
8,000	0.038	0.072	3.039	3.070			ERR	ERR
7,000	0.037	0.070	3.038	3.068			ERR	ERR
6,000	0.034	0.068	3.035	3.066			3.40	1.71
5,000	0.032	0.065	3.033	3.063			1.13	1.72
4,000	0.029	0.062	3.030	3.060			1.70	1.15
3,000	0.025	0.059	3.026	3.057			1.13	1.15
2,000	0.021	0.055	3.022	3.054	AVERAGE	RECOVERY	0.84	1.15
1,000	0.013	0.049	3.014	3.048	(10^6 psi)	MODULUS	0.84	0.87
					1.51	1.29		

MF-105 59.6 FEET			DIAMETER	DIAMETER			EXTEND	
PRESSURE	NEAR	FAR	NEAR	FAR			E(near)	E(far)
1,000	0.002	0.022	3.003	3.022			0.15	0.08
2,000	0.006	0.028	3.007	3.028			0.83	0.59
3,000	0.009	0.035	3.010	3.034			1.11	0.50
4,000	0.013	0.042	3.014	3.041			0.83	0.50
5,000	0.017	0.050	3.018	3.049			0.84	0.44
6,000	0.021	0.060	3.022	3.058			0.84	0.35
7,000	0.025	0.070	3.026	3.068			0.84	0.34
8,000	0.030	0.079	3.031	3.077			0.68	0.38
9,000	0.034	0.093	3.035	3.091	AVERAGE	DEFORMATION	0.85	0.24
10,000	0.038	0.110	3.039	3.108	(10^6 psi)	MODULUS	0.85	0.20
					0.78	0.36		

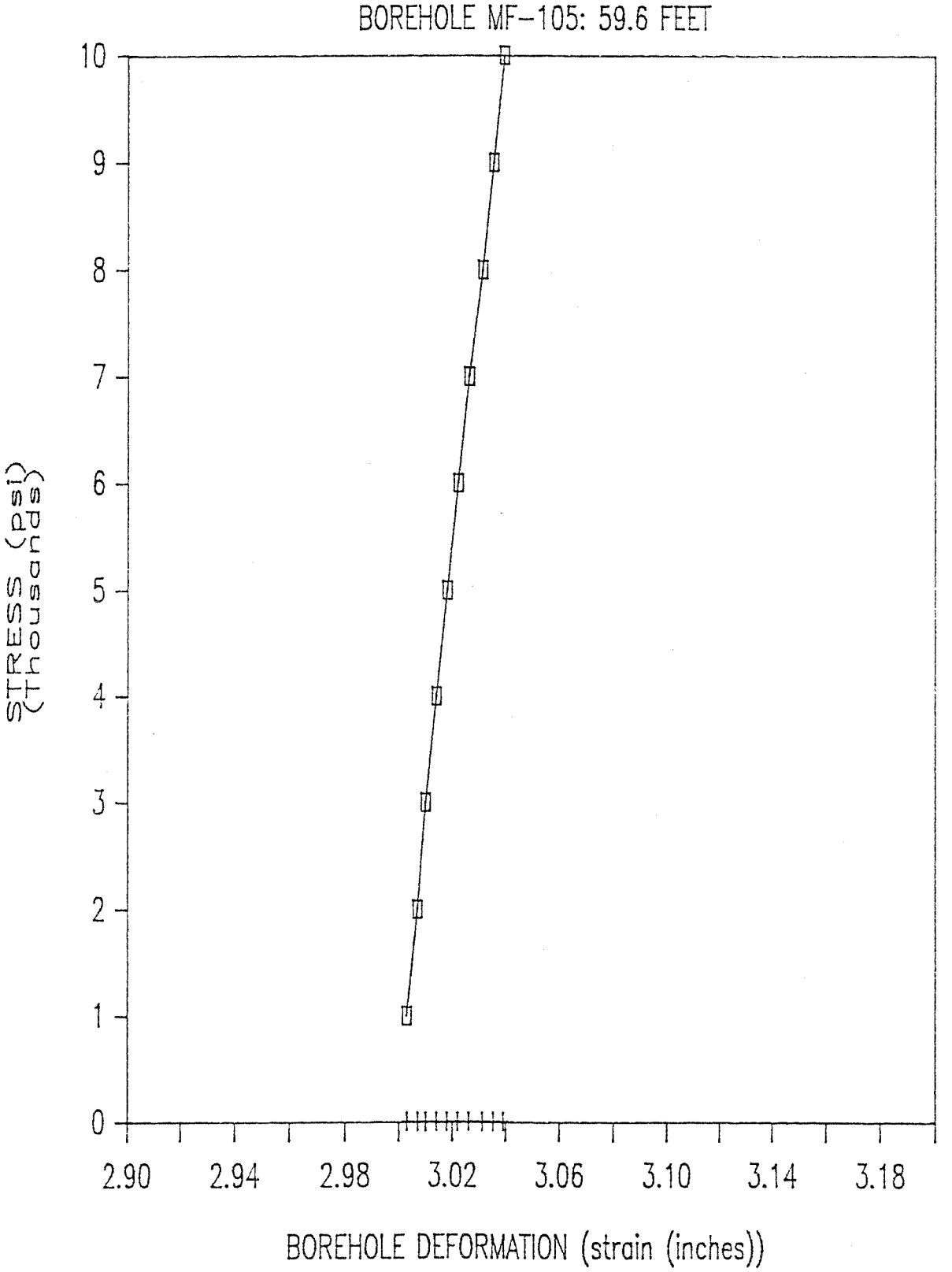
DEFORMATION MODULAE: MINER FLAT DAM



DEFORMATION MODULAE: MINER FLAT DAM



DEFORMATION MODULAE: MINER FLAT DAM



GOODMAN JACK: DEFORMATION MODULI: MINER FLAT DAM SITE

MF-113 133.0 FEET PRESSURE	NEAR	FAR	DIAMETER NEAR	DIAMETER FAR			EXTEND E(near)	EXTEND E(far)
500	-0.022	-0.030	2.978	2.972				
600	-0.012	-0.029	2.988	2.973			0.03	0.35
700	-0.003	-0.028	2.998	2.974			0.04	0.35
800	0.010	-0.027	3.011	2.975			0.03	0.35
900	0.019	-0.026	3.020	2.976			0.04	0.35
800	0.022	-0.026	3.023	2.976			NA	NA
700	0.022	-0.026	3.023	2.976			NA	NA
600	0.022	-0.026	3.023	2.976			NA	NA
500	0.022	-0.027	3.023	2.975	AVERAGE	DEFORMATION	NA	NA
					(10^6 psi)	MODULUS	NA	NA
					0.03	0.35		

MF-113 130.6 FEET PRESSURE	NEAR	FAR	DIANEAR	DIAFAR			EXTEND E(near)	EXTEND E(far)
500	-0.007	0.160	2.994	3.161			123.96	9.31
600	0.002	0.220	3.003	3.230			36.64	4.88
700	0.009	0.280	3.010	3.307			47.42	4.35
800	0.018	0.360	3.019	3.428			37.12	2.80
900	0.035	0.500	3.036	3.702			19.85	1.23
1,000	0.047	0.600	3.048	3.960			28.43	1.30
1,500	0.103	0.111	3.102	3.109			31.15	-1.98
1,600	0.111	0.123	3.109	3.122			44.42	27.29
1,700	0.118	0.135	3.116	3.134			50.95	26.88
1,800	0.121	0.139	3.119	3.138			119.17	79.78
2,000	0.132	0.166	3.129	3.168	AVERAGE	DEFORMATION	65.21	23.11
2,200	0.138	0.184	3.135	3.188	(10^3 psi)	MODULUS	119.98	33.45
2,000	0.138	0.184	3.135	3.188	53.91	15.58	RETRACT	
1,800	0.138	0.184	3.135	3.188			ERR	ERR
1,700	0.138	0.184	3.135	3.188			ERR	ERR
1,600	0.138	0.184	3.135	3.188			ERR	ERR
1,500	0.138	0.184	3.135	3.188			ERR	ERR
1,000	0.138	0.185	3.135	3.189			ERR	ERR
900	0.137	0.185	3.134	3.189			ERR	ERR
800	0.137	0.185	3.134	3.189			ERR	-0.30
700	0.136	0.185	3.133	3.189	AVERAGE	RECOVERY	0.36	ERR
600	0.136	0.185	3.133	3.189	(10^3 psi)	MODULUS	ERR	ERR
500	0.135	0.184	3.132	3.188	NA	NA	0.36	ERR

GOODMAN JACK: DEFORMATION MODULI: MINER FLAT DAM SITE

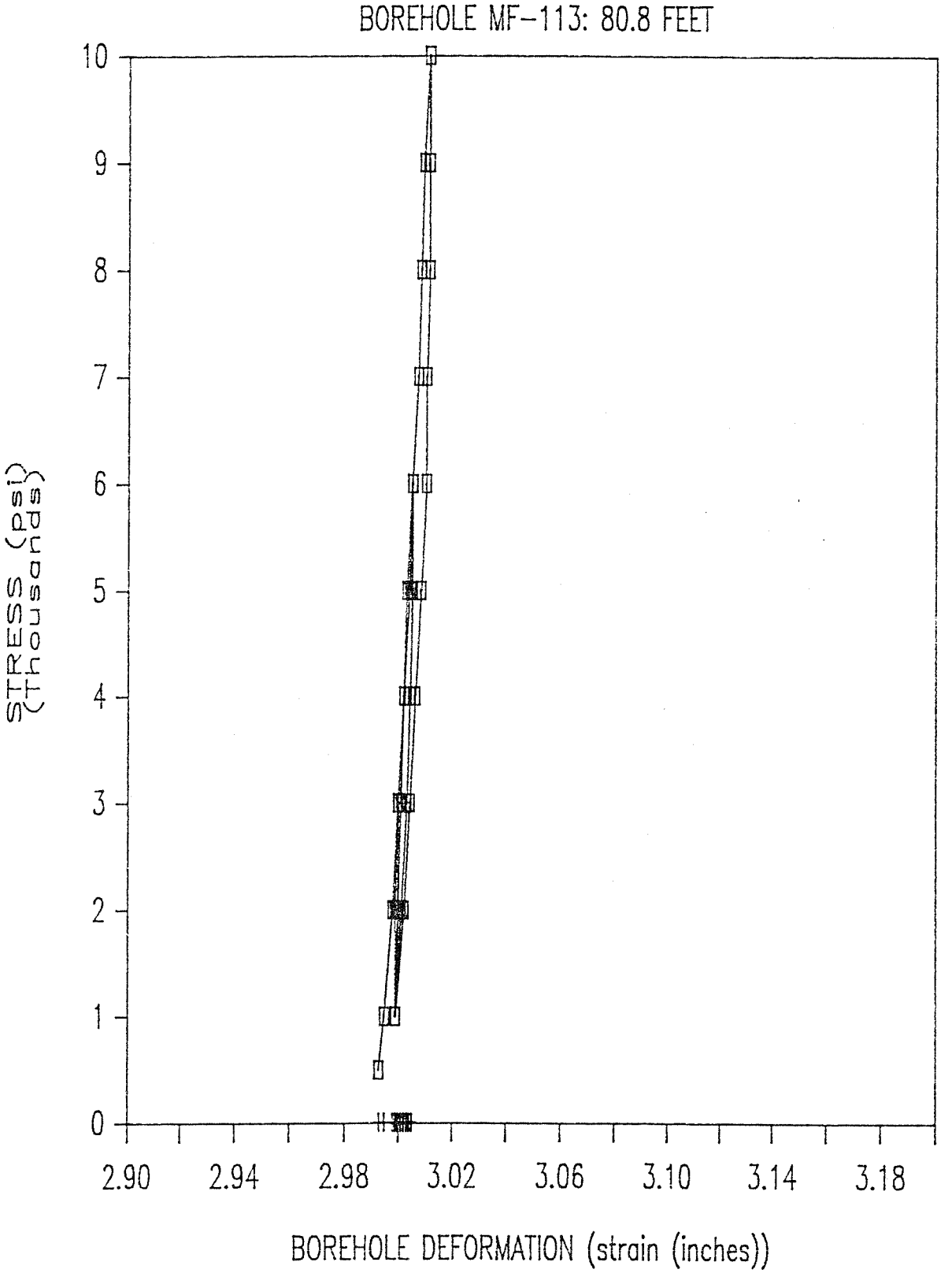
MF-113 121.5 FEET			DIAMETER	DIAMETER			EXTEND	
PRESSURE	NEAR	FAR	NEAR	FAR			E(near)	E(far)
500	-0.003	0.002	2.998	3.003			0.10	0.07
600	-0.001	0.007	3.000	3.007			0.16	0.07
700	0.000	0.013	3.001	3.013			0.33	0.06
800	0.002	0.021	3.003	3.021			0.17	0.04
900	0.005	0.026	3.006	3.026			0.11	0.07
1,000	0.008	0.031	3.009	3.030			0.11	0.07
1,500	0.016	0.058	3.017	3.057			0.21	0.06
1,600	0.019	0.064	3.020	3.062			0.11	0.06
1,800	0.023	0.068	3.024	3.066	AVERAGE	DEFORMATION	0.17	0.17
2,000	0.027	0.086	3.028	3.084	(10^6 psi)	MODULUS	0.17	0.04
2,000	0.027	0.086	3.028	3.084	0.16	0.07	RETRACT	
1,800	0.026	0.086	3.027	3.084			0.68	ERR
1,600	0.025	0.086	3.026	3.084			0.68	ERR
1,500	0.024	0.086	3.025	3.084			0.34	ERR
1,000	0.019	0.086	3.020	3.084			1.68	ERR
900	0.018	0.086	3.019	3.084			0.07	ERR
800	0.016	0.085	3.017	3.083			0.34	ERR
700	0.015	0.085	3.016	3.083			0.17	0.34
600	0.013	0.082	3.014	3.080	AVERAGE	RECOVERY	0.33	ERR
500	0.011	0.079	3.012	3.077	(10^6 psi)	MODULUS	0.17	0.11
					0.46	ERR		

MF-113 101.5 FEET			DIAMETER	DIAMETER			EXTEND	
PRESSURE	NEAR	FAR	NEAR	FAR			E(near)	E(far)
500	-0.005	-0.010	2.996	2.991			SET	JACK
1,000	-0.005	-0.010	2.996	2.991			ERR	ERR
2,000	-0.003	-0.007	2.998	2.994			1.65	1.17
3,000	-0.001	-0.004	3.000	2.997			1.65	1.17
4,000	0.000	-0.002	3.001	2.999			3.30	1.76
5,000	0.001	0.000	3.002	3.001			3.31	1.76
6,000	0.003	0.001	3.004	3.002			1.65	3.52
7,000	0.004	0.003	3.005	3.004			3.31	1.76
8,000	0.006	0.004	3.007	3.005			1.66	3.52
9,000	0.007	0.006	3.008	3.006	AVERAGE	DEFORMATION	3.32	1.76
10,000	0.008	0.007	3.009	3.007	(10^6 psi)	MODULUS	3.32	3.52
10,000	0.008	0.007	3.009	3.007	2.58	2.22	RETRACT	
9,000	0.008	0.007	3.009	3.007			ERR	ERR
8,000	0.008	0.007	3.009	3.007			ERR	ERR
7,000	0.007	0.007	3.008	3.007			ERR	ERR
6,000	0.006	0.006	3.007	3.006			3.32	ERR
5,000	0.004	0.004	3.005	3.005			3.32	3.52
4,000	0.003	0.003	3.004	3.004			1.66	1.76
3,000	0.001	0.001	3.002	3.002			3.31	3.52
2,000	0.000	-0.001	3.001	3.000	AVERAGE	RECOVERY	1.65	1.76
1,000	-0.002	-0.005	2.999	2.996	(10^6 psi)	MODULUS	3.31	1.76
					2.76	2.46		

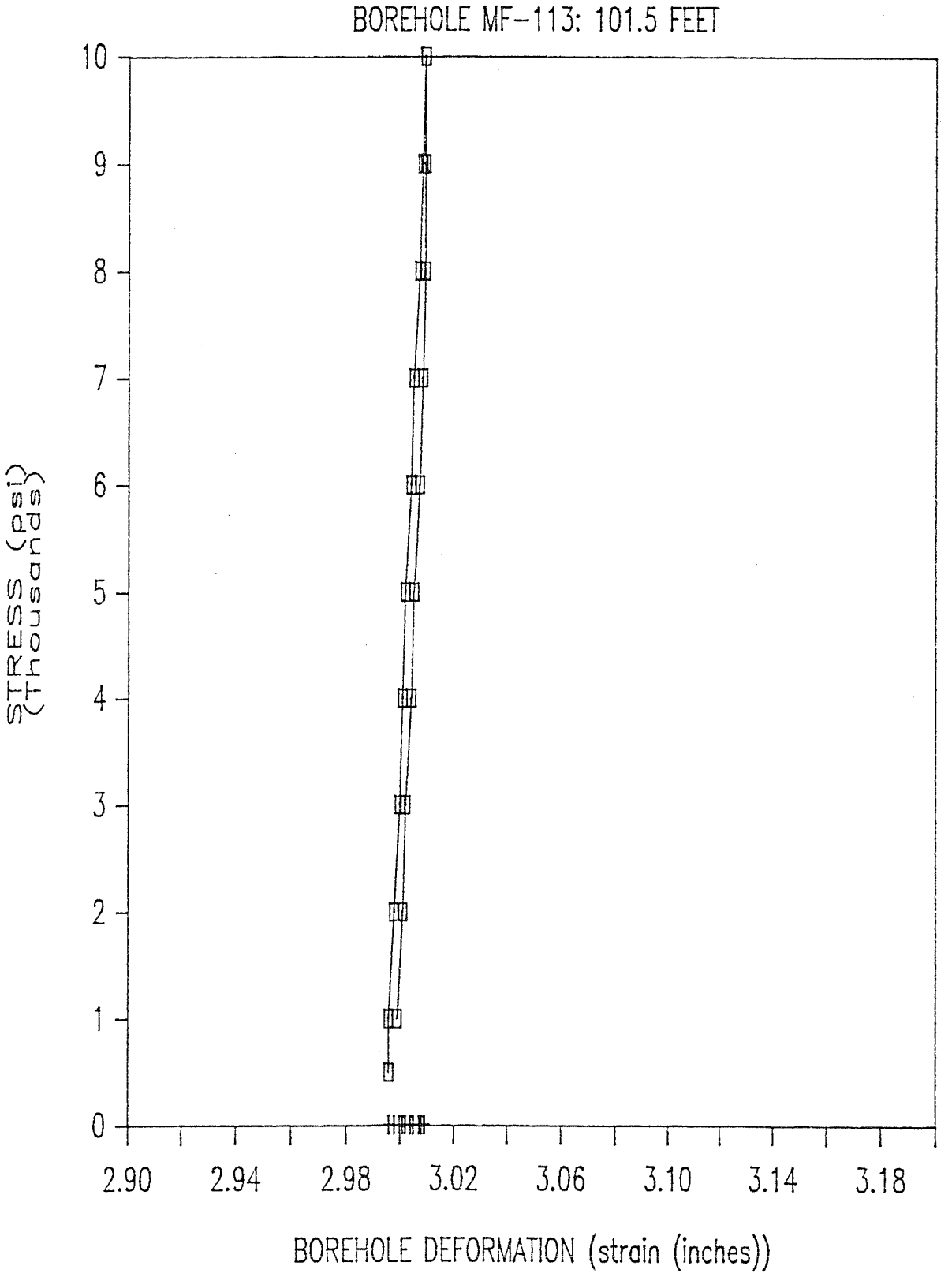
GOODMAN JACK: DEFORMATION MODULI: MINER FLAT DAM SITE

MF-113 80.8 FEET PRESSURE	NEAR	FAR	DIAMETER NEAR	DIAMETER FAR			EXTEND E(near) SET	EXTEND E(far) JACK
500	-0.008	-0.019	2.993	2.982			0.82	0.88
1,000	-0.006	-0.017	2.995	2.984			1.10	0.88
2,000	-0.003	-0.013	2.998	2.988			1.65	1.17
3,000	-0.001	-0.010	3.000	2.991			ERR	ERR
2,000	-0.001	-0.010	3.000	2.991			3.30	1.17
1,000	-0.002	-0.013	2.999	2.988			ERR	ERR
2,000	-0.002	-0.013	2.999	2.988			3.30	0.88
3,000	-0.001	-0.009	3.000	2.992			1.65	1.17
4,000	0.001	-0.006	3.002	2.995			3.31	1.76
5,000	0.002	-0.004	3.003	2.997			1.66	1.76
6,000	0.004	-0.002	3.005	2.999			ERR	ERR
5,000	0.004	-0.002	3.005	2.999			3.31	ERR
4,000	0.003	-0.002	3.004	2.999			3.31	1.76
3,000	0.002	-0.004	3.003	2.997			1.65	1.17
2,000	0.000	-0.007	3.001	2.994			1.65	0.70
1,000	-0.002	-0.012	2.999	2.989			3.30	3.52
2,000	-0.001	-0.011	3.000	2.990			3.30	1.17
3,000	0.000	-0.008	3.001	2.993			3.31	1.17
4,000	0.001	-0.005	3.002	2.996			1.65	1.76
5,000	0.003	-0.003	3.004	2.998			3.31	1.76
6,000	0.004	-0.001	3.005	3.000			1.66	3.52
7,000	0.006	0.000	3.007	3.001			3.32	1.76
8,000	0.007	0.002	3.008	3.003			3.32	3.52
9,000	0.008	0.003	3.009	3.004			1.66	1.76
10,000	0.010	0.005	3.011	3.005			ERR	ERR
9,000	0.010	0.005	3.011	3.005			ERR	ERR
8,000	0.010	0.005	3.011	3.005			3.33	ERR
7,000	0.009	0.005	3.010	3.005			ERR	3.52
6,000	0.009	0.004	3.010	3.005	AVERAGE	DEFORMATION	1.66	1.76
5,000	0.007	0.002	3.008	3.003	(10^6 psi)	MODULUS	1.66	1.76
4,000	0.005	0.000	3.006	3.001	2.46	1.66	1.66	1.17
3,000	0.003	-0.003	3.004	2.998			1.65	0.88
2,000	0.001	-0.007	3.002	2.994	AVERAGE	RECOVERY	1.10	0.88
1,000	-0.002	-0.011	2.999	2.990	(10^6 psi)	MODULUS		
					2.21	1.48		

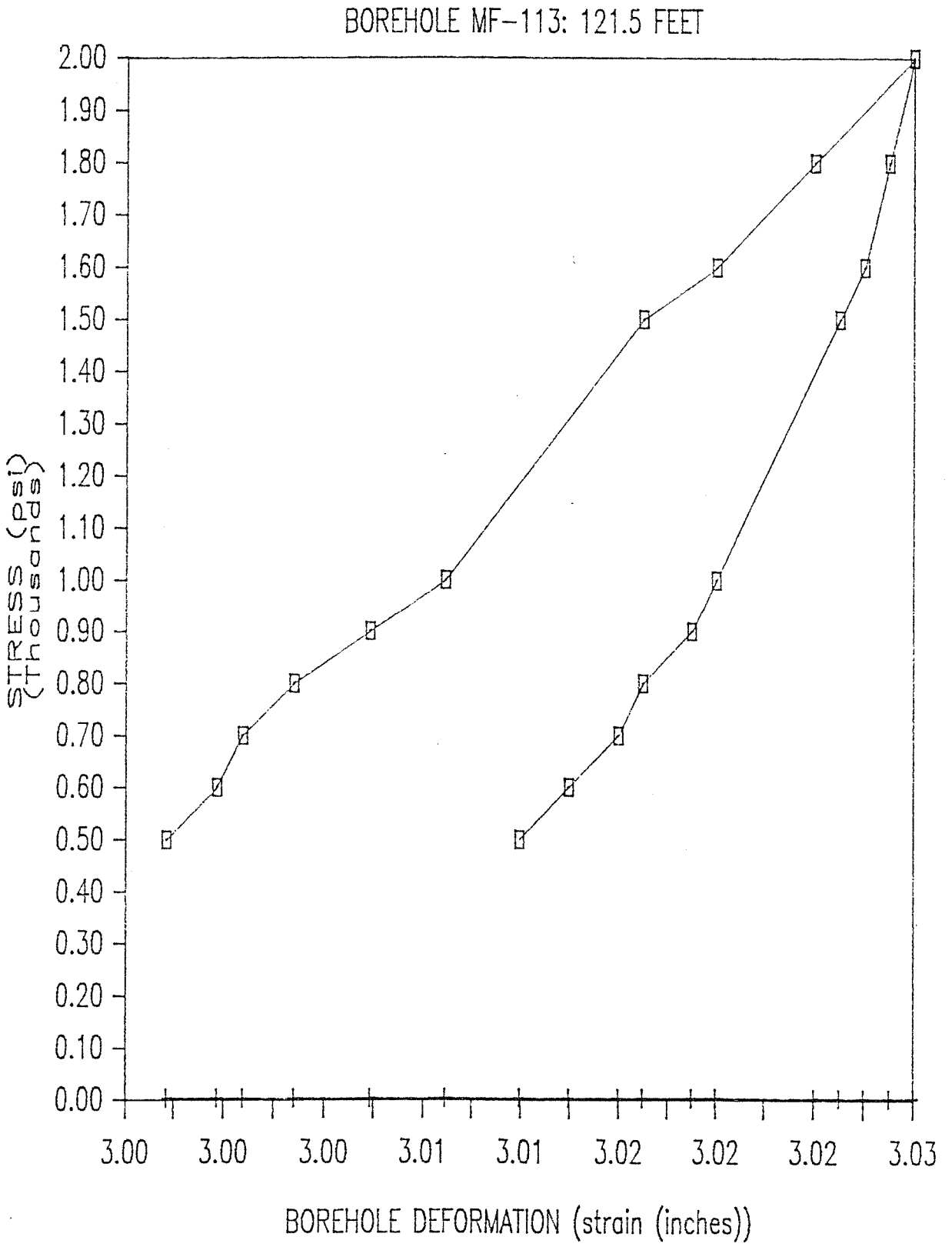
DEFORMATION MODULAE: MINER FLAT DAM



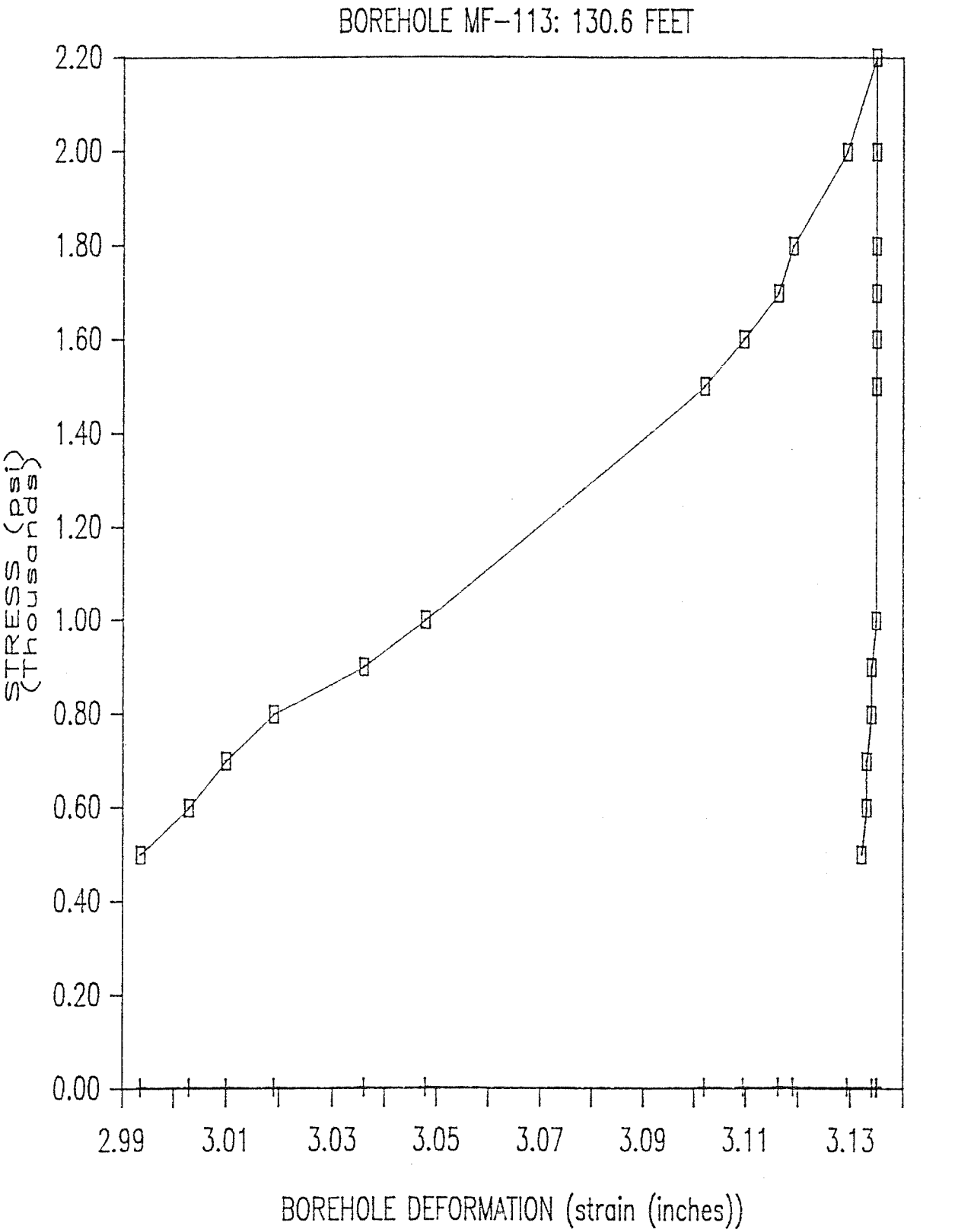
DEFORMATION MODULAE: MINER FLAT DAM



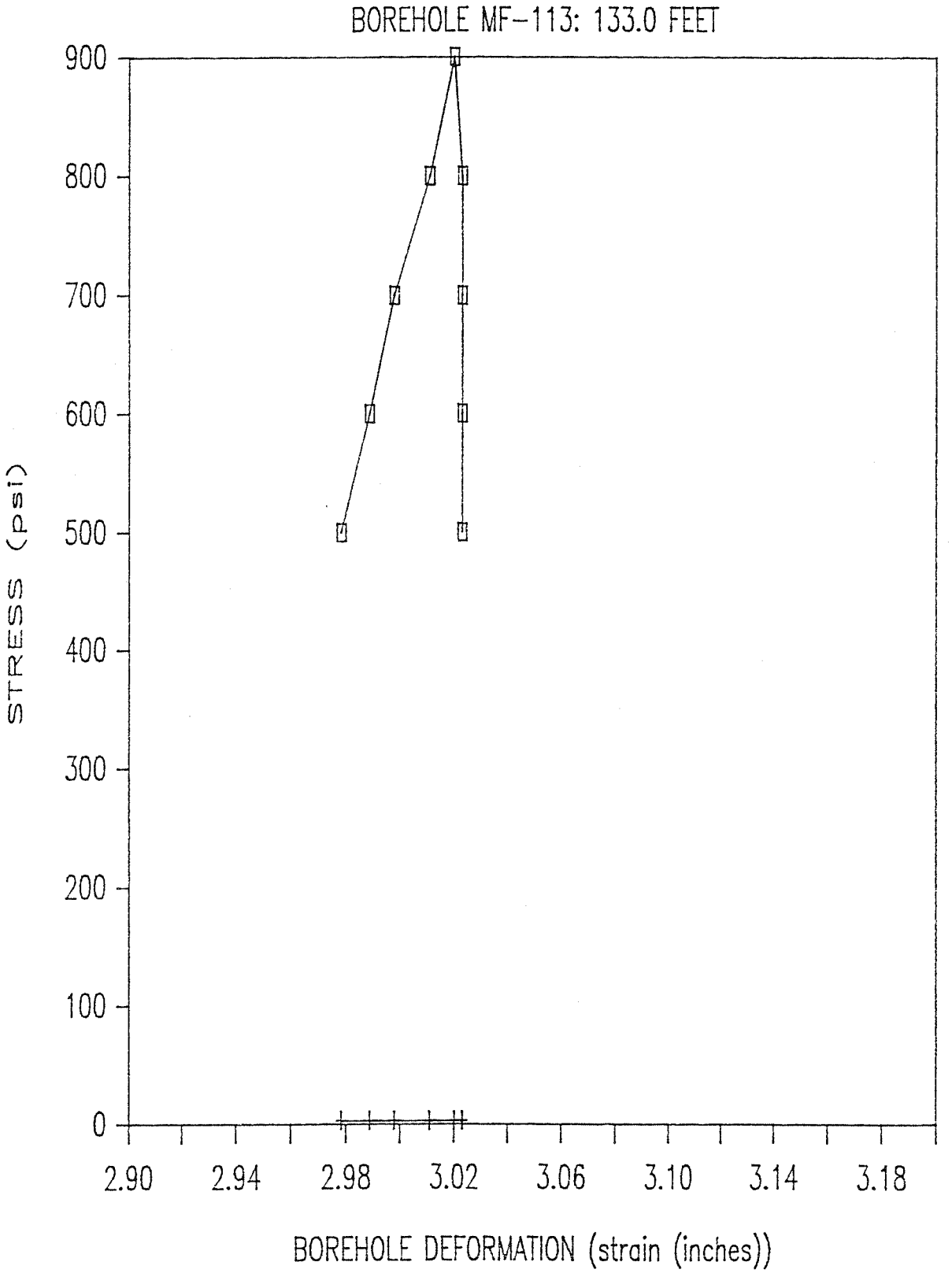
DEFORMATION MODULAE: MINER FLAT DAM



DEFORMATION MODULAE: MINER FLAT DAM



DEFORMATION MODULAE: MINER FLAT DAM



GOODMAN JACK: DEFORMATION MODULI: MINER FLAT DAM SITE

MF-117 10.0 FEET			DIAMETER	DIAMETER			EXTEND	
PRESSURE	NEAR	FAR	NEAR	FAR			E(near)	E(far)
500	0.014	0.000	3.015	3.001			SET	JACK
1,000	0.016	0.003	3.017	3.004			0.84	0.59
2,000	0.020	0.010	3.021	3.010			0.84	0.50
3,000	0.023	0.019	3.024	3.019			1.12	0.39
2,000	0.021	0.019	3.022	3.019			1.68	ERR
1,000	0.017	0.013	3.018	3.013			0.84	0.59
2,000	0.020	0.015	3.021	3.015			1.12	1.76
3,000	0.023	0.020	3.024	3.020			1.12	0.70
4,000	0.026	0.028	3.027	3.028			1.12	0.44
5,000	0.029	0.038	3.030	3.037			1.13	0.35
6,000	0.033	0.050	3.034	3.049			0.85	0.29
5,000	0.033	0.050	3.034	3.049			ERR	ERR
4,000	0.031	0.049	3.032	3.048			1.69	3.48
3,000	0.027	0.045	3.028	3.044			0.85	0.87
2,000	0.024	0.038	3.025	3.037			1.12	0.50
1,000	0.019	0.028	3.020	3.028			0.67	0.35
2,000	0.021	0.030	3.022	3.029			1.68	1.75
3,000	0.024	0.035	3.025	3.034			1.12	0.70
4,000	0.027	0.041	3.028	3.040			1.12	0.58
5,000	0.030	0.046	3.031	3.045			1.13	0.70
6,000	0.033	0.052	3.034	3.051			1.13	0.58
7,000	0.037	0.059	3.038	3.057			0.85	0.49
8,000	0.043	0.070	3.044	3.068			0.57	0.31
9,000	0.090	0.084	3.089	3.082			0.07	0.24
10,000	0.106	0.092	3.105	3.090			0.22	0.42
9,000	0.106	0.092	3.105	3.090			ERR	ERR
8,000	0.106	0.092	3.105	3.090			ERR	ERR
7,000	0.103	0.092	3.102	3.090			1.18	ERR
6,000	0.099	0.092	3.098	3.090	AVERAGE	DEFORMATION	0.89	ERR
5,000	0.095	0.089	3.094	3.087	(10^6 psi)	MODULUS	0.88	1.12
4,000	0.091	0.083	3.090	3.081	0.94	0.57	0.88	0.56
3,000	0.086	0.077	3.086	3.075			0.70	0.57
2,000	0.081	0.068	3.081	3.066	AVERAGE	RECOVERY	0.70	0.38
1,000	0.076	0.056	3.076	3.055	(10^6 psi)	MODULUS	0.70	0.29
					0.93	0.87		

GOODMAN JACK: DEFORMATION MODULI: MINER FLAT DAM SITE

MF-117 30.0 FEET			DIAMETER	DIAMETER			EXTEND	
PRESSURE	NEAR	FAR	NEAR	FAR			E(near) SET	E(far) JACK
500	0.014	0.017	3.015	3.017			0.56	0.35
1,000	0.017	0.022	3.018	3.022			3.35	0.35
2,000	0.018	0.032	3.019	3.031			1.12	0.23
3,000	0.021	0.047	3.022	3.046			3.36	0.58
2,000	0.020	0.041	3.021	3.040			1.68	0.87
1,000	0.018	0.037	3.019	3.036			3.35	3.50
2,000	0.019	0.038	3.020	3.037			1.68	0.87
3,000	0.021	0.042	3.022	3.041			1.12	0.39
4,000	0.024	0.051	3.025	3.050			1.12	0.38
5,000	0.027	0.060	3.028	3.058			1.13	0.38
6,000	0.030	0.069	3.031	3.067			ERR	ERR
5,000	0.030	0.069	3.031	3.067			1.69	ERR
4,000	0.028	0.069	3.029	3.067			1.13	1.72
3,000	0.025	0.067	3.026	3.065			1.12	0.69
2,000	0.022	0.062	3.023	3.060			1.12	0.35
1,000	0.019	0.052	3.020	3.051			3.36	ERR
2,000	0.020	0.052	3.021	3.051			1.12	0.69
3,000	0.023	0.057	3.024	3.056			1.68	0.69
4,000	0.025	0.062	3.026	3.060			1.13	0.86
5,000	0.028	0.066	3.029	3.064			1.13	0.69
6,000	0.031	0.071	3.032	3.069			1.13	0.57
7,000	0.034	0.077	3.035	3.075			0.85	0.49
8,000	0.038	0.084	3.039	3.082			0.85	0.68
9,000	0.042	0.089	3.043	3.087			0.68	0.42
10,000	0.047	0.097	3.048	3.095			ERR	ERR
9,000	0.047	0.097	3.048	3.095			3.42	ERR
8,000	0.046	0.097	3.047	3.095			1.14	ERR
7,000	0.043	0.097	3.044	3.095			1.71	3.35
6,000	0.041	0.096	3.042	3.094	AVERAGE	DEFORMATION	1.14	1.68
5,000	0.038	0.094	3.039	3.092	(10^6 psi)	MODULUS	0.85	0.84
4,000	0.034	0.090	3.035	3.088	1.49	0.72	1.13	0.84
3,000	0.031	0.086	3.032	3.084			0.85	0.49
2,000	0.027	0.079	3.028	3.077	AVERAGE	RECOVERY	0.84	0.29
1,000	0.023	0.067	3.024	3.065	(10^6 psi)	MODULUS		
					1.51	1.06		

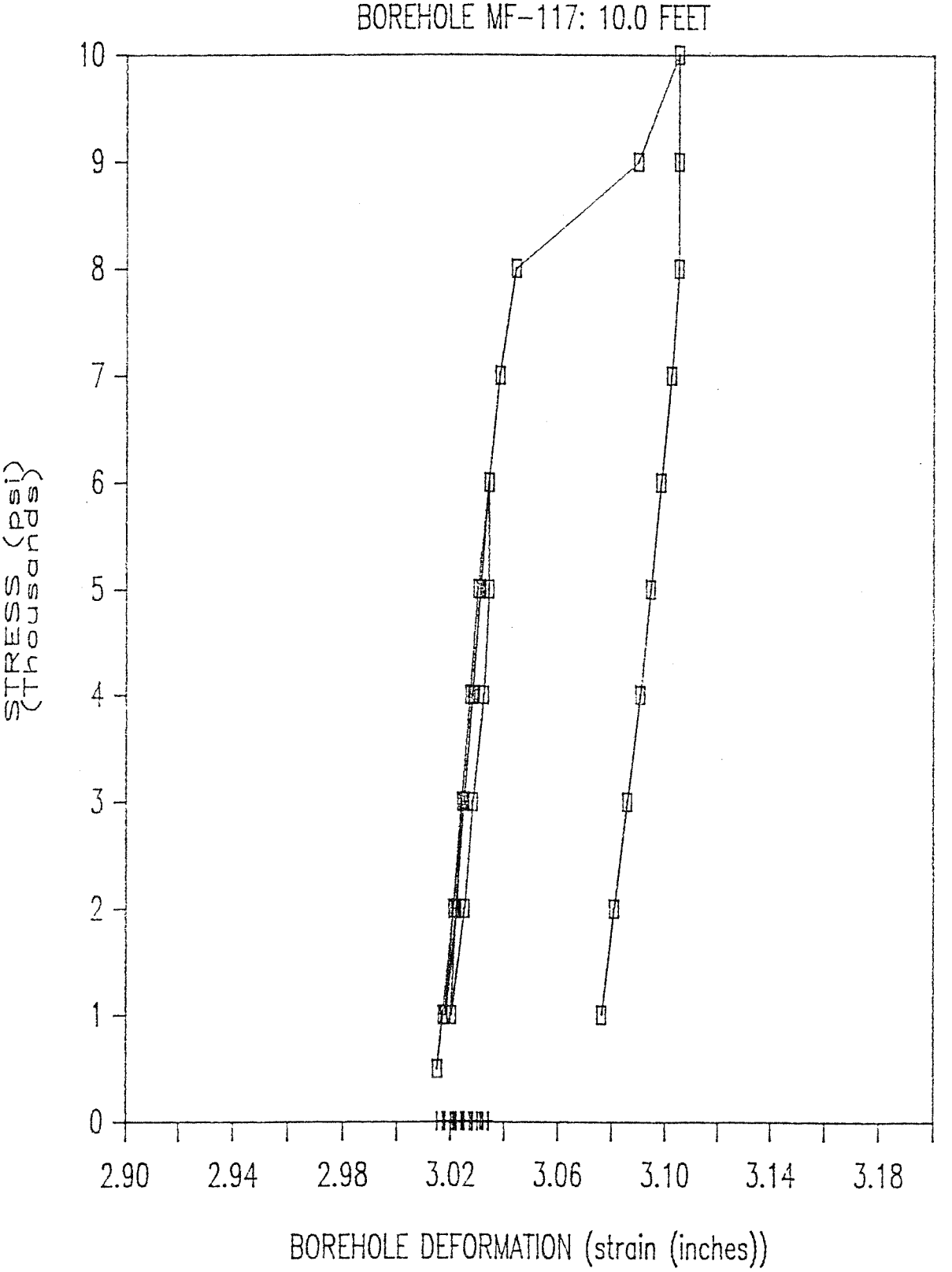
GOODMAN JACK: DEFORMATION MODULI: MINER FLAT DAM SITE

MF-117 50.0 FEET PRESSURE	NEAR	FAR	DIAMETER NEAR	DIAMETER FAR			EXTEND E(near) SET	EXTEND E(far) JACK
500	0.003	0.000	3.004	3.001			0.83	0.88
1,000	0.005	0.002	3.006	3.003			1.11	1.17
2,000	0.008	0.005	3.009	3.005			1.11	1.17
3,000	0.011	0.010	3.012	3.010			1.11	0.70
2,000	0.010	0.010	3.011	3.010			3.33	ERR
1,000	0.007	0.006	3.008	3.006			1.11	0.88
2,000	0.009	0.008	3.010	3.008			1.66	1.76
3,000	0.012	0.011	3.013	3.011			1.11	1.17
4,000	0.016	0.016	3.017	3.016			0.84	0.70
5,000	0.021	0.021	3.022	3.021			0.67	0.70
6,000	0.026	0.026	3.027	3.026			0.67	0.70
5,000	0.025	0.026	3.026	3.026			3.37	ERR
4,000	0.023	0.024	3.024	3.024			1.68	1.76
3,000	0.020	0.021	3.021	3.021			1.12	1.17
2,000	0.016	0.017	3.017	3.017			0.84	0.88
1,000	0.012	0.012	3.013	3.012			0.84	0.70
2,000	0.015	0.014	3.016	3.014			1.11	1.76
3,000	0.018	0.018	3.019	3.018			1.12	0.88
4,000	0.021	0.021	3.022	3.021			1.12	1.17
5,000	0.024	0.024	3.025	3.024			1.12	1.17
6,000	0.027	0.027	3.028	3.027			1.12	1.17
7,000	0.031	0.030	3.032	3.029			0.85	1.17
8,000	0.035	0.034	3.036	3.033			0.85	0.88
9,000	0.040	0.039	3.041	3.038			0.68	0.70
10,000	0.045	0.043	3.046	3.042			0.68	0.87
9,000	0.045	0.043	3.046	3.042			ERR	ERR
8,000	0.043	0.043	3.044	3.042			1.71	ERR
7,000	0.040	0.041	3.041	3.040			1.14	1.74
6,000	0.037	0.038	3.038	3.037	AVERAGE	DEFORMATION	1.14	1.16
5,000	0.034	0.036	3.035	3.035	(10^6 psi)	MODULUS	1.13	1.75
4,000	0.031	0.032	3.032	3.031	0.99	1.02	1.13	0.88
3,000	0.027	0.029	3.028	3.028			0.85	1.17
2,000	0.022	0.024	3.023	3.024	AVERAGE	RECOVERY	0.67	0.70
1,000	0.018	0.019	3.019	3.019	(10^6 psi)	MODULUS	0.84	0.70
					1.39	1.12		

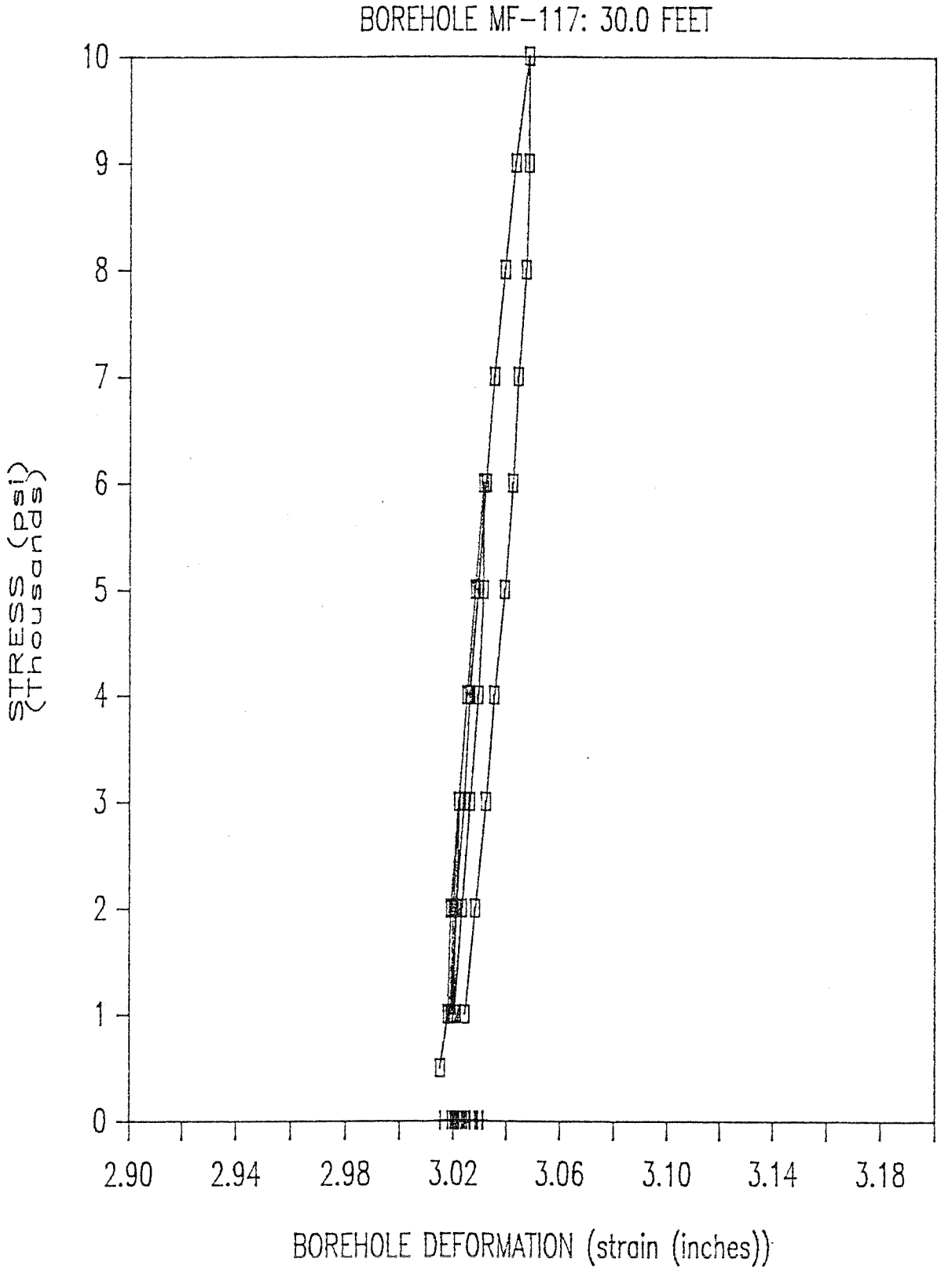
GOODMAN JACK: DEFORMATION MODULI: MINER FLAT DAM SITE

MF-117	90.2 FT		DIAMETER	DIAMETER			EXTEND	
PRESSURE	NEAR	FAR	NEAR	FAR			E(near)	E(far)
1,000	0.000	0.003	3.001	3.004			0.16	0.14
2,000	0.003	0.009	3.004	3.009			1.10	0.59
3,000	0.006	0.014	3.007	3.014			1.11	0.70
4,000	0.010	0.022	3.011	3.022			0.83	0.44
5,000	0.014	0.027	3.015	3.027			0.83	0.70
6,000	0.017	0.031	3.018	3.030			1.12	0.88
7,000	0.020	0.036	3.021	3.035			1.12	0.70
8,000	0.026	0.039	3.027	3.038			0.56	1.17
9,000	0.027	0.043	3.028	3.042	AVERAGE	DEFORMATION	3.38	0.87
10,000	0.030	0.046	3.031	3.045	(10^6 psi)	MODULUS	1.13	1.16
10,000	0.030	0.046	3.031	3.045	1.13	0.74	RETRACT	
9,000	0.030	0.046	3.031	3.045			ERR	ERR
8,000	0.030	0.046	3.031	3.045			ERR	ERR
7,000	0.028	0.046	3.029	3.045			1.69	ERR
6,000	0.027	0.045	3.028	3.044			3.38	ERR
5,000	0.025	0.043	3.026	3.042			1.69	3.48
4,000	0.022	0.041	3.023	3.040			1.12	1.74
3,000	0.020	0.038	3.021	3.037			1.68	1.74
2,000	0.017	0.035	3.018	3.034	AVERAGE	RECOVERY	1.12	1.16
1,000	0.012	0.030	3.013	3.029	(10^6 psi)	MODULUS	0.67	1.17
					1.62	1.86		

DEFORMATION MODULAE: MINER FLAT DAM



DEFORMATION MODULAE: MINER FLAT DAM



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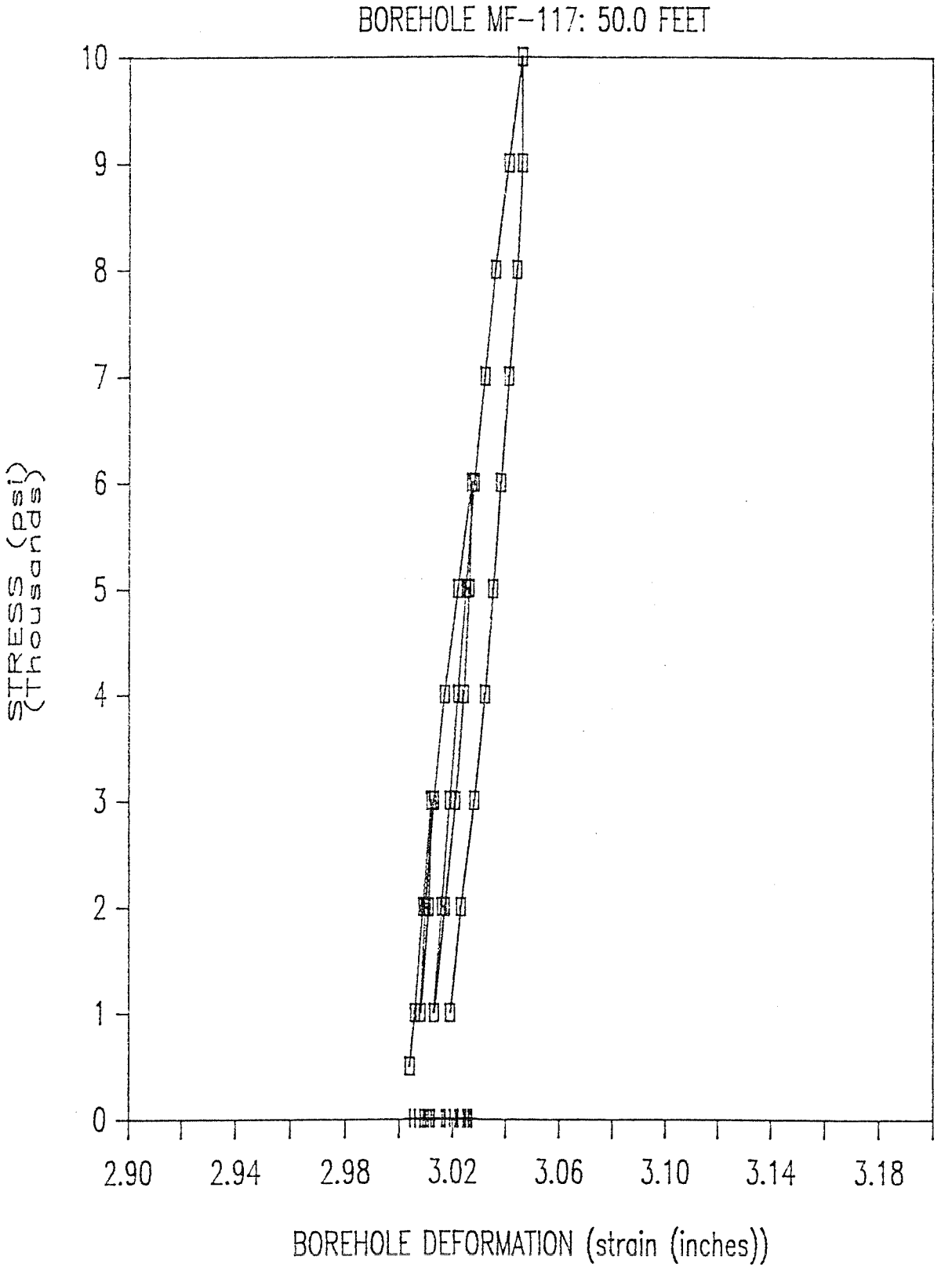
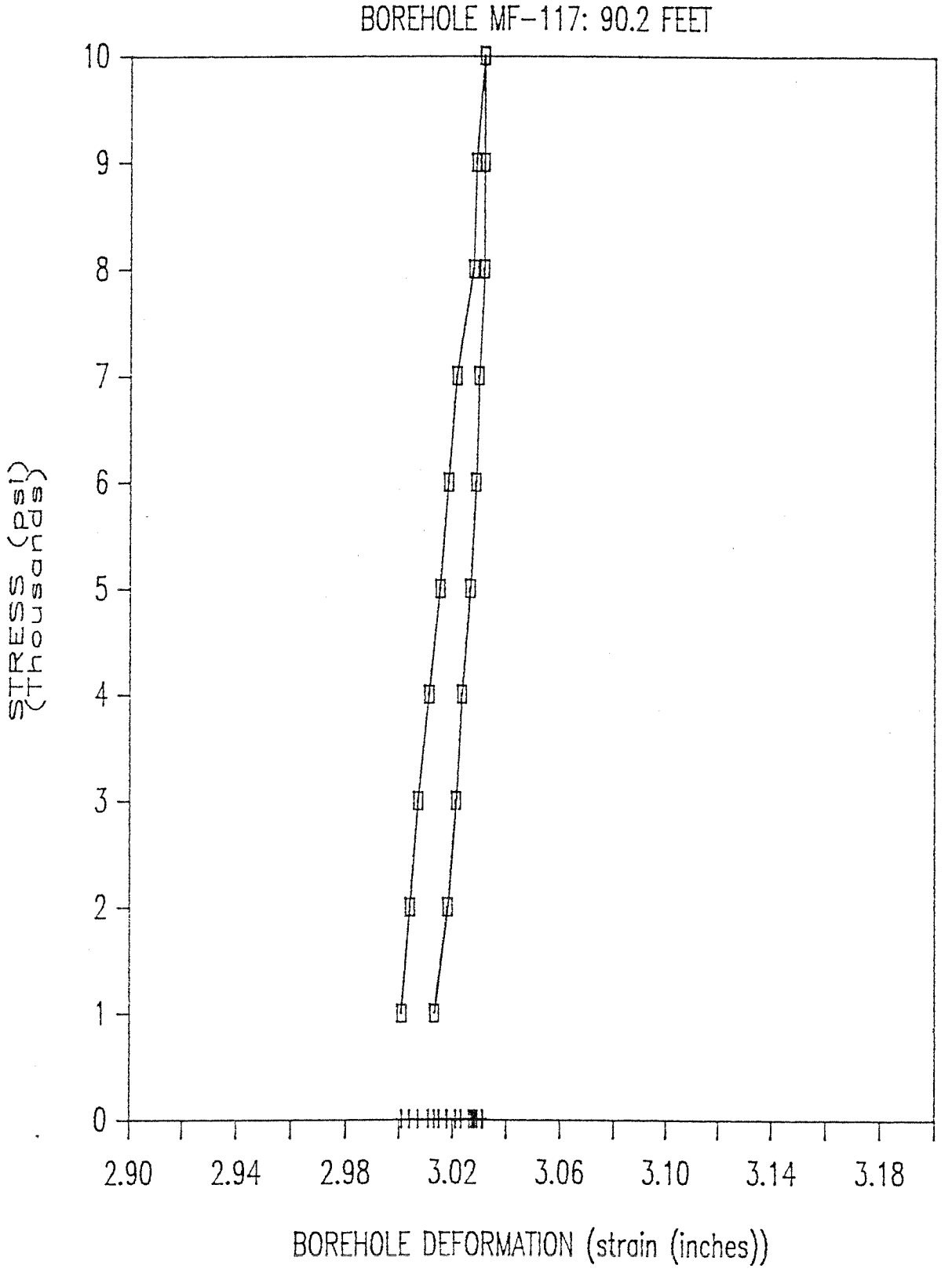


DEFORMATION MODULAE: MINER FLAT DAM



APPENDIX F

Basic Data Drill Hole Surveys

BOREHOLE COORDINATE DATA

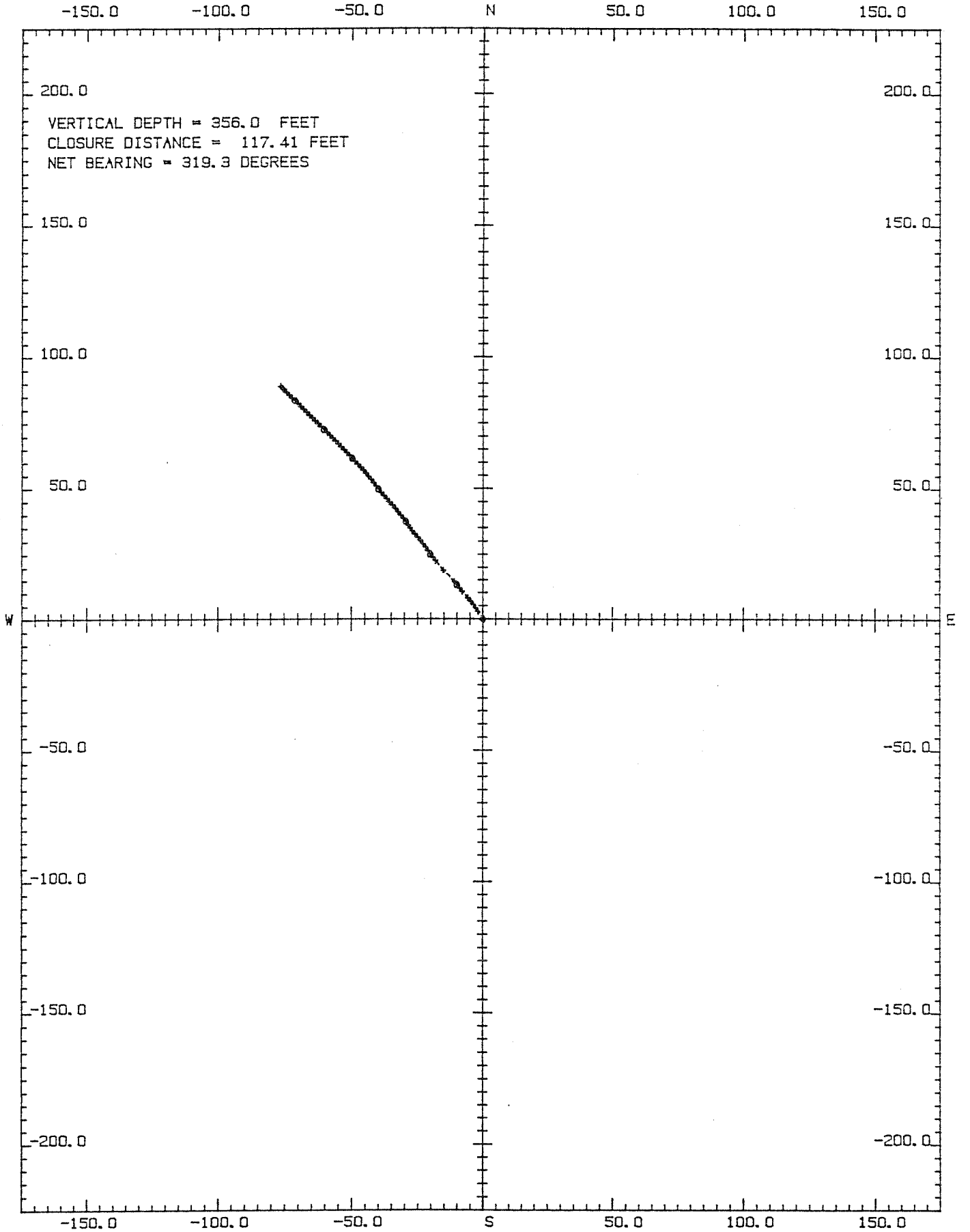
MINER FLAT DAM SITE
BOREHOLE: MF-102

NORTHING: 1,085,798.00 LOGGED BY: CHR FILE: MFS102
EASTING: 576,853.00 DATE: 1/29/86 PAGE: 1
ELEVATION: 6,078.40

CABLE DEPTH	INCLIN	DIRECTION	NORTH STATION	EAST STATION	ELEVATION
0.0	20.0	320	1,085,798.00	576,853.00	6,078.40
10.0	19.5	328	1,085,800.73	576,851.02	6,068.99
15.0	19.4	323	1,085,802.10	576,850.07	6,064.27
20.0	19.4	322	1,085,803.41	576,849.06	6,059.56
25.0	19.4	323	1,085,804.73	576,848.05	6,054.84
30.0	19.4	319	1,085,806.02	576,847.01	6,050.13
40.0	19.4	319	1,085,808.53	576,844.83	6,040.69
45.0	19.2	320	1,085,809.78	576,843.76	6,035.97
50.0	18.5	325	1,085,811.06	576,842.77	6,031.24
55.0	18.4	317	1,085,812.29	576,841.78	6,026.50
75.0	18.4	318	1,085,816.95	576,837.51	6,007.52
90.0	18.2	323	1,085,820.58	576,834.52	5,993.28
95.0	18.4	323	1,085,821.83	576,833.58	5,988.53
100.0	18.5	319	1,085,823.06	576,832.58	5,983.79
105.0	18.3	327	1,085,824.32	576,831.63	5,979.05
110.0	18.7	323	1,085,825.61	576,830.72	5,974.30
115.0	18.3	326	1,085,826.90	576,829.80	5,969.56
120.0	19.2	318	1,085,828.17	576,828.81	5,964.83
125.0	19.1	321	1,085,829.41	576,827.75	5,960.10
130.0	19.0	318	1,085,830.65	576,826.69	5,955.38
135.0	19.0	321	1,085,831.89	576,825.63	5,950.65
140.0	10.0	327	1,085,832.89	576,824.88	5,945.83
145.0	19.0	326	1,085,833.93	576,824.19	5,941.00
150.0	19.0	324	1,085,835.26	576,823.26	5,936.27
155.0	19.0	322	1,085,836.56	576,822.28	5,931.54
160.0	19.1	321	1,085,837.84	576,821.26	5,926.82
165.0	19.0	321	1,085,839.11	576,820.23	5,922.09
170.0	19.0	319	1,085,840.35	576,819.19	5,917.36
175.0	19.0	319	1,085,841.58	576,818.12	5,912.64
180.0	19.0	319	1,085,842.81	576,817.05	5,907.91
185.0	19.0	319	1,085,844.04	576,815.98	5,903.18
190.0	19.0	319	1,085,845.27	576,814.92	5,898.45
195.0	18.9	319	1,085,846.49	576,813.85	5,893.73
200.0	18.0	324	1,085,847.73	576,812.87	5,888.98
205.0	18.0	324	1,085,848.98	576,811.96	5,884.23
210.0	18.1	321	1,085,850.21	576,811.01	5,879.47
215.0	18.0	322	1,085,851.42	576,810.05	5,874.72
220.0	17.9	323	1,085,852.64	576,809.11	5,869.96
225.0	17.9	320	1,085,853.84	576,808.16	5,865.20
230.0	18.0	318	1,085,855.01	576,807.14	5,860.45

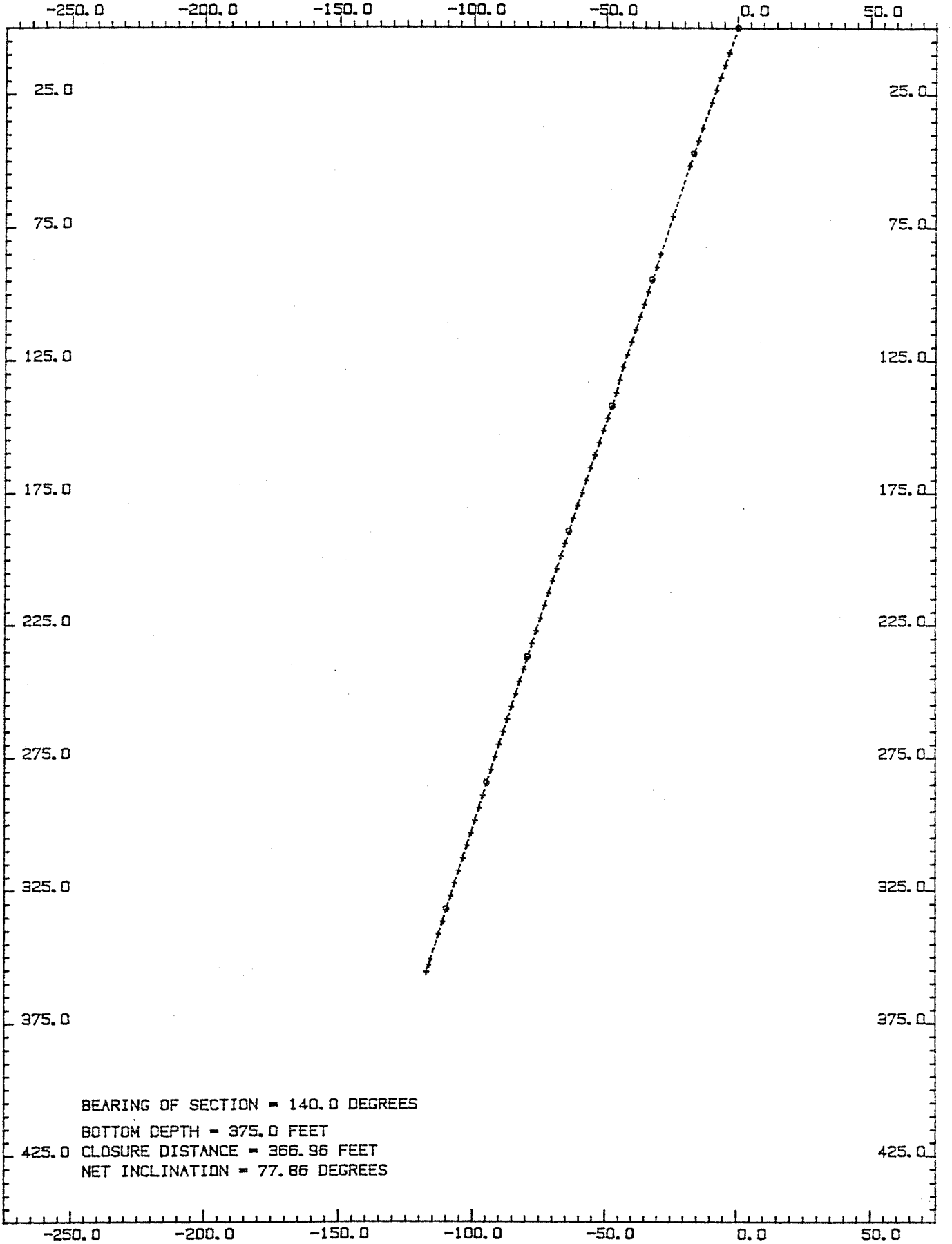
MINER FLAT DAM SITE
PLAN OF BOREHOLE: MF-102

COLLAR NORTHING: 1,085,798.00 COLLAR ELEVATION: 6,078.4 NORTH SCALE: 1 in = 50.0 ft
COLLAR EASTING: 576,853.00 LOGGED BY: CHR DATE: 1/29/86 EAST SCALE: 1 in = 50.0 ft



MINER FLAT DAM SITE
CROSS SECTION OF BOREHOLE: MF-102

COLLAR NORTHING: 1,085,798.00 COLLAR ELEVATION: 6,078.4 HORIZ. SCALE: 1 in = 50.0 ft
COLLAR EASTING: 576,853.00 LOGGED BY: CHR DATE: 1/29/86 VERTICAL SCALE: 1 in = 50.0 ft



BOREHOLE COORDINATE DATA

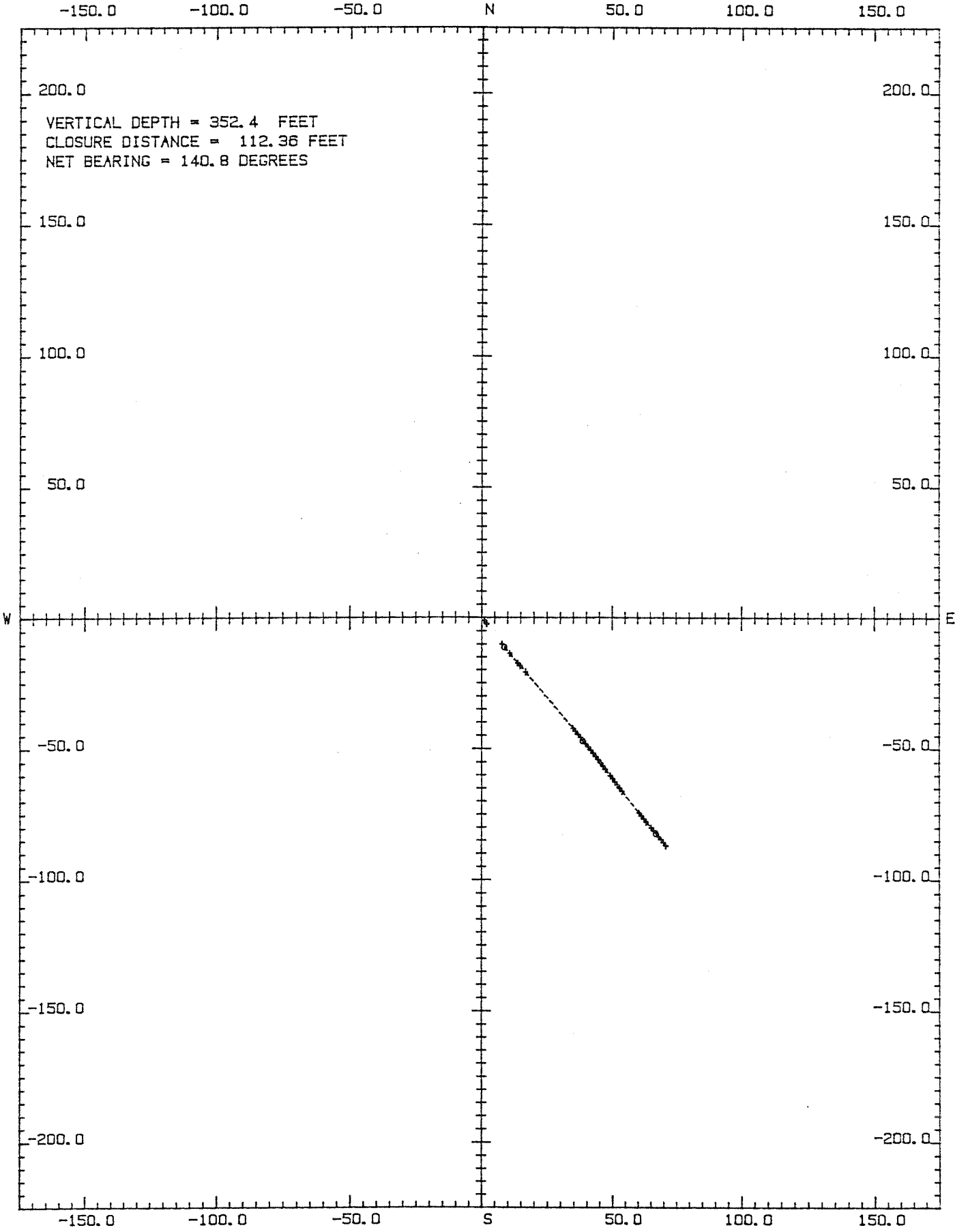
MINER FLAT DAM SITE
BOREHOLE: MF-105

NORTHING: 1,086,058.00 LOGGED BY: CHR FILE: MFS105
EASTING: 576,636.00 DATE: 1/8/86 PAGE: 1
ELEVATION: 6,073.40

CABLE DEPTH	INCLIN	DIRECTION	NORTH STATION	EAST STATION	ELEVATION
10.0	18.5	142	1,086,056.75	576,636.98	6,063.66
15.0	18.8	144	1,086,055.47	576,637.94	6,058.92
45.0	18.4	141	1,086,047.88	576,643.76	6,030.49
50.0	18.4	139	1,086,046.67	576,644.77	6,025.74
60.0	18.3	141	1,086,044.26	576,646.80	6,016.25
75.0	18.2	140	1,086,040.64	576,649.79	6,002.01
80.0	18.2	140	1,086,039.44	576,650.79	5,997.26
90.0	18.2	141	1,086,037.03	576,652.78	5,987.76
180.0	18.0	139	1,086,015.61	576,670.74	5,902.21
185.0	18.0	141	1,086,014.43	576,671.74	5,897.46
190.0	17.9	141	1,086,013.23	576,672.71	5,892.70
194.9	17.9	141	1,086,012.06	576,673.65	5,888.04
200.0	17.9	140	1,086,010.85	576,674.65	5,883.18
205.0	18.0	140	1,086,009.67	576,675.64	5,878.43
210.0	17.9	140	1,086,008.49	576,676.63	5,873.67
215.0	17.9	141	1,086,007.31	576,677.61	5,868.91
220.0	17.9	141	1,086,006.11	576,678.58	5,864.15
225.0	17.9	142	1,086,004.91	576,679.53	5,859.40
230.0	17.9	142	1,086,003.70	576,680.48	5,854.64
235.0	17.9	143	1,086,002.48	576,681.42	5,849.88
240.0	17.8	142	1,086,001.26	576,682.35	5,845.12
245.0	17.8	142	1,086,000.06	576,683.29	5,840.36
255.0	17.7	142	1,085,997.66	576,685.17	5,830.84
260.0	17.7	142	1,085,996.46	576,686.10	5,826.07
265.0	17.7	143	1,085,995.25	576,687.03	5,821.31
270.0	17.6	143	1,085,994.04	576,687.94	5,816.54
275.0	17.6	143	1,085,992.83	576,688.85	5,811.78
280.0	17.5	143	1,085,991.63	576,689.76	5,807.01
315.0	17.5	139	1,085,983.46	576,696.38	5,773.63
320.0	17.4	140	1,085,982.32	576,697.35	5,768.86
325.0	17.4	140	1,085,981.17	576,698.31	5,764.09
330.0	17.3	139	1,085,980.04	576,699.28	5,759.32
340.0	17.3	139	1,085,977.79	576,701.23	5,749.77
345.0	17.4	140	1,085,976.66	576,702.20	5,745.00
350.0	17.1	139	1,085,975.53	576,703.16	5,740.22
355.0	17.2	139	1,085,974.42	576,704.13	5,735.44
360.0	17.5	142	1,085,973.27	576,705.08	5,730.67
365.0	17.5	141	1,085,972.09	576,706.01	5,725.90
370.1	17.5	142	1,085,970.89	576,706.97	5,721.04

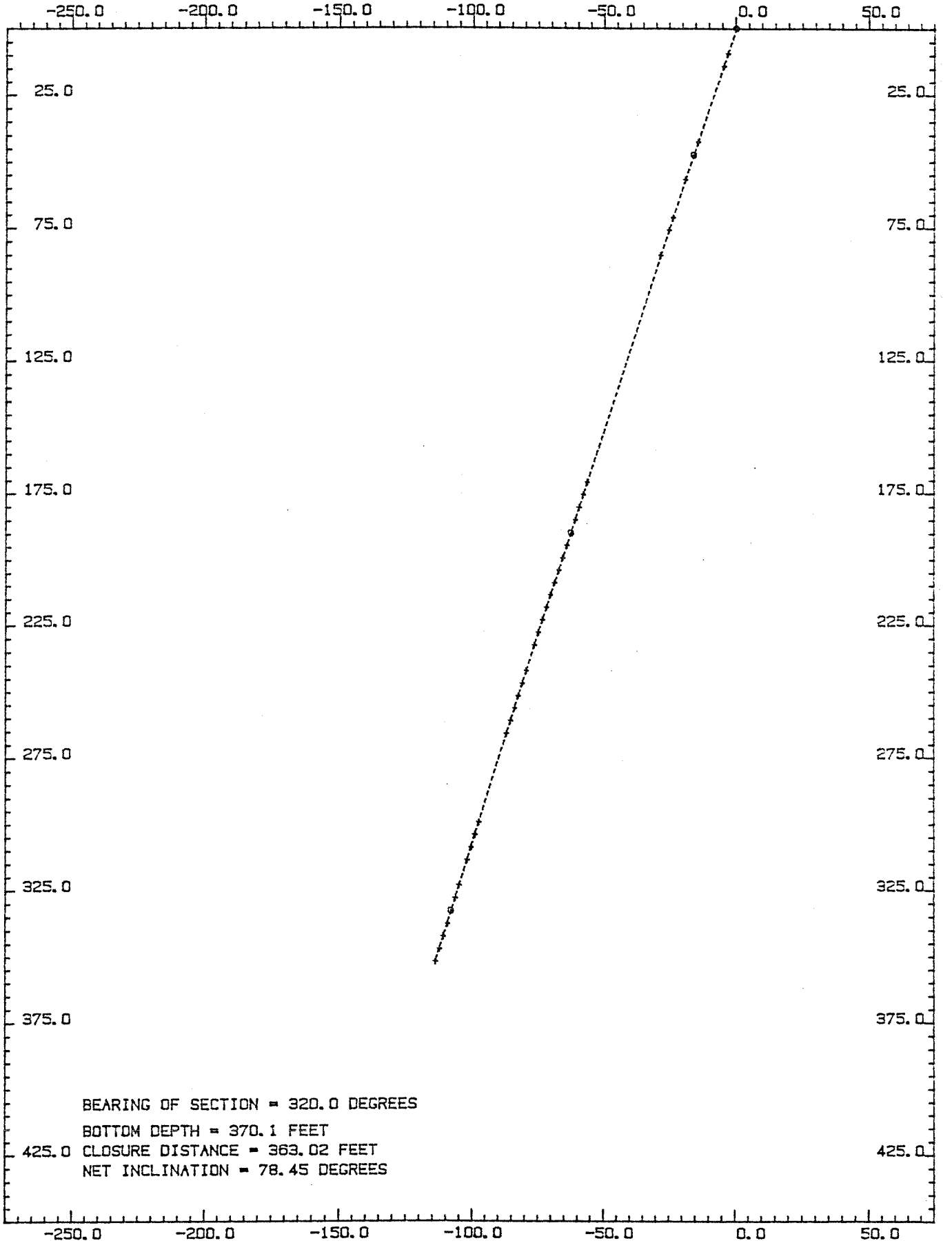
MINER FLAT DAM SITE
PLAN OF BOREHOLE: MF-105

COLLAR NORTHING: 1,086,058.00 COLLAR ELEVATION: 6,073.4 NORTH SCALE: 1 in = 50.0 ft
COLLAR EASTING: 576,636.00 LOGGED BY: CHR DATE: 1/8/86 EAST SCALE: 1 in = 50.0 ft



MINER FLAT DAM SITE
CROSS SECTION OF BOREHOLE: MF-105

COLLAR NORTHING: 1,086,058.00 COLLAR ELEVATION: 6,073.4 HORIZ. SCALE: 1 in = 50.0 ft
COLLAR EASTING: 576,636.00 LOGGED BY: CHR DATE: 1/8/86 VERTICAL SCALE: 1 in = 50.0 ft



BOREHOLE COORDINATE DATA

MINER FLAT DAM SITE
BOREHOLE: MF-106

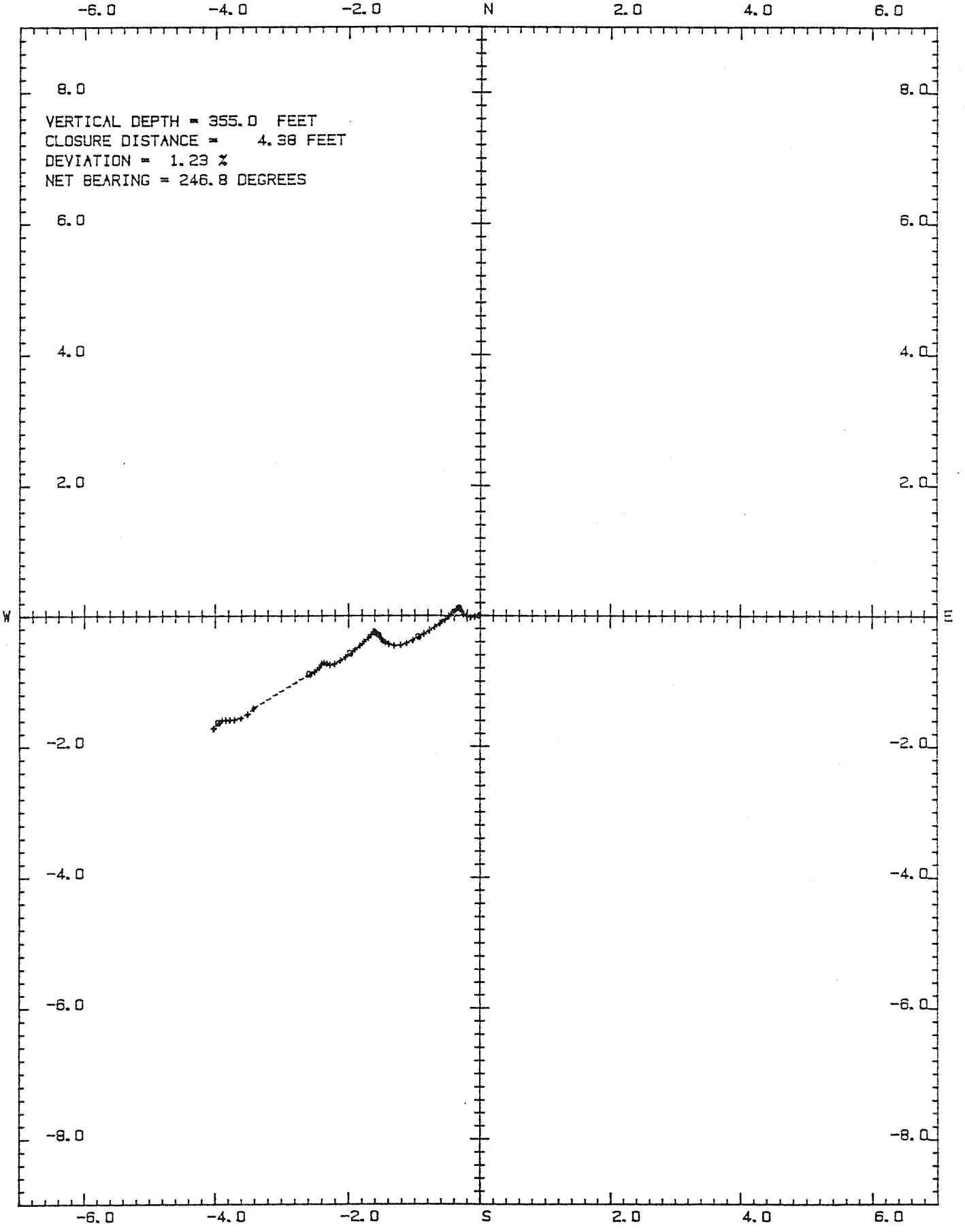
NORTHING: 1,086,059.63 LOGGED BY: CHR FILE: MFS106
EASTING: 576,634.61 DATE: 11/25/85 PAGE: 1
ELEVATION: 6,073.40

CABLE DEPTH	INCLIN	DIRECTION	NORTH STATION	EAST STATION	ELEVATION
5.0	.1	324	1,086,059.63	576,634.61	6,068.40
10.0	.1	234	1,086,059.63	576,634.60	6,063.40
14.9	.5	260	1,086,059.63	576,634.58	6,058.50
20.0	.7	253	1,086,059.62	576,634.53	6,053.40
25.0	.8	271	1,086,059.61	576,634.46	6,048.40
30.0	.7	289	1,086,059.62	576,634.40	6,043.40
35.0	.6	322	1,086,059.65	576,634.35	6,038.40
40.0	.5	324	1,086,059.69	576,634.32	6,033.40
45.0	.4	327	1,086,059.72	576,634.30	6,028.40
50.0	.3	325	1,086,059.74	576,634.28	6,023.40
54.9	.1	234	1,086,059.75	576,634.27	6,018.50
60.0	.9	233	1,086,059.73	576,634.24	6,013.40
65.0	.9	225	1,086,059.67	576,634.18	6,008.40
70.1	.9	227	1,086,059.62	576,634.12	6,003.30
75.0	1.0	232	1,086,059.57	576,634.06	5,998.40
80.0	1.1	233	1,086,059.51	576,633.99	5,993.41
85.0	1.1	236	1,086,059.45	576,633.91	5,988.41
90.0	1.1	237	1,086,059.40	576,633.83	5,983.41
95.0	1.1	240	1,086,059.35	576,633.75	5,978.41
100.0	1.1	241	1,086,059.30	576,633.66	5,973.41
105.0	1.2	239	1,086,059.25	576,633.58	5,968.41
110.0	1.2	250	1,086,059.21	576,633.48	5,963.41
114.8	1.1	249	1,086,059.18	576,633.39	5,958.61
120.0	1.1	281	1,086,059.17	576,633.30	5,953.41
125.0	.9	297	1,086,059.19	576,633.21	5,948.41
130.0	.5	304	1,086,059.22	576,633.16	5,943.41
135.0	.4	297	1,086,059.24	576,633.13	5,938.41
140.0	.5	325	1,086,059.27	576,633.10	5,933.41
144.9	.4	329	1,086,059.30	576,633.08	5,928.51
150.0	.4	319	1,086,059.33	576,633.06	5,923.41
154.9	.3	317	1,086,059.35	576,633.04	5,918.51
160.0	.2	304	1,086,059.37	576,633.02	5,913.41
165.0	.3	299	1,086,059.38	576,633.00	5,908.41
169.9	.3	229	1,086,059.38	576,632.98	5,903.51
174.9	.8	220	1,086,059.34	576,632.95	5,898.52
179.5	.9	226	1,086,059.29	576,632.90	5,893.92
184.9	1.0	226	1,086,059.23	576,632.84	5,888.52
189.7	1.0	228	1,086,059.17	576,632.78	5,883.72
195.0	1.1	230	1,086,059.11	576,632.70	5,878.42
200.0	1.0	231	1,086,059.05	576,632.63	5,873.42

CABLE DEPTH	INCLIN	DIRECTION	NORTH STATION	EAST STATION	ELEVATION
205.0	1.1	234	1,086,058.99	576,632.56	5,868.42
209.8	1.1	235	1,086,058.94	576,632.48	5,863.62
214.9	1.2	240	1,086,058.89	576,632.40	5,858.52
220.0	.6	297	1,086,058.87	576,632.33	5,853.42
225.0	.5	294	1,086,058.89	576,632.29	5,848.42
230.0	.5	293	1,086,058.91	576,632.25	5,843.42
235.0	.8	214	1,086,058.89	576,632.21	5,838.42
240.0	.8	214	1,086,058.83	576,632.17	5,833.42
244.8	1.4	231	1,086,058.77	576,632.10	5,828.62
250.0	.6	276	1,086,058.73	576,632.03	5,823.43
315.0	1.3	222	1,086,058.22	576,631.19	5,758.44
320.1	1.5	229	1,086,058.13	576,631.10	5,753.34
325.0	1.3	249	1,086,058.07	576,631.00	5,748.44
330.0	1.0	266	1,086,058.05	576,630.91	5,743.44
335.0	.7	269	1,086,058.04	576,630.83	5,738.44
340.0	.7	270	1,086,058.04	576,630.77	5,733.44
345.0	.6	269	1,086,058.04	576,630.72	5,728.44
350.0	1.3	216	1,086,057.99	576,630.66	5,723.44
354.5	1.4	222	1,086,057.91	576,630.59	5,718.94
355.0	.7	247	1,086,057.91	576,630.58	5,718.44

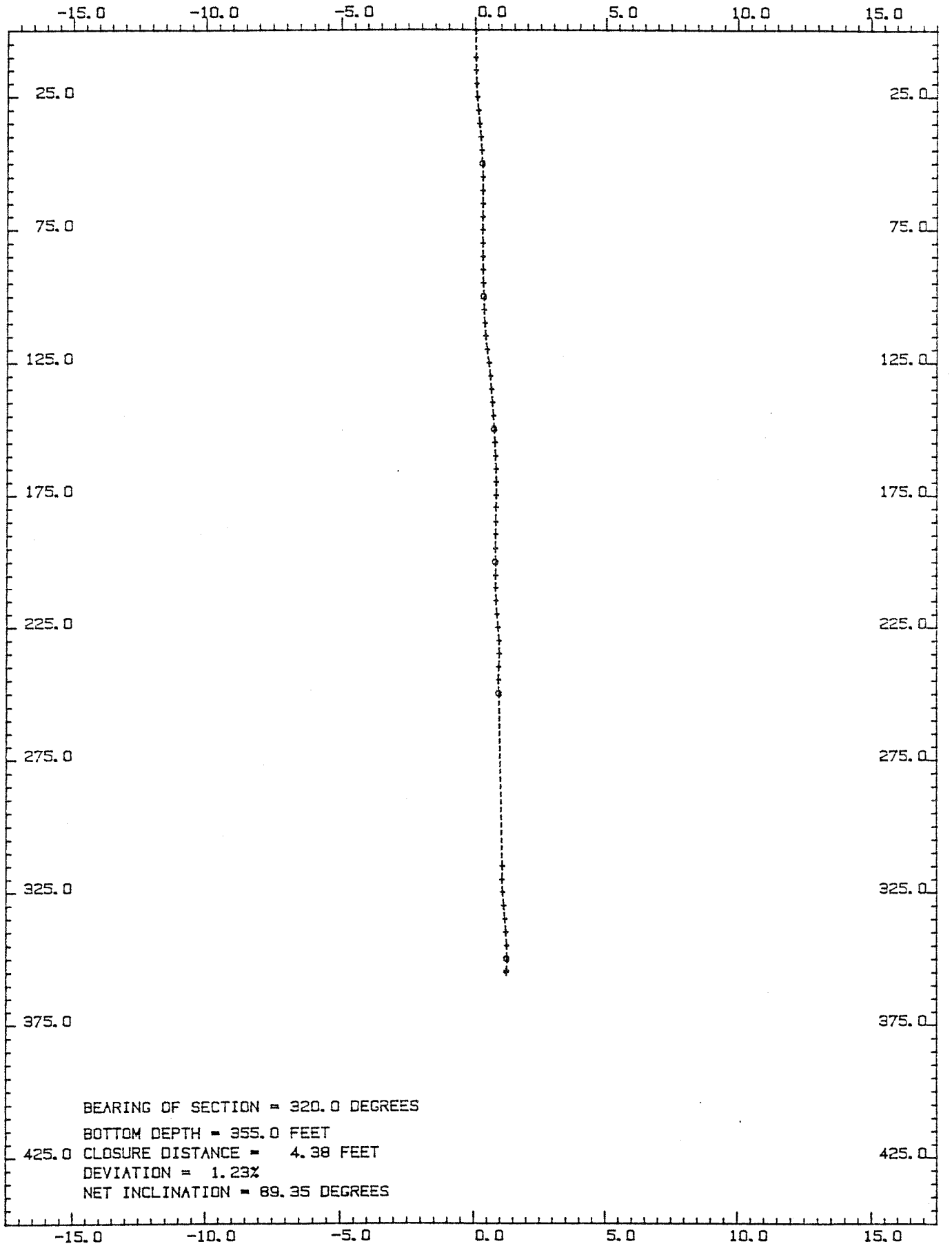
MINER FLAT DAM SITE
PLAN OF BOREHOLE: MF-106

COLLAR NORTHING: 1,086,059.63 COLLAR ELEVATION: 6,073.4 NORTH SCALE: 1 in = 2.0 ft
COLLAR EASTING: 576,634.61 LOGGED BY: CHR DATE: 11/25/85 EAST SCALE: 1 in = 2.0 ft



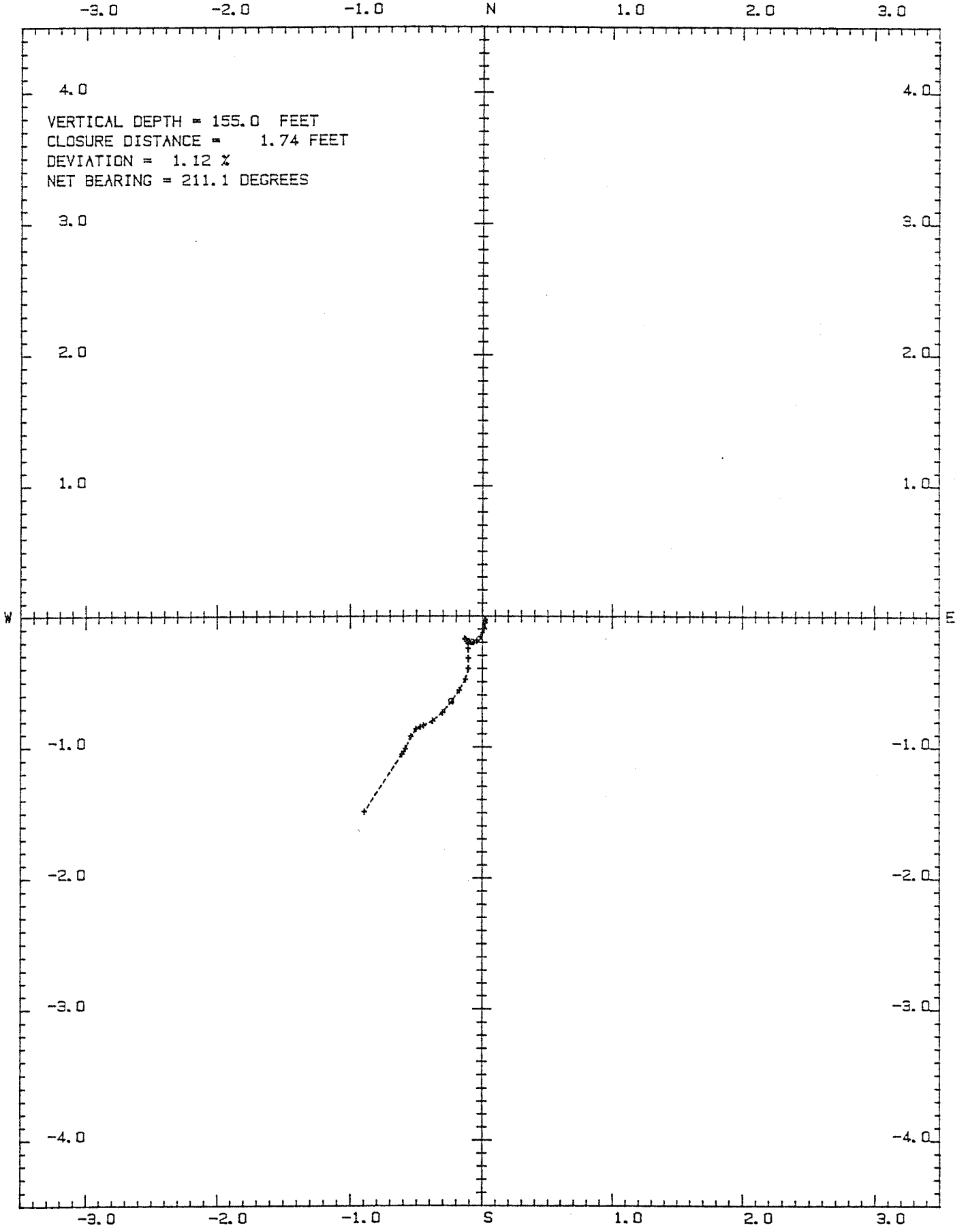
MINER FLAT DAM SITE
CROSS SECTION OF BOREHOLE: MF-106

COLLAR NORTHING: 1,086,059.63 COLLAR ELEVATION: 6,073.4 HORIZ. SCALE: 1 in = 5.0 ft
COLLAR EASTING: 576,634.61 LOGGED BY: CHR DATE: 11/25/85 VERTICAL SCALE: 1 in = 50.0 ft



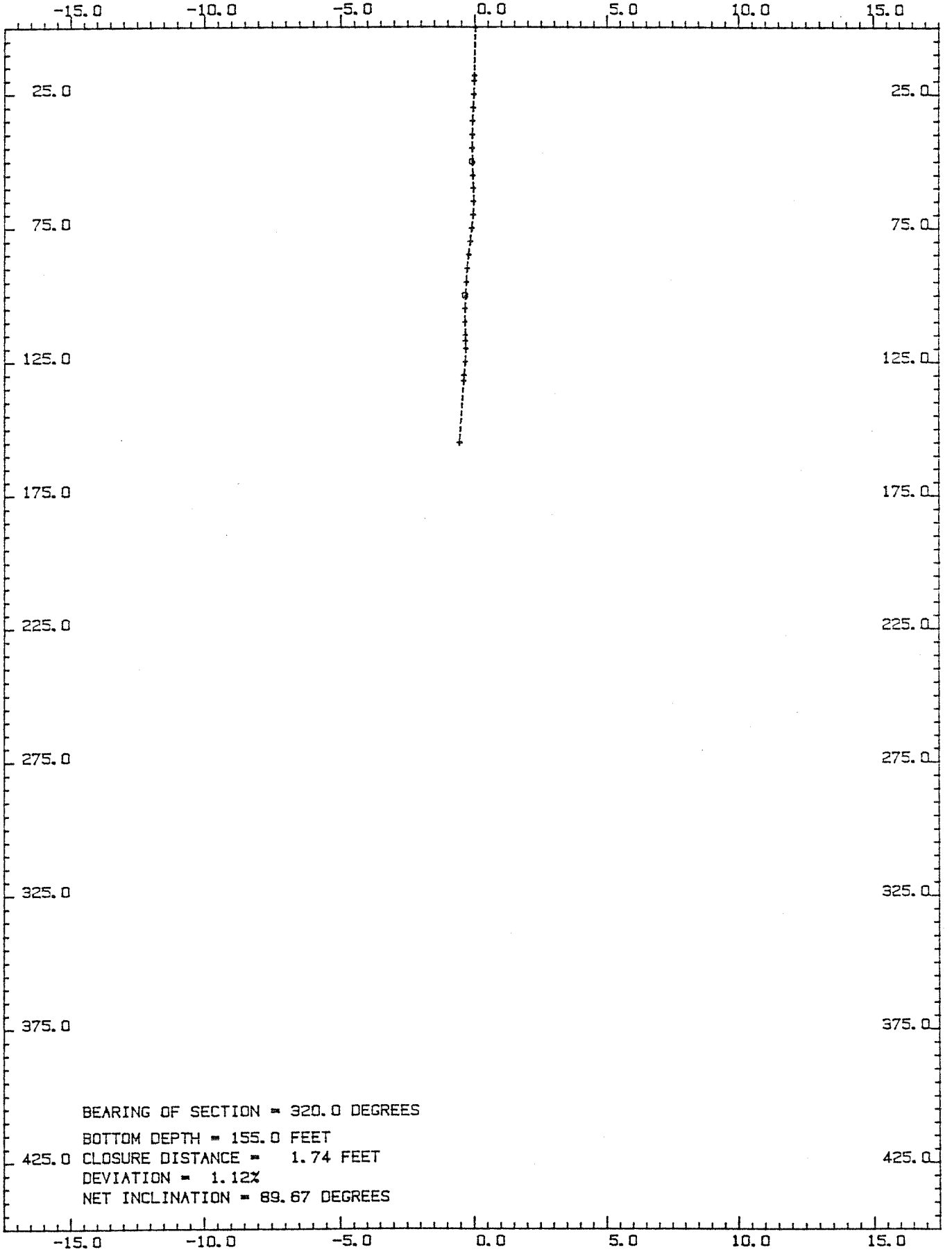
MINER FLAT DAM SITE
PLAN OF BOREHOLE: MF-113

COLLAR NORTHING: 1,086,019.00 COLLAR ELEVATION: 5,920.5 NORTH SCALE: 1 in = 1.0 ft
COLLAR EASTING: 576,698.00 LOGGED BY: CHR DATE: 2/28/86 EAST SCALE: 1 in = 1.0 ft



MINER FLAT DAM SITE
CROSS SECTION OF BOREHOLE: MF-113

COLLAR NORTHING: 1,086,019.00 COLLAR ELEVATION: 5,920.5 HORIZ. SCALE: 1 in = 5.0 ft
COLLAR EASTING: 576,698.00 LOGGED BY: CHR DATE: 2/28/86 VERTICAL SCALE: 1 in = 50.0 ft



BOREHOLE COORDINATE DATA

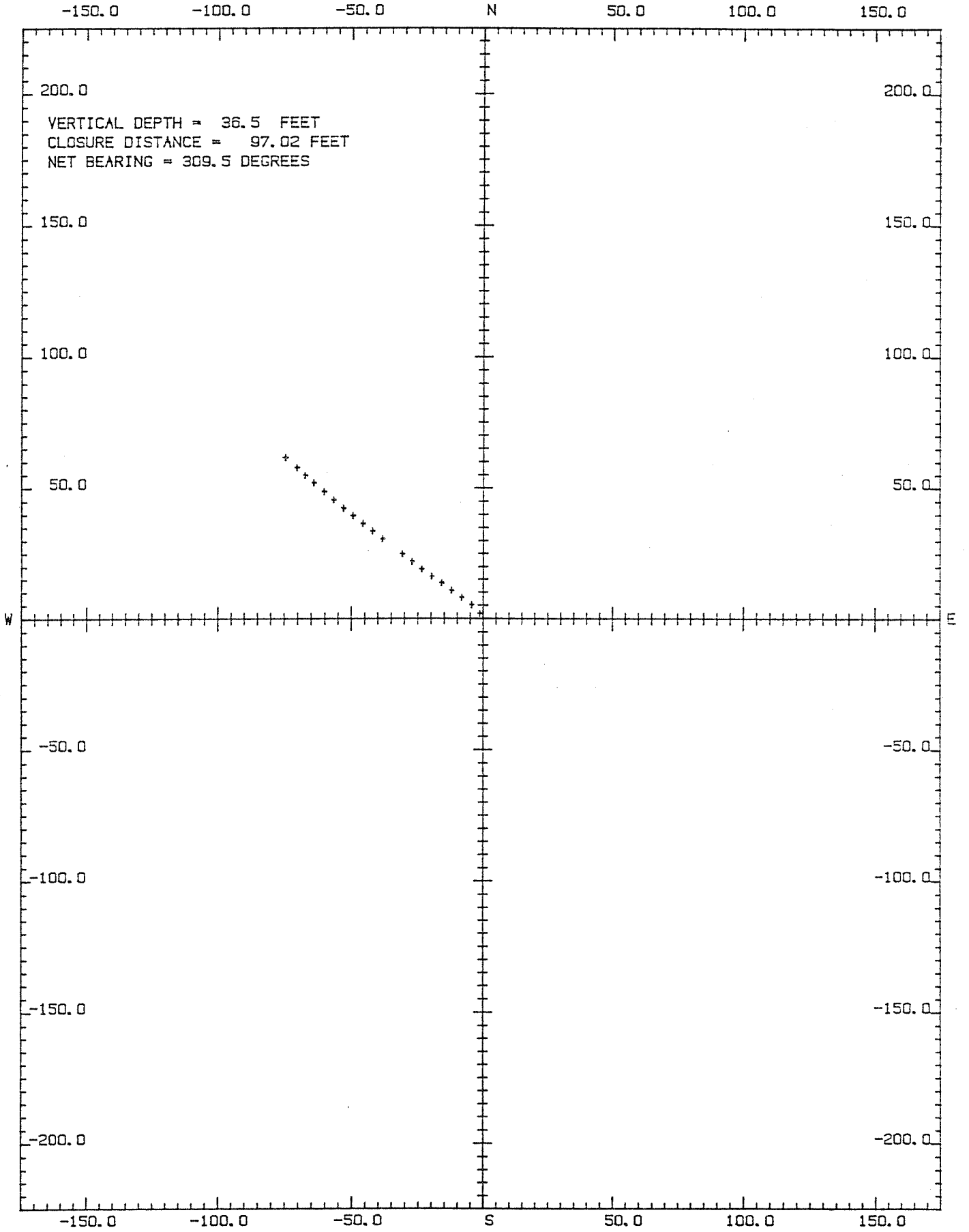
MINER FLAT DAM SITE
BOREHOLE: MF-117

NORTHING: 1,086,025.00 LOGGED BY: CHR FILE: MFS117
EASTING: 576,695.00 DATE: 3/10/86 PAGE: 1
ELEVATION: 5,924.80

CABLE DEPTH	INCLIN	DIRECTION	NORTH STATION	EAST STATION	ELEVATION
5.0	70.2	322	1,086,026.85	576,693.55	5,921.45
10.0	71.3	307	1,086,030.13	576,690.21	5,919.80
15.0	71.3	305	1,086,032.92	576,686.38	5,918.20
20.0	71.5	306	1,086,035.67	576,682.52	5,916.61
25.0	71.2	306	1,086,038.45	576,678.69	5,915.01
30.0	71.0	306	1,086,041.23	576,674.86	5,913.39
34.9	71.0	308	1,086,044.02	576,671.16	5,911.79
40.0	70.8	308	1,086,046.99	576,667.37	5,910.12
45.0	70.7	308	1,086,049.89	576,663.65	5,908.48
55.0	70.6	308	1,086,055.70	576,656.21	5,905.16
60.0	70.5	309	1,086,058.64	576,652.52	5,903.50
65.0	70.6	309	1,086,061.60	576,648.86	5,901.83
70.0	70.6	310	1,086,064.60	576,645.22	5,900.17
74.9	70.5	309	1,086,067.54	576,641.65	5,898.54
80.0	70.5	311	1,086,070.63	576,637.97	5,896.84
85.0	70.4	311	1,086,073.72	576,634.42	5,895.16
90.4	70.2	312	1,086,077.09	576,630.61	5,893.34
94.9	70.2	312	1,086,079.93	576,627.46	5,891.82
99.4	70.5	313	1,086,082.79	576,624.34	5,890.31
105.5	70.2	312	1,086,086.67	576,620.10	5,888.26

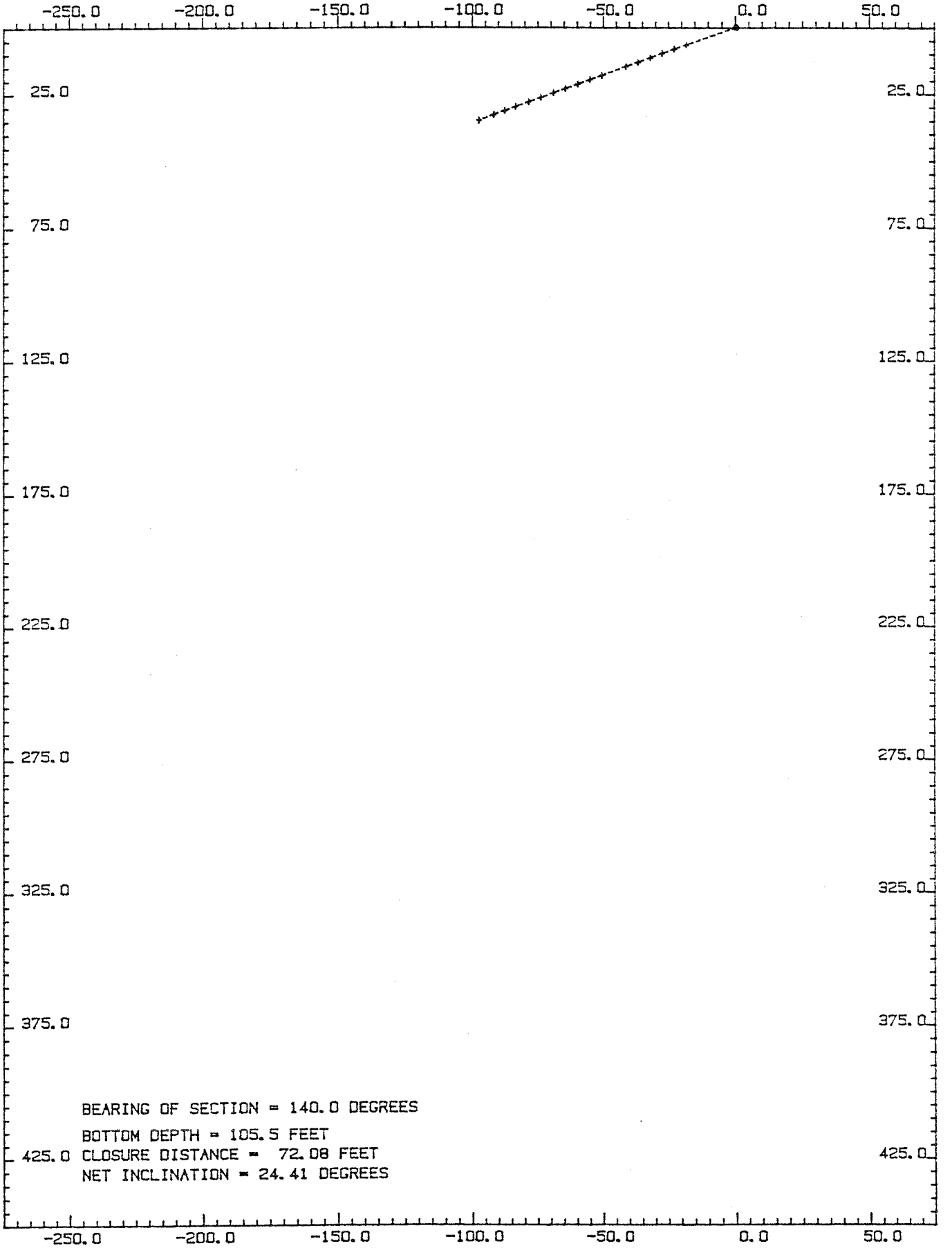
MINER FLAT DAM SITE
PLAN OF BOREHOLE: MF-117

COLLAR NORTHING: 1,086,025.00 COLLAR ELEVATION: 5,924.8 NORTH SCALE: 1 in = 50.0 ft
COLLAR EASTING: 576,695.00 LOGGED BY: CHR DATE: 3/10/86 EAST SCALE: 1 in = 50.0 ft



MINER FLAT DAM SITE
CROSS SECTION OF BOREHOLE: MF-117

COLLAR NORTHING: 1,086,025.00 COLLAR ELEVATION: 5,924.8 HORIZ. SCALE: 1 in = 50.0 ft
COLLAR EASTING: 576,695.00 LOGGED BY: CHR DATE: 3/10/86 VERTICAL SCALE: 1 in = 50.0 ft



BOREHOLE COORDINATE DATA

MINER FLAT DAM SITE
BOREHOLE: MF-118

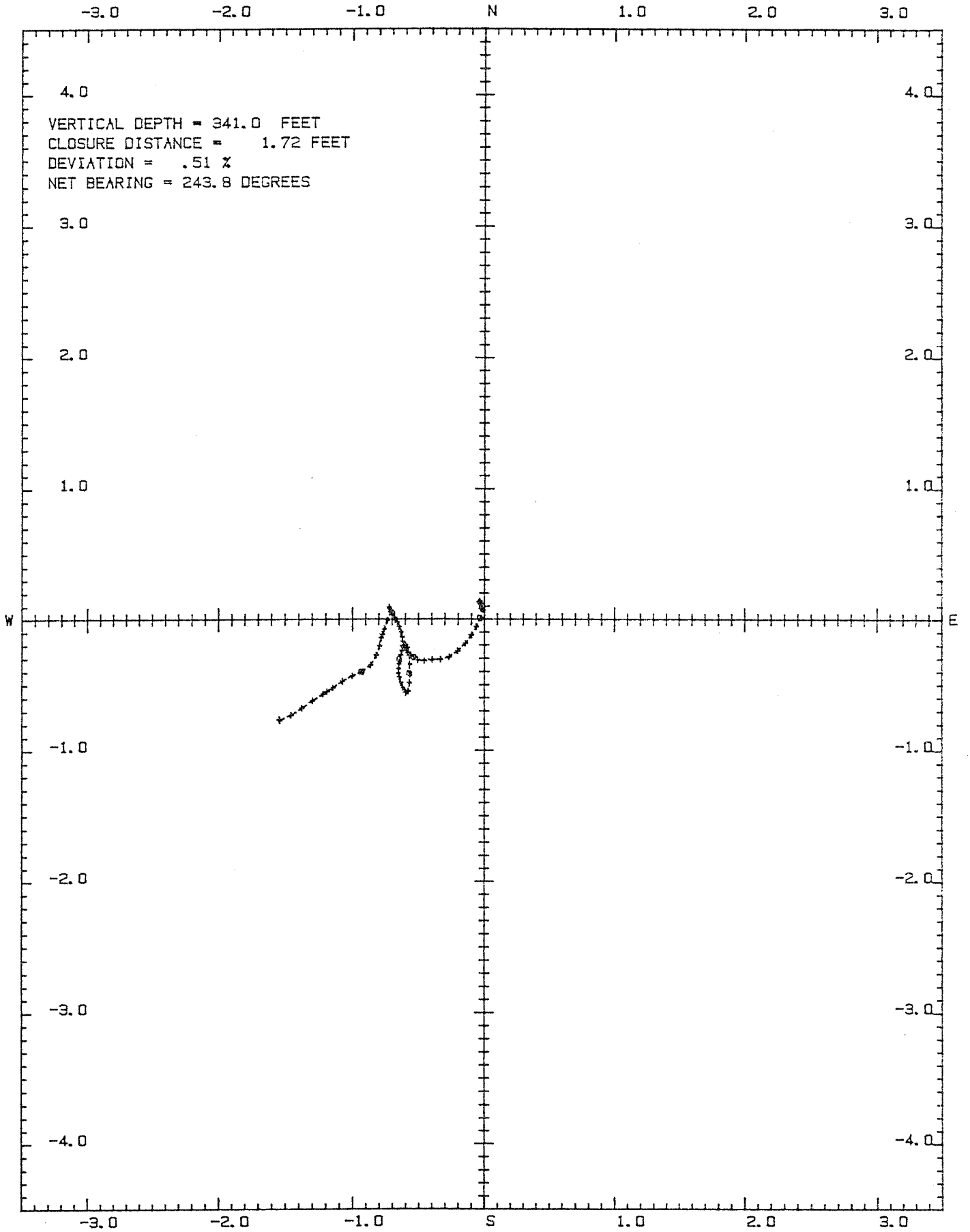
NORTHING: 1,086,321.00 LOGGED BY: CHR FILE: MFS118
EASTING: 576,417.00 DATE: 1/5/86 PAGE: 1
ELEVATION: 6,077.00

CABLE DEPTH	INCLIN	DIRECTION	NORTH STATION	EAST STATION	ELEVATION
20.0	.5	342	1,086,321.08	576,416.97	6,057.00
25.0	.3	336	1,086,321.12	576,416.96	6,052.00
30.0	.2	1	1,086,321.14	576,416.96	6,047.00
35.0	.2	119	1,086,321.14	576,416.96	6,042.00
40.0	.4	154	1,086,321.12	576,416.98	6,037.00
45.0	.7	186	1,086,321.07	576,416.98	6,032.00
50.0	.9	203	1,086,321.01	576,416.96	6,027.00
55.0	.8	206	1,086,320.94	576,416.93	6,022.00
60.0	.9	214	1,086,320.88	576,416.90	6,017.00
65.0	.9	218	1,086,320.81	576,416.85	6,012.00
70.0	1.0	232	1,086,320.76	576,416.79	6,007.00
75.0	.9	239	1,086,320.71	576,416.72	6,002.00
80.0	.7	275	1,086,320.69	576,416.66	5,997.01
85.0	.7	262	1,086,320.69	576,416.60	5,992.01
90.0	.7	265	1,086,320.68	576,416.54	5,987.01
95.0	.5	292	1,086,320.69	576,416.49	5,982.01
100.0	.3	323	1,086,320.71	576,416.46	5,977.01
105.0	.4	299	1,086,320.73	576,416.44	5,972.01
110.0	.3	321	1,086,320.74	576,416.41	5,967.01
115.0	.3	331	1,086,320.77	576,416.40	5,962.01
120.0	.3	324	1,086,320.79	576,416.38	5,957.01
125.0	.2	85	1,086,320.80	576,416.39	5,952.01
130.0	.1	43	1,086,320.80	576,416.40	5,947.01
135.0	.6	159	1,086,320.78	576,416.41	5,942.01
140.0	.8	172	1,086,320.72	576,416.42	5,937.01
145.0	.8	182	1,086,320.65	576,416.43	5,932.01
150.0	.8	178	1,086,320.58	576,416.43	5,927.01
155.0	.8	184	1,086,320.51	576,416.43	5,922.01
160.0	.7	194	1,086,320.45	576,416.42	5,917.01
165.0	.5	328	1,086,320.44	576,416.40	5,912.01
170.0	.5	334	1,086,320.48	576,416.38	5,907.01
175.0	.5	341	1,086,320.52	576,416.36	5,902.01
180.0	.4	344	1,086,320.55	576,416.35	5,897.01
185.0	.4	357	1,086,320.59	576,416.34	5,892.01
190.0	.4	3	1,086,320.62	576,416.34	5,887.01
195.0	.4	6	1,086,320.66	576,416.34	5,882.01
200.0	.4	14	1,086,320.69	576,416.35	5,877.01
205.0	.4	13	1,086,320.73	576,416.36	5,872.01
210.0	.4	18	1,086,320.76	576,416.37	5,867.01
215.0	.4	1	1,086,320.79	576,416.37	5,862.01

CABLE DEPTH	INCLIN	DIRECTION	NORTH STATION	EAST STATION	ELEVATION
220.0	.4	355	1,086,320.83	576,416.37	5,857.01
225.0	.4	357	1,086,320.86	576,416.37	5,852.01
230.0	.5	338	1,086,320.90	576,416.36	5,847.01
235.0	.5	337	1,086,320.94	576,416.34	5,842.01
240.0	.4	337	1,086,320.98	576,416.33	5,837.01
245.0	.5	333	1,086,321.01	576,416.31	5,832.01
250.0	.4	333	1,086,321.05	576,416.29	5,827.01
255.0	.5	320	1,086,321.08	576,416.27	5,822.01
260.0	.3	112	1,086,321.09	576,416.27	5,817.01
265.0	.7	187	1,086,321.06	576,416.28	5,812.01
270.0	.9	206	1,086,320.99	576,416.26	5,807.01
275.0	.8	196	1,086,320.92	576,416.23	5,802.01
278.0	.8	202	1,086,320.88	576,416.22	5,799.01
280.0	.7	188	1,086,320.86	576,416.21	5,797.01
285.0	.8	195	1,086,320.79	576,416.20	5,792.01
290.0	.9	201	1,086,320.72	576,416.17	5,787.01
295.0	1.1	219	1,086,320.65	576,416.13	5,782.02
300.0	.9	249	1,086,320.60	576,416.06	5,777.02
305.0	.9	243	1,086,320.57	576,415.99	5,772.02
310.0	1.0	238	1,086,320.53	576,415.92	5,767.02
315.0	1.0	235	1,086,320.48	576,415.85	5,762.02
318.0	1.0	235	1,086,320.45	576,415.80	5,759.02
320.0	1.0	238	1,086,320.43	576,415.78	5,757.02
325.0	1.1	237	1,086,320.38	576,415.70	5,752.02
330.0	1.1	234	1,086,320.32	576,415.62	5,747.02
335.0	1.1	237	1,086,320.27	576,415.54	5,742.02
340.0	1.0	255	1,086,320.23	576,415.46	5,737.02
341.0	1.1	32	1,086,320.24	576,415.45	5,736.02

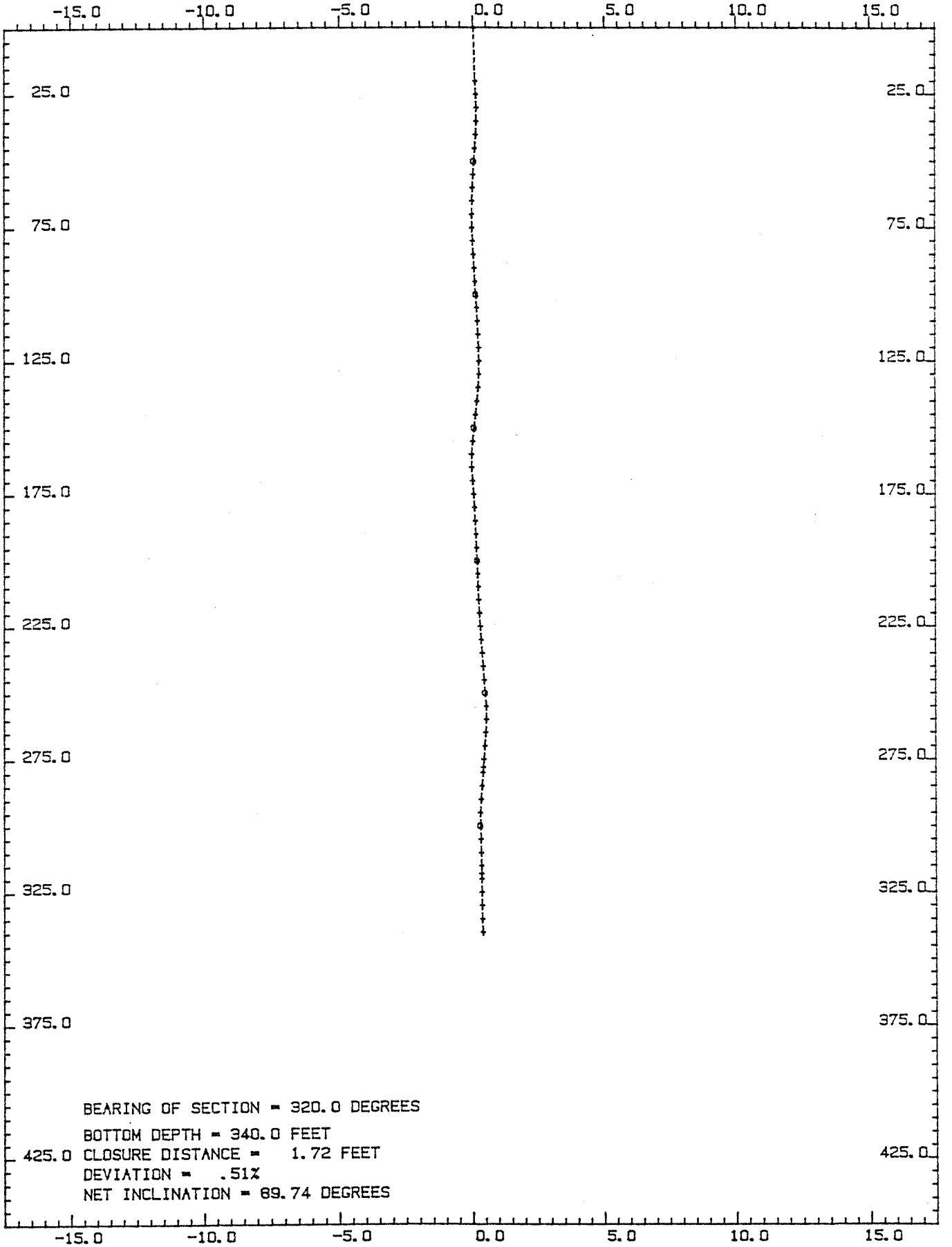
MINER FLAT DAM SITE
PLAN OF BOREHOLE: MF-118

COLLAR NORTHING: 1,086,321.00 COLLAR ELEVATION: 6,077.0 NORTH SCALE: 1 in = 1.0 ft
COLLAR EASTING: 576,417.00 LOGGED BY: CHR DATE: 1/5/86 EAST SCALE: 1 in = 1.0 ft



MINER FLAT DAM SITE
CROSS SECTION OF BOREHOLE: MF-118

COLLAR NORTHING: 1,086,321.00 COLLAR ELEVATION: 6,077.0 HORIZ. SCALE: 1 in = 5.0 ft
COLLAR EASTING: 576,417.00 LOGGED BY: CHR DATE: 1/5/86 VERTICAL SCALE: 1 in = 50.0 ft



BOREHOLE COORDINATE DATA

MINER FLAT DAM SITE
BOREHOLE: MF-119

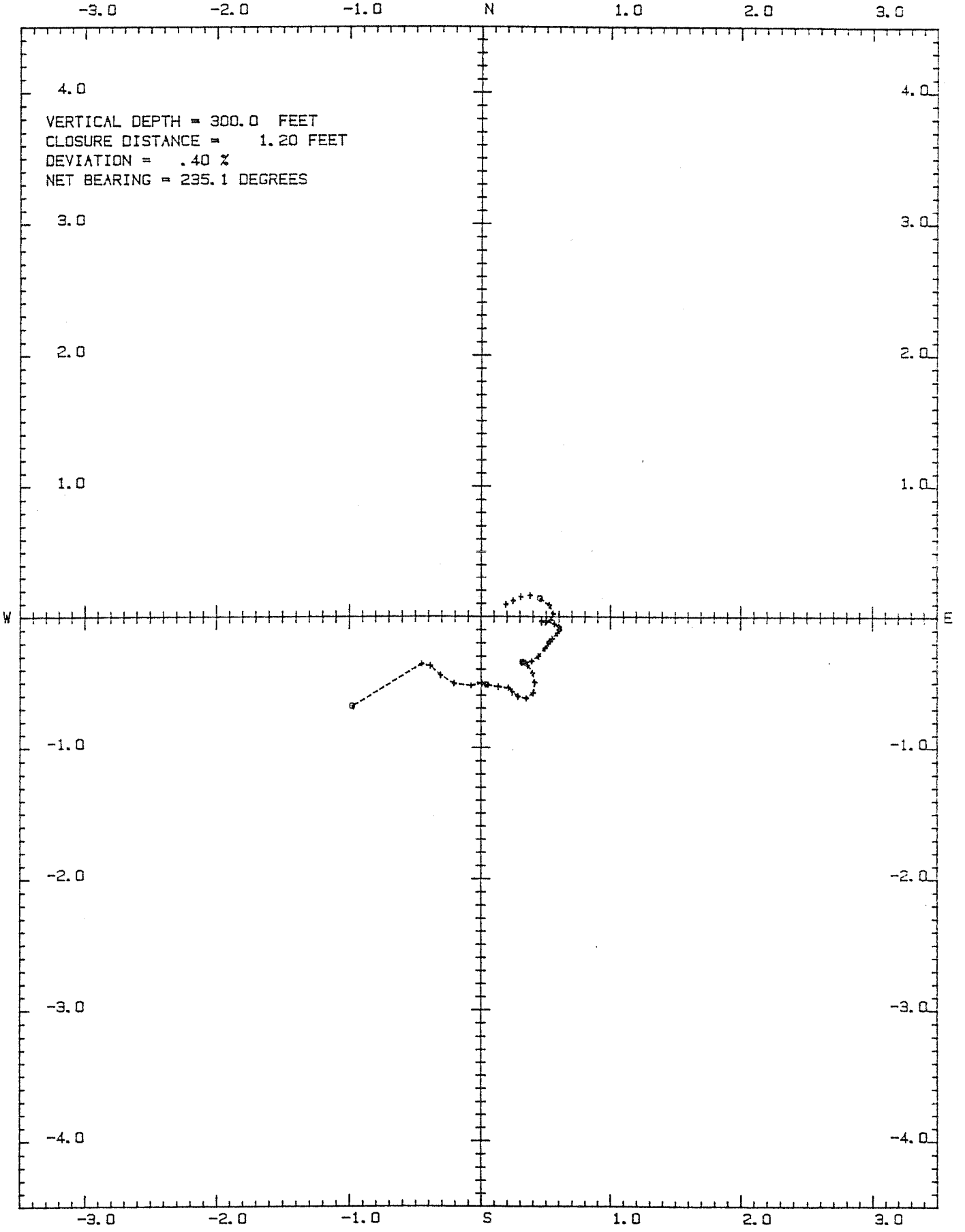
NORTHING: 1,086,816.00 LOGGED BY: CHR FILE: MFS119
EASTING: 576,078.00 DATE: 4/17/86 PAGE: 1
ELEVATION: 6,093.70

CABLE DEPTH	INCLIN	DIRECTION	NORTH STATION	EAST STATION	ELEVATION
30.0	.8	64	1,086,816.09	576,078.19	6,063.70
35.0	.7	58	1,086,816.12	576,078.25	6,058.70
40.0	.8	67	1,086,816.15	576,078.30	6,053.70
45.0	.9	96	1,086,816.16	576,078.37	6,048.70
50.0	1.0	116	1,086,816.14	576,078.45	6,043.70
55.0	1.0	138	1,086,816.09	576,078.52	6,038.70
60.0	.8	178	1,086,816.02	576,078.55	6,033.70
65.0	.5	241	1,086,815.98	576,078.53	6,028.71
70.0	.5	256	1,086,815.96	576,078.49	6,023.71
75.0	.2	301	1,086,815.96	576,078.47	6,018.71
80.0	.2	48	1,086,815.97	576,078.46	6,013.71
85.0	.7	104	1,086,815.97	576,078.50	6,008.71
90.0	.8	116	1,086,815.94	576,078.56	6,003.71
95.0	.2	155	1,086,815.92	576,078.60	5,998.71
100.0	.1	161	1,086,815.91	576,078.60	5,993.71
105.0	.8	212	1,086,815.88	576,078.58	5,988.71
110.0	.6	237	1,086,815.83	576,078.54	5,983.71
115.0	.2	194	1,086,815.81	576,078.52	5,978.71
120.0	.1	207	1,086,815.80	576,078.52	5,973.71
125.0	.9	218	1,086,815.76	576,078.49	5,968.71
130.0	.9	221	1,086,815.70	576,078.44	5,963.71
135.0	.6	247	1,086,815.66	576,078.39	5,958.71
140.0	.5	266	1,086,815.65	576,078.34	5,953.71
145.0	.2	299	1,086,815.65	576,078.31	5,948.71
150.0	.3	98	1,086,815.65	576,078.32	5,943.71
155.0	.8	137	1,086,815.63	576,078.36	5,938.71
160.0	.8	156	1,086,815.57	576,078.39	5,933.71
165.0	.9	176	1,086,815.50	576,078.41	5,928.71
170.0	1.0	199	1,086,815.42	576,078.40	5,923.71
175.0	.9	269	1,086,815.38	576,078.35	5,918.71
180.0	.7	302	1,086,815.39	576,078.28	5,913.71
185.0	.6	315	1,086,815.43	576,078.24	5,908.71
190.0	.4	316	1,086,815.46	576,078.21	5,903.71
195.0	1.5	266	1,086,815.47	576,078.13	5,898.71
200.0	.7	310	1,086,815.48	576,078.04	5,893.71
205.0	.4	243	1,086,815.49	576,078.00	5,888.72
210.0	1.6	262	1,086,815.47	576,077.92	5,883.72
215.0	1.5	293	1,086,815.49	576,077.79	5,878.72
220.0	1.3	311	1,086,815.55	576,077.68	5,873.72
225.0	1.1	317	1,086,815.63	576,077.61	5,868.72

CABLE DEPTH	INCLIN	DIRECTION	NORTH STATION	EAST STATION	ELEVATION
230.0	.9	239	1,086,815.64	576,077.54	5,863.72
300.0	.1	232	1,086,815.32	576,077.02	5,793.73

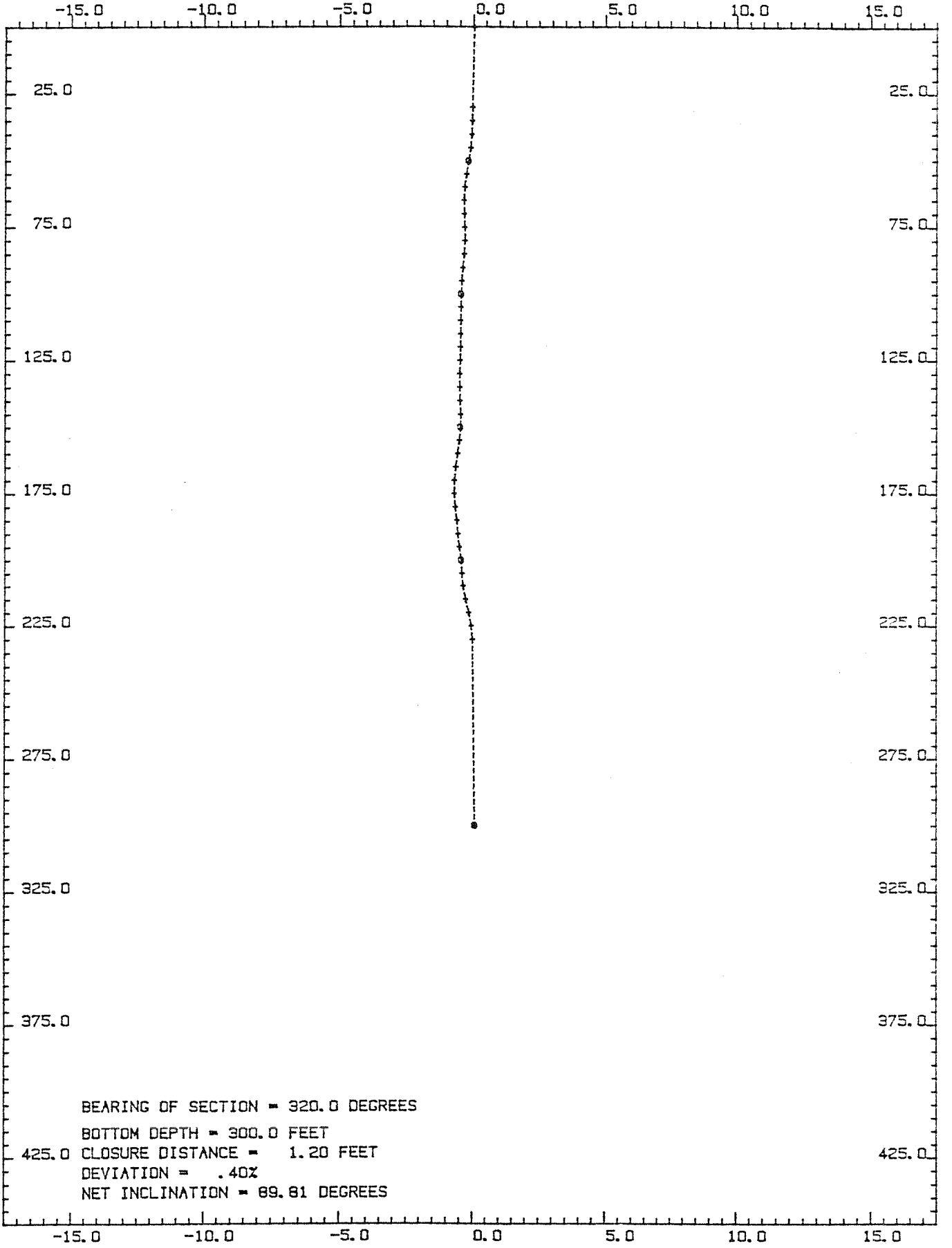
MINER FLAT DAM SITE
PLAN OF BOREHOLE: MF-119

COLLAR NORTHING: 1,086,816.00 COLLAR ELEVATION: 6,093.7 NORTH SCALE: 1 in = 1.0 ft
COLLAR EASTING: 576,078.00 LOGGED BY: CHR DATE: 4/17/86 EAST SCALE: 1 in = 1.0 ft



MINER FLAT DAM SITE
CROSS SECTION OF BOREHOLE: MF-119

COLLAR NORTHING: 1,086,816.00 COLLAR ELEVATION: 6,093.7 HORIZ. SCALE: 1 in = 5.0 ft
COLLAR EASTING: 576,078.00 LOGGED BY: CHR DATE: 4/17/86 VERTICAL SCALE: 1 in = 50.0 ft



BOREHOLE COORDINATE DATA

MINER FLAT DAM SITE
BOREHOLE: MF-120A

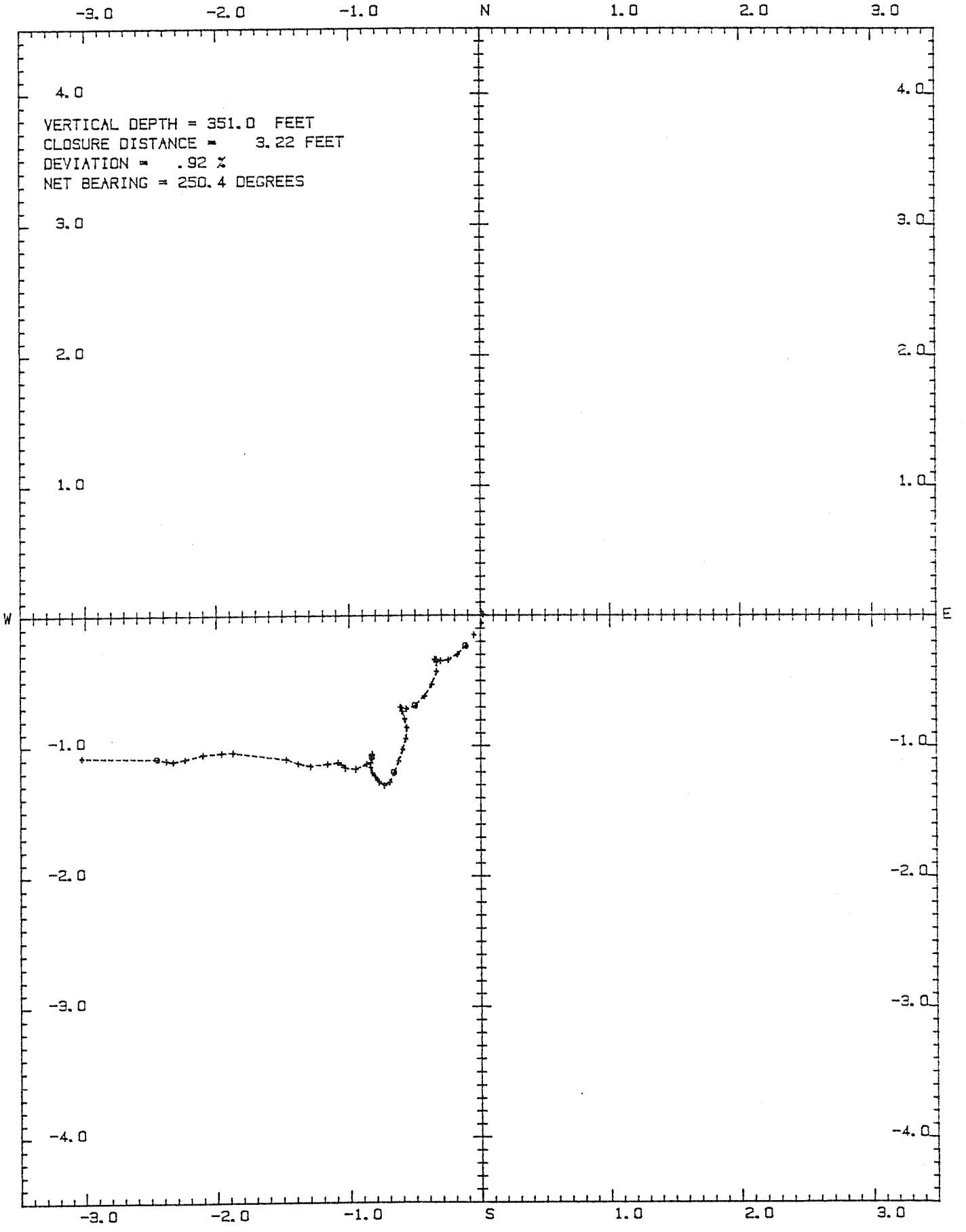
NORTHING: 1,086,568.00 LOGGED BY: CHR FILE: MFS120A
EASTING: 576,247.00 DATE: 4/21/86 PAGE: 1
ELEVATION: 6,082.00

CABLE DEPTH	INCLIN	DIRECTION	NORTH STATION	EAST STATION	ELEVATION
30.0	.1	15	1,086,568.03	576,247.01	6,052.00
35.0	.6	151	1,086,568.01	576,247.02	6,047.00
40.0	1.2	211	1,086,567.94	576,247.01	6,042.00
45.0	1.3	216	1,086,567.85	576,246.95	6,037.00
50.0	1.1	220	1,086,567.77	576,246.88	6,032.00
55.0	1.0	230	1,086,567.70	576,246.82	6,027.00
60.0	.9	249	1,086,567.66	576,246.75	6,022.00
65.0	.5	285	1,086,567.65	576,246.69	6,017.01
70.0	.3	283	1,086,567.66	576,246.66	6,012.01
75.0	0.0	283	1,086,567.66	576,246.64	6,007.01
80.0	.6	148	1,086,567.64	576,246.66	6,002.01
85.0	1.2	195	1,086,567.57	576,246.66	5,997.01
90.0	1.2	207	1,086,567.47	576,246.62	5,992.01
95.0	1.2	216	1,086,567.38	576,246.57	5,987.01
100.0	1.1	235	1,086,567.31	576,246.50	5,982.01
105.0	.6	275	1,086,567.29	576,246.43	5,977.01
110.0	.3	301	1,086,567.29	576,246.39	5,972.01
115.0	.1	122	1,086,567.30	576,246.39	5,967.01
120.0	.7	163	1,086,567.27	576,246.40	5,962.01
125.0	.7	160	1,086,567.21	576,246.42	5,957.01
130.0	.9	173	1,086,567.14	576,246.43	5,952.01
135.0	1.1	196	1,086,567.06	576,246.42	5,947.01
140.0	1.0	196	1,086,566.97	576,246.40	5,942.01
145.0	1.1	201	1,086,566.88	576,246.37	5,937.01
150.0	1.0	204	1,086,566.80	576,246.33	5,932.01
155.0	.9	204	1,086,566.72	576,246.30	5,927.02
160.0	.6	293	1,086,566.70	576,246.26	5,922.02
165.0	.5	321	1,086,566.72	576,246.22	5,917.02
170.0	.5	323	1,086,566.76	576,246.20	5,912.02
175.0	.5	329	1,086,566.79	576,246.17	5,907.02
180.0	.5	350	1,086,566.83	576,246.16	5,902.02
185.0	.4	20	1,086,566.87	576,246.16	5,897.02
190.0	.4	9	1,086,566.91	576,246.17	5,892.02
195.0	.3	6	1,086,566.94	576,246.17	5,887.02
200.0	.7	191	1,086,566.92	576,246.17	5,882.02
205.0	1.0	230	1,086,566.86	576,246.13	5,877.02
210.0	1.2	260	1,086,566.82	576,246.04	5,872.02
215.0	.7	306	1,086,566.83	576,245.97	5,867.02
220.0	.2	308	1,086,566.86	576,245.94	5,862.02
225.0	.5	306	1,086,566.87	576,245.91	5,857.02

CABLE DEPTH	INCLIN	DIRECTION	NORTH STATION	EAST STATION	ELEVATION
230.0	1.5	249	1,086,566.86	576,245.83	5,852.02
235.0	1.5	275	1,086,566.85	576,245.71	5,847.02
240.0	.7	306	1,086,566.87	576,245.62	5,842.02
245.0	1.5	283	1,086,566.90	576,245.53	5,837.02
270.0	.4	255	1,086,566.95	576,245.12	5,812.03
275.1	1.6	271	1,086,566.95	576,245.04	5,806.93
280.0	1.7	259	1,086,566.94	576,244.90	5,802.03
285.0	1.6	253	1,086,566.90	576,244.76	5,797.03
290.0	.5	279	1,086,566.88	576,244.67	5,792.04
295.0	.7	279	1,086,566.89	576,244.62	5,787.04
300.0	.9	284	1,086,566.91	576,244.55	5,782.04
351.0	.5	246	1,086,566.92	576,243.97	5,731.04

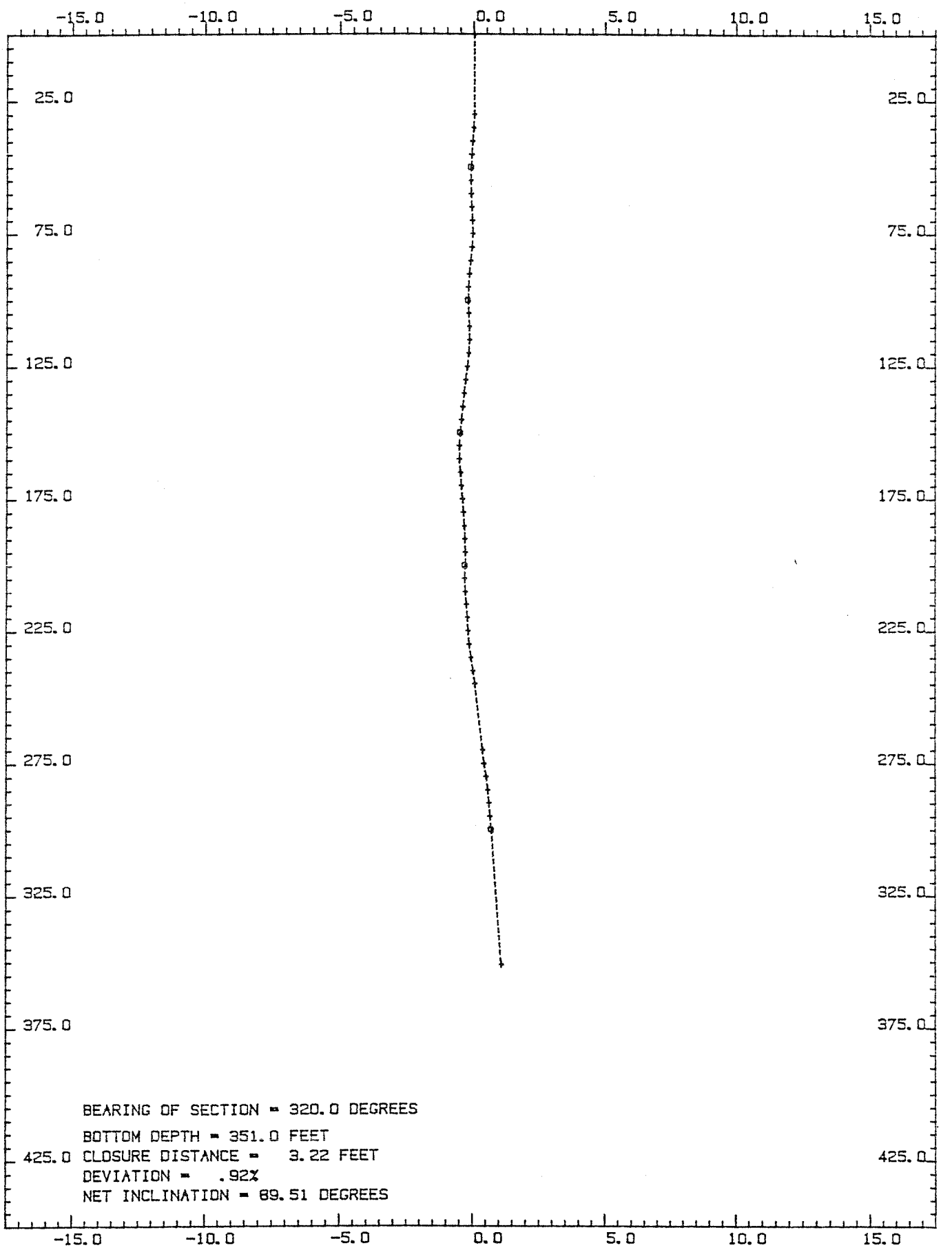
MINER FLAT DAM SITE
PLAN OF BOREHOLE: MF-120A

COLLAR NORTHING: 1,086,568.00 COLLAR ELEVATION: 6,082.0 NORTH SCALE: 1 in = 1.0 ft
COLLAR EASTING: 576,247.00 LOGGED BY: CHR DATE: 4/21/86 EAST SCALE: 1 in = 1.0 ft



MINER FLAT DAM SITE
CROSS SECTION OF BOREHOLE: MF-120A

COLLAR NORTHING: 1,086,568.00 COLLAR ELEVATION: 6,082.0 HORIZ. SCALE: 1 in = 5.0 ft
COLLAR EASTING: 576,247.00 LOGGED BY: CHR DATE: 4/21/86 VERTICAL SCALE: 1 in = 50.0 ft



BOREHOLE COORDINATE DATA

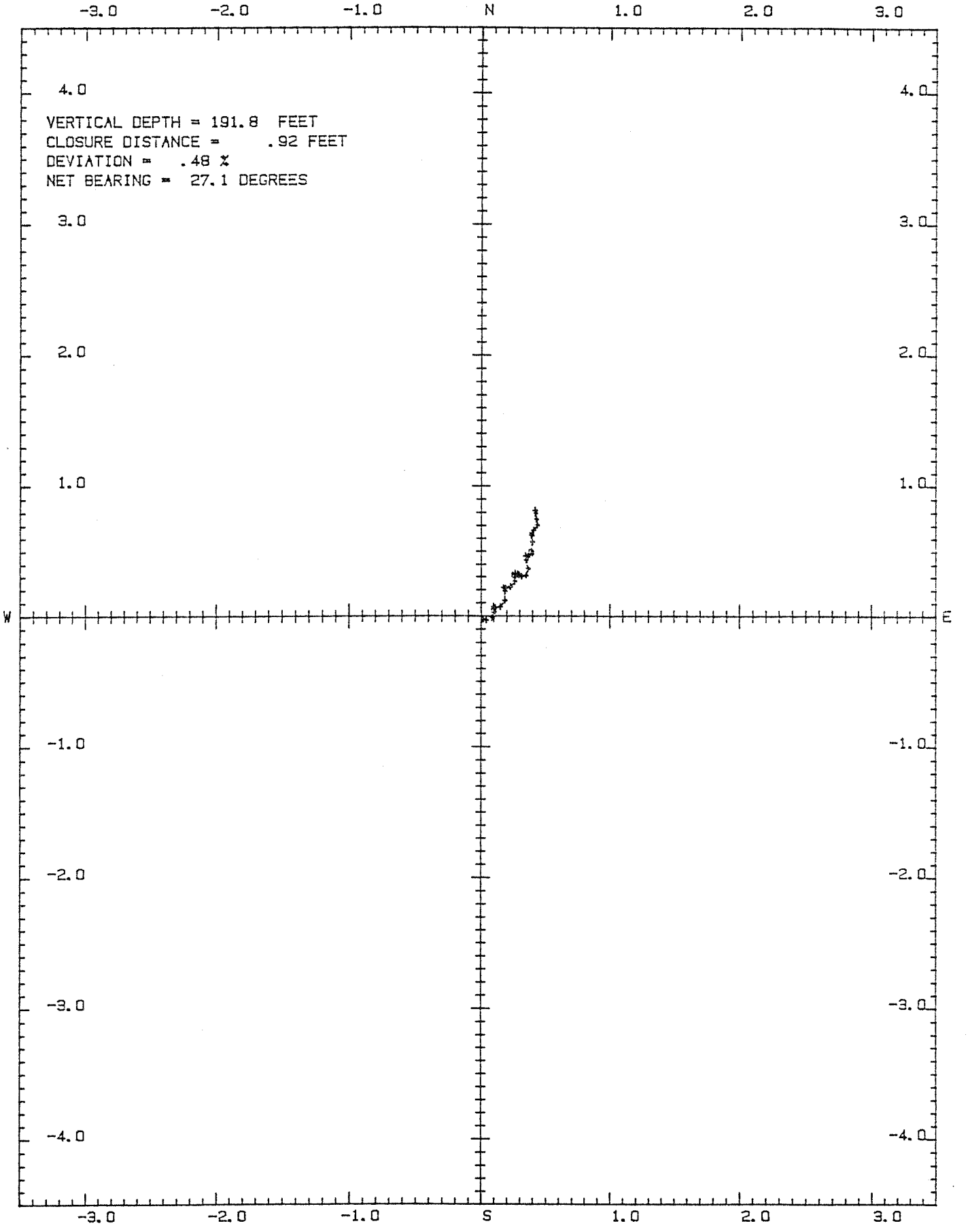
MINER FLAT DAM SITE
BOREHOLE: MF-121

NORTHING: 1,085,595.00 LOGGED BY: CHR FILE: MFS121
EASTING: 576,895.00 DATE: 2/21/86 PAGE: 1
ELEVATION: 6,090.20

CABLE DEPTH	INCLIN	DIRECTION	NORTH STATION	EAST STATION	ELEVATION
35.0	.1	148	1,085,594.97	576,895.02	6,055.20
40.0	.5	95	1,085,594.97	576,895.04	6,050.20
45.0	.7	48	1,085,594.99	576,895.08	6,045.20
50.0	.8	349	1,085,595.04	576,895.10	6,040.20
55.0	.1	150	1,085,595.07	576,895.10	6,035.20
60.0	.3	105	1,085,595.07	576,895.11	6,030.20
65.0	.6	67	1,085,595.07	576,895.15	6,025.20
70.0	.9	17	1,085,595.12	576,895.18	6,020.20
75.0	.8	340	1,085,595.19	576,895.18	6,015.20
80.0	.1	155	1,085,595.22	576,895.17	6,010.20
85.0	.3	88	1,085,595.22	576,895.19	6,005.20
90.0	.6	70	1,085,595.22	576,895.23	6,000.20
95.0	.8	17	1,085,595.27	576,895.26	5,995.20
100.0	.4	315	1,085,595.31	576,895.25	5,990.20
105.0	.4	92	1,085,595.32	576,895.26	5,985.20
110.0	.1	144	1,085,595.32	576,895.28	5,980.20
115.0	.2	117	1,085,595.31	576,895.29	5,975.20
120.0	.3	110	1,085,595.30	576,895.31	5,970.20
125.0	.6	62	1,085,595.31	576,895.35	5,965.20
130.0	.9	349	1,085,595.36	576,895.36	5,960.20
135.0	.8	345	1,085,595.44	576,895.35	5,955.20
140.0	.1	127	1,085,595.47	576,895.34	5,950.21
145.0	.4	104	1,085,595.46	576,895.36	5,945.21
150.0	.9	14	1,085,595.49	576,895.39	5,940.21
155.0	1.0	357	1,085,595.58	576,895.40	5,935.21
160.0	.2	316	1,085,595.63	576,895.39	5,930.21
165.0	.3	115	1,085,595.63	576,895.39	5,925.21
170.0	.6	331	1,085,595.64	576,895.39	5,920.21
175.0	.6	91	1,085,595.67	576,895.41	5,915.21
180.0	.9	0	1,085,595.70	576,895.43	5,910.21
185.0	.2	309	1,085,595.75	576,895.43	5,905.21
190.0	.9	0	1,085,595.79	576,895.42	5,900.21
191.8	.5	349	1,085,595.82	576,895.42	5,898.41

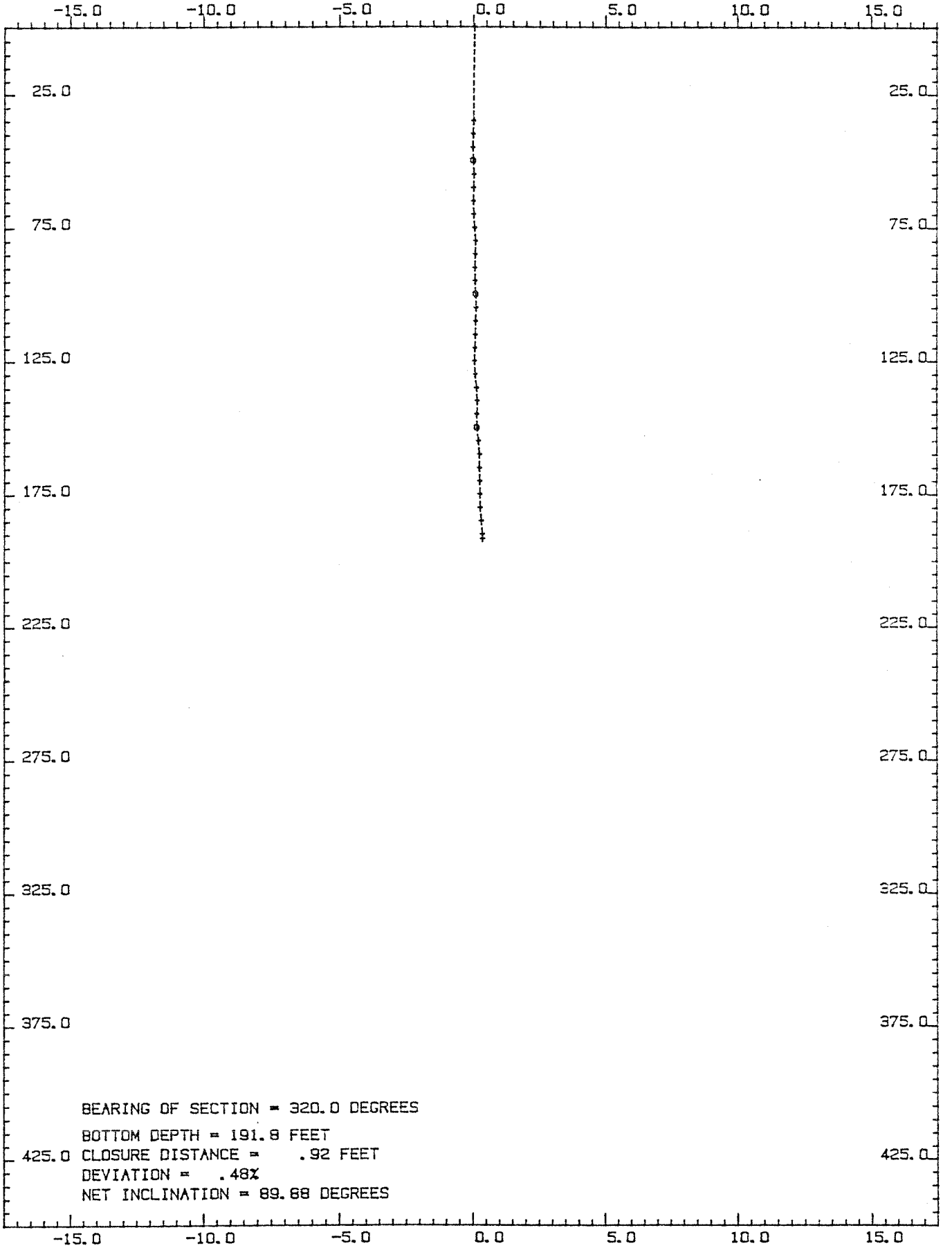
MINER FLAT DAM SITE
PLAN OF BOREHOLE: MF-121

COLLAR NORTHING: 1,085,595.00 COLLAR ELEVATION: 6,090.2 NORTH SCALE: 1 in = 1.0 ft
COLLAR EASTING: 576,895.00 LOGGED BY: CHR DATE: 2/21/86 EAST SCALE: 1 in = 1.0 ft



MINER FLAT DAM SITE
CROSS SECTION OF BOREHOLE: MF-121

COLLAR NORTHING: 1,085,595.00 COLLAR ELEVATION: 6,090.2 HORIZ. SCALE: 1 in = 5.0 ft
COLLAR EASTING: 576,895.00 LOGGED BY: CHR DATE: 2/21/86 VERTICAL SCALE: 1 in = 50.0 ft



BOREHOLE COORDINATE DATA

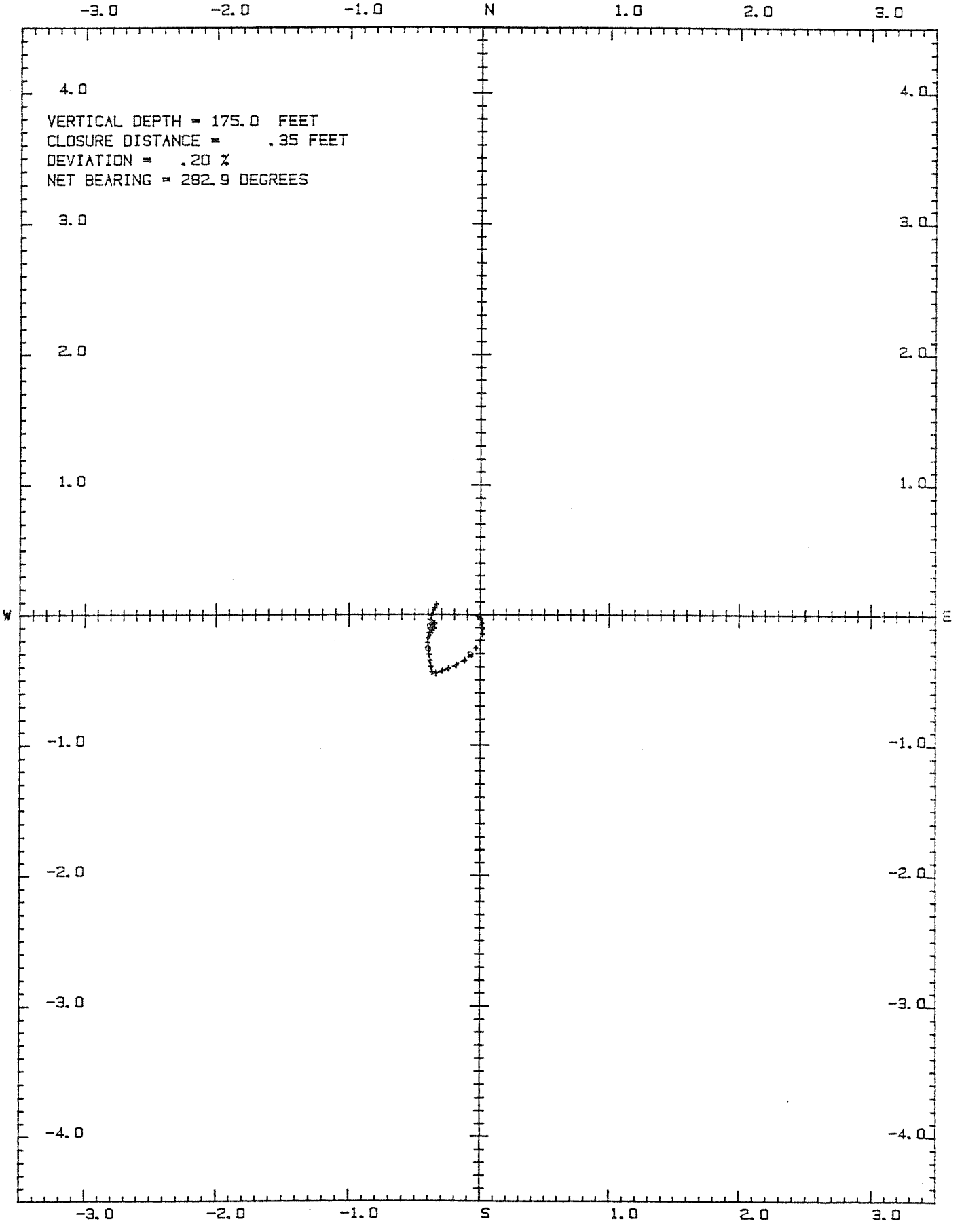
MINER FLAT DAM SITE
BOREHOLE: MF-122

NORTHING: 1,085,645.00 LOGGED BY: CHR FILE: MFS122
EASTING: 576,785.00 DATE: 2/8/86 PAGE: 1
ELEVATION: 6,075.00

CABLE DEPTH	INCLIN	DIRECTION	NORTH STATION	EAST STATION	ELEVATION
5.0	.4	233	1,085,644.99	576,784.99	6,070.00
10.0	.2	74	1,085,644.98	576,784.98	6,065.00
15.0	.2	144	1,085,644.98	576,784.99	6,060.00
20.0	.3	154	1,085,644.96	576,785.00	6,055.00
24.9	.4	171	1,085,644.93	576,785.01	6,050.10
30.0	.5	173	1,085,644.89	576,785.02	6,045.00
35.0	.5	195	1,085,644.85	576,785.02	6,040.00
40.0	.7	205	1,085,644.80	576,785.00	6,035.00
45.0	.8	218	1,085,644.74	576,784.96	6,030.00
50.0	.7	216	1,085,644.69	576,784.92	6,025.00
55.0	.8	236	1,085,644.65	576,734.88	6,020.00
60.0	.9	247	1,085,644.61	576,784.81	6,015.00
65.0	.6	243	1,085,644.58	576,784.75	6,010.00
70.0	.6	253	1,085,644.57	576,784.70	6,005.00
75.0	.6	244	1,085,644.55	576,784.65	6,000.00
80.0	.5	348	1,085,644.56	576,784.63	5,995.00
85.0	.5	349	1,085,644.60	576,784.62	5,990.00
90.0	.6	350	1,085,644.65	576,784.61	5,985.00
95.0	.5	354	1,085,644.69	576,784.60	5,980.00
100.0	.5	352	1,085,644.74	576,784.60	5,975.00
105.0	.5	357	1,085,644.78	576,784.59	5,970.01
110.0	.4	11	1,085,644.82	576,784.60	5,965.01
115.0	.5	18	1,085,644.86	576,784.61	5,960.01
120.0	.4	25	1,085,644.89	576,784.62	5,955.01
125.0	.4	24	1,085,644.93	576,784.63	5,950.01
130.0	.3	149	1,085,644.93	576,784.65	5,945.01
135.0	.6	211	1,085,644.90	576,784.64	5,940.01
140.0	.5	211	1,085,644.85	576,784.62	5,935.01
145.0	.5	4	1,085,644.86	576,784.61	5,930.01
150.0	.6	4	1,085,644.91	576,784.61	5,925.01
155.0	.5	9	1,085,644.95	576,784.62	5,920.01
160.0	.5	9	1,085,645.00	576,784.62	5,915.01
165.0	.4	32	1,085,645.03	576,784.63	5,910.01
168.0	.5	37	1,085,645.05	576,784.65	5,907.01
175.0	.1	278	1,085,645.08	576,784.66	5,900.01

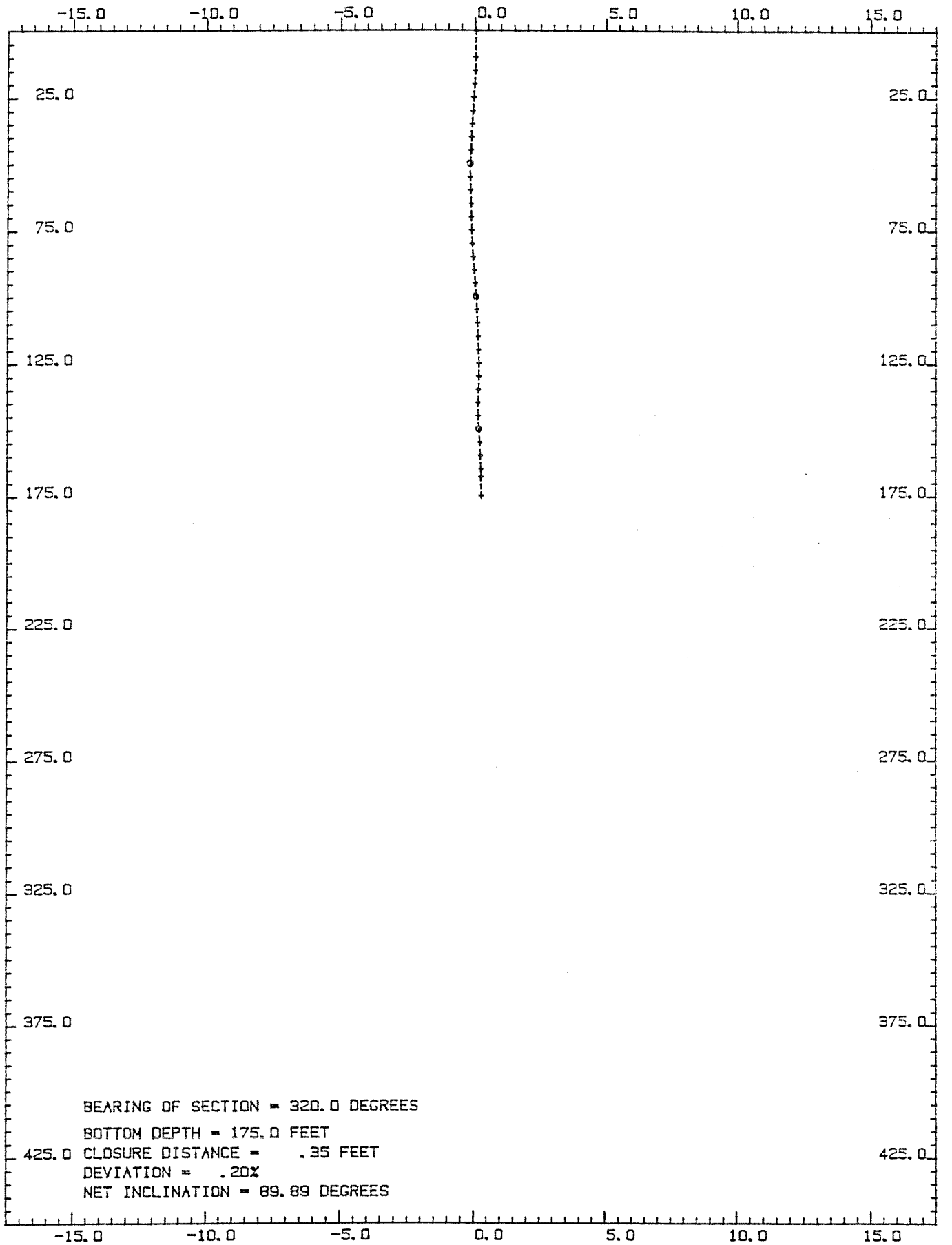
MINER FLAT DAM SITE
PLAN OF BOREHOLE: MF-122

COLLAR NORTHING: 1,085,645.00 COLLAR ELEVATION: 6,075.0 NORTH SCALE: 1 in = 1.0 ft
COLLAR EASTING: 576,785.00 LOGGED BY: CHR DATE: 2/8/86 EAST SCALE: 1 in = 1.0 ft



MINER FLAT DAM SITE
CROSS SECTION OF BOREHOLE: MF-122

COLLAR NORTHING: 1,085,645.00 COLLAR ELEVATION: 6,075.0 HORIZ. SCALE: 1 in = 5.0 ft
COLLAR EASTING: 576,785.00 LOGGED BY: CHR DATE: 2/8/86 VERTICAL SCALE: 1 in = 50.0 ft



BOREHOLE COORDINATE DATA

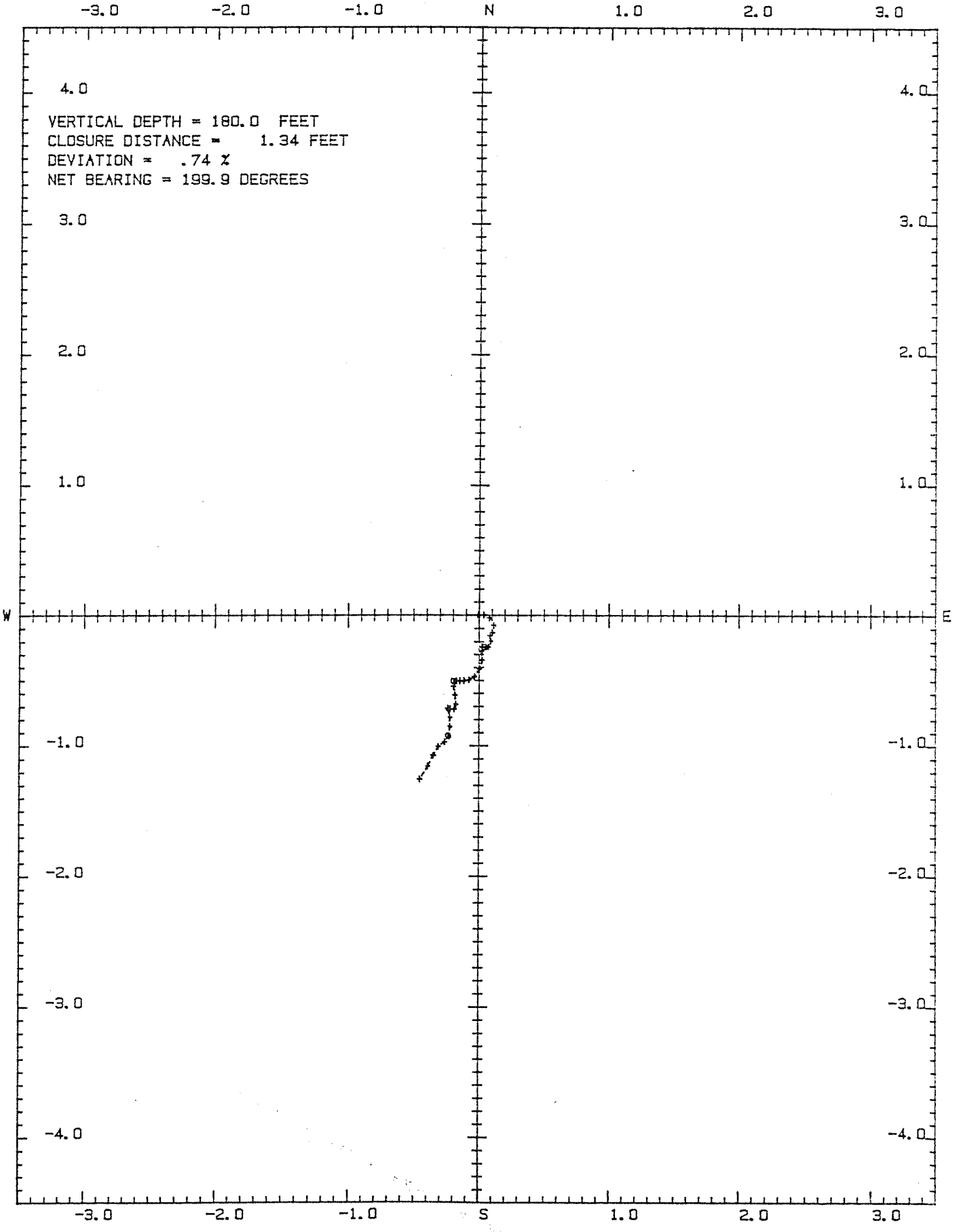
MINER FLAT DAM SITE
BOREHOLE: MF-125A

NORTHING: 0.00 LOGGED BY: CHR FILE: MFS125A
EASTING: 0.00 DATE: 4/7/86 PAGE: 1
ELEVATION: 6,070.00

CABLE DEPTH	INCLIN	DIRECTION	NORTH STATION	EAST STATION	ELEVATION
5.4	.2	273	.00	-.01	6,064.60
10.0	.4	84	.00	-.00	6,060.00
15.0	.5	99	.00	.04	6,055.00
20.0	.7	134	-.02	.08	6,050.00
25.0	.8	164	-.08	.11	6,045.00
30.0	.7	221	-.13	.10	6,040.00
35.0	0.0	283	-.16	.08	6,035.00
40.0	.9	171	-.20	.09	6,030.00
45.0	.5	254	-.24	.07	6,025.00
50.0	.2	295	-.24	.04	6,020.00
55.0	.3	264	-.24	.02	6,015.00
60.0	.8	163	-.28	.02	6,010.00
65.0	.8	191	-.34	.02	6,005.00
70.0	.9	206	-.41	.00	6,000.00
75.0	.7	223	-.47	-.04	5,995.00
80.0	.5	261	-.50	-.08	5,990.00
85.0	.4	261	-.50	-.12	5,985.00
90.0	.3	275	-.50	-.15	5,980.00
95.0	.3	268	-.50	-.18	5,975.00
100.0	.2	243	-.51	-.20	5,970.00
105.0	.8	170	-.55	-.20	5,965.01
110.0	.8	171	-.62	-.19	5,960.01
115.0	.8	179	-.69	-.18	5,955.01
120.0	.3	269	-.72	-.19	5,950.01
125.0	.4	272	-.72	-.22	5,945.01
130.0	.1	319	-.72	-.24	5,940.01
135.0	.5	154	-.73	-.24	5,935.01
140.0	.8	179	-.79	-.23	5,930.01
145.0	.8	179	-.86	-.23	5,925.01
150.0	.9	198	-.93	-.24	5,920.01
155.0	.5	254	-.97	-.27	5,915.01
160.0	.9	220	-1.01	-.32	5,910.01
165.0	.9	200	-1.08	-.35	5,905.01
170.0	1.2	212	-1.16	-.40	5,900.01
180.0	.1	199	-1.26	-.46	5,890.01

MINER FLAT DAM SITE
PLAN OF BOREHOLE: MF-125A

COLLAR NORTHING: 0.00 COLLAR ELEVATION: 6,070.0 NORTH SCALE: 1 in = 1.0 ft
COLLAR EASTING: 0.00 LOGGED BY: CHR DATE: 4/7/86 EAST SCALE: 1 in = 1.0 ft



MINER FLAT DAM SITE
CROSS SECTION OF BOREHOLE: MF-125A

COLLAR NORTHING: 0.00 COLLAR ELEVATION: 6,070.0 HORIZ. SCALE: 1 in = 5.0 ft
COLLAR EASTING: 0.00 LOGGED BY: CHR DATE: 4/7/86 VERTICAL SCALE: 1 in = 50.0 ft

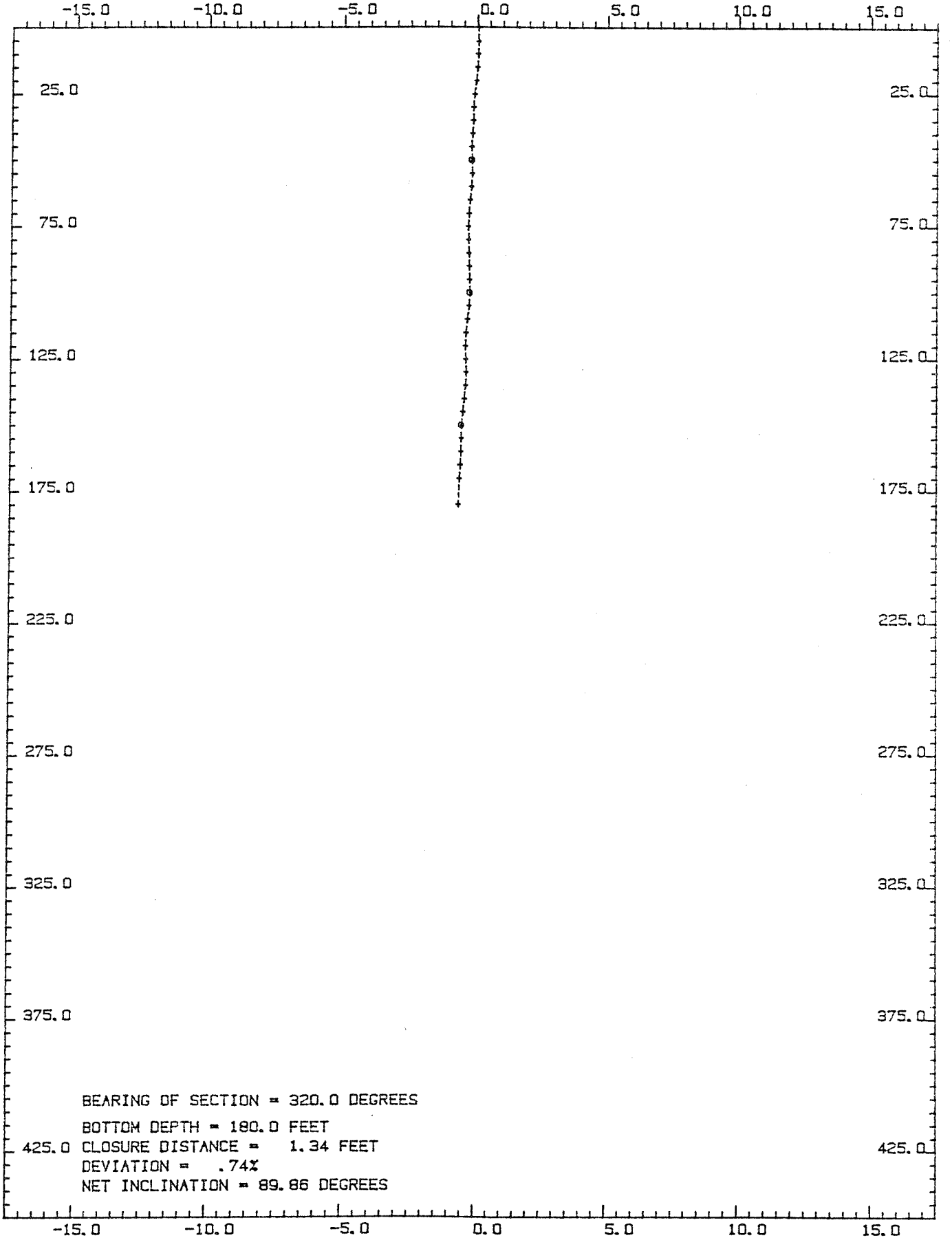


FIGURE 2
GEOLOGIC MAP
OF THE
MINER FLAT DAM RESERVOIR AREA
WHITE MOUNTAIN APACHE INDIAN RESERVATION
NAVAJO COUNTY, ARIZONA

EXPLANATION

af
Artificial fill

Qal
Alluvium
(Recent deposits of boulders, cobbles, gravel, sand and silt along major stream valleys.)

Qaf
Alluvial fans
(Deposits of gravel and sand at mouths of tributary streams.)

Qt
Terrace deposits
(Deposits of boulders, cobbles, gravel, sand and silt at levels above present flood plain. Subscript indicates relative age; 1 being the oldest.)

Qc
Colluvium
(Deposits derived from the weathering of bedrock. Symbols in parentheses indicate principal bedrock unit from which colluvium derived.)

Qta
Talus
(Angular boulders, cobbles and gravel at base of steep cliffs. Symbols in parentheses indicate bedrock unit from which talus derived.)

BEDROCK

QTg
Quaternary-Tertiary gravel
(Cobbles and gravel in deposits of sand and silt, interlayered with sequences of basalt flows and between basalt flow sequences and Paleozoic bedrock units.)

QTb
Basalt
(Sequence of basalt flows that filled pre-existing valleys)

Ps
Supai Formation
(Of Permian age. In dam and reservoir area fine-grained, well sorted, friable sandstone. Thin sandy siltstone interbeds in lower part.)

Geology By
Charles S. Robinson
and
Charles H. Robinson
1982-1983
Mineral Systems, Inc.

GEOLOGIC SYMBOLS

25
Contact, showing dip
(Dashed where approximately located)

5
Strike and dip of beds

Strike and dip of joints

Strike of vertical joints

Line of detail line measurements

LINE A
Line of seismic reflexion or refraction surveys

DH-10
Drill Hole

Drill Hole with piezometer

Trench
(Gravel Samples)

400 0 400 800

CONTOUR INTERVAL 10 FEET

TOPOGRAPHIC MAP
MINER FLAT DAMSITE
WHITE MOUNTAIN APACHE RESERVATION
NAVAJO CO., ARIZONA

GEODETIC ENGINEERS, INC.
Englewood, Colorado

DATE: JAN., 1982
FILE NO: 82202

EXPLANATION

af

Artificial fill

ALLUVIAL DEPOSITS

Qal

ALLUVIUM

(Boulders, cobbles, gravel, sand and silt along present stream channels.)

Qt_2

TERRACES

(Alluvium of boulders, cobbles, gravel, sand and silt; subscript relative age, 1 being the oldest.)

COLLUVIAL DEPOSITS

Qc

COLLUVIUM

(Derived from weathering of bedrock; letter symbols in parentheses are symbols for bedrock units from which colluvium derived.)

Qta

TALUS

(Letter symbols in parentheses are symbols for bedrock units from which talus derived.)

BEDROCK

QTg

QUATERNARY-TERTIARY GRAVEL

(No outcrops)

QTb

BASALT

(Massive to vesicular and scoriatious basalt.)

Ps

SUPAI FORMATION

(Sandstone, fine-grained rounded, well sorted, cross-stratified, massive bedded. Lower part interbedded with siltstone.)

70

Contact, showing dip

(Dashed where approximately located)

5

Strike and dip of beds

75

Strike and dip of joints

Strike of vertical joint

DH-3 5920.8 — Drill Hole

DH-2 60 5920.8 — Surface drill hole with inclination

RA-2H — Line of detail survey

A A' — Line of section

Geology by Charles S. Robinson

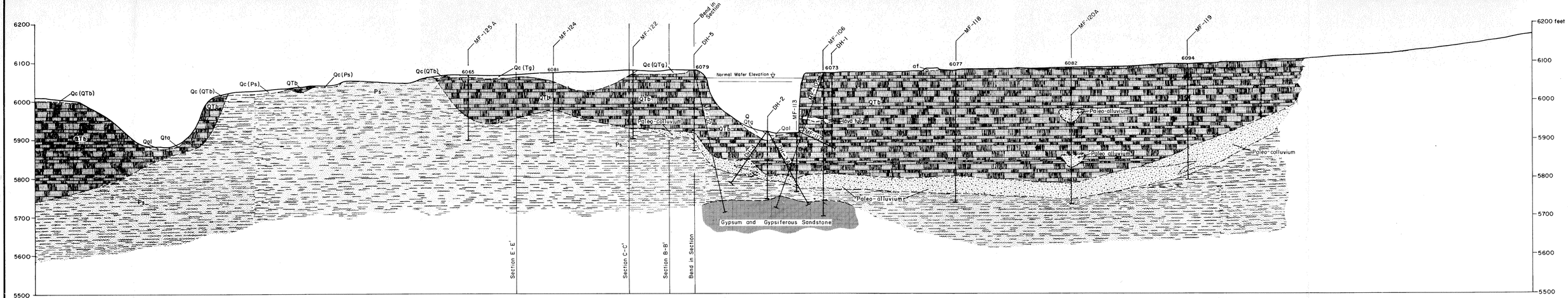
Mineral Systems, Inc.

Golden, Colorado, June 1983

FEET

GEOLOGIC MAP OF THE MINER FLAT DAM SITE
WHITE MOUNTAIN APACHE INDIAN RESERVATION
NAVAJO COUNTY, ARIZONA

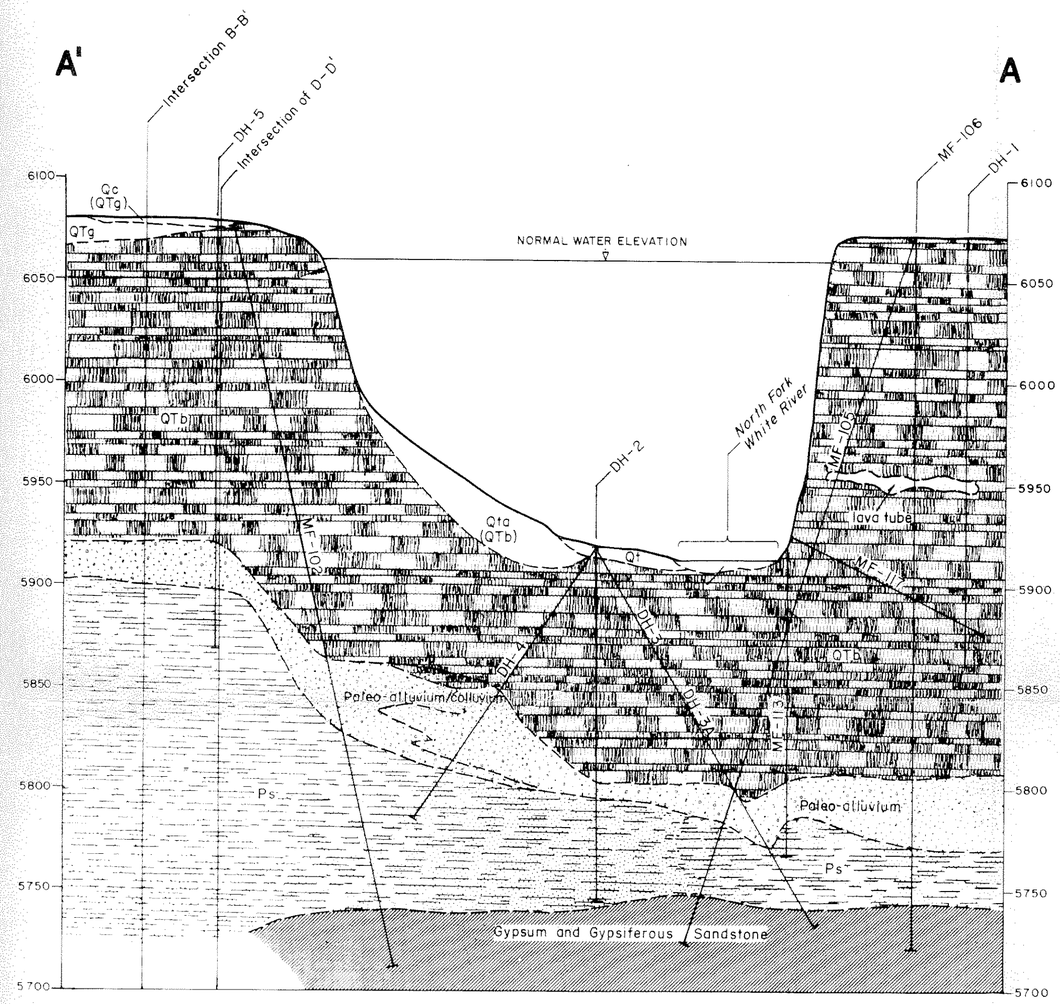
FIGURE 3



PRELIMINARY GEOLOGIC SECTION
MINER FLAT DAM SITE
WHITE MOUNTAIN APACHE INDIAN RESERVATION
NAVAJO COUNTY, ARIZONA

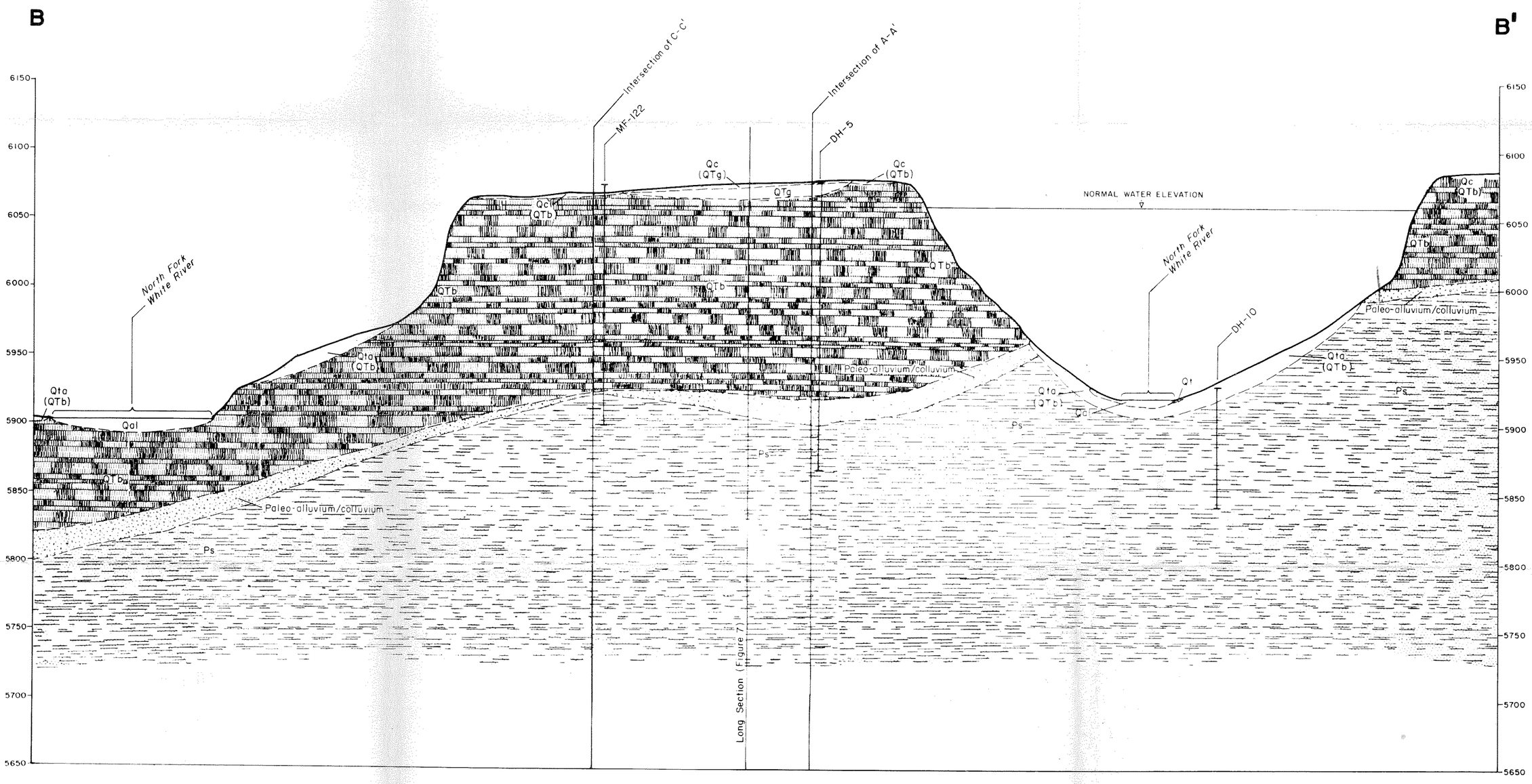
Figure 7

MINERAL SYSTEMS, INC.
Golden, Colorado
February, 1986



EXPLANATION

- Qal — Alluvium
- Qt — Terrace
- Qc — Colluvium (Bedrock source shown by symbol for rock unit)
- Qta — Talus (Bedrock source shown by symbol for rock unit)
- QTg — Quaternary-Tertiary Gravel
- QTb — Basalt
- Ps — Supai Formation (Showing gypsiferous units)
- Contact
- MF-105 — Drill Hole



HORIZONTAL AND VERTICAL SCALE
1 INCH = 50 FEET
0 50 100 150 FEET

GEOLOGIC SECTIONS A-A' AND B-B'
MINER FLAT DAM SITE
WHITE MOUNTAIN APACHE INDIAN RESERVATION
NAVAJO COUNTY, ARIZONA

Figure 8

MINERAL SYSTEMS, INC
1986

C'

C

D'

D

E'

E

EXPLANATION

Qal — Alluvium

Qt — Terrace

Qc — Colluvium (Bedrock source shown by symbol for rock unit)

Qta — Talus (Bedrock source shown by symbol for rock unit)

QTg — Quaternary-Tertiary Gravel

QTb — Basalt

Ps — Supai Formation (Showing gypsiferous units)

Contact

MF-105 — Drill Hole

HORIZONTAL AND VERTICAL SCALE
1 INCH = 50 FEET

GEOLOGIC SECTIONS C-C', D-D' AND E-E'
MINER FLAT DAM SITE
WHITE MOUNTAIN APACHE INDIAN RESERVATION
NAVAJO COUNTY, ARIZONA

Figure 9

Mineral Systems, Inc.
Golden, Colorado

1986

LEGEND

- BC-4 / 6406.20 — HORIZONTAL AND VERTICAL CONTROL STATION
- 093 / 5082.10 — ANALYTICAL AEROTRIANGULATION STATION
- 6247.0 — SPOT ELEVATION
- 6300 — INDEX CONTOUR
- INTERMEDIATE CONTOUR
- SUPPLEMENTARY CONTOUR
- DEPRESSION CONTOUR
- ROAD WITH HARD SURFACE
- UNIMPROVED ROAD OR TRAIL
- BUILDINGS
- TREES
- FENCE
- HYDROGRAPHY

NOTES

TOPOGRAPHY BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY FLOWN 11-4-80.

500-FT. GRIDS BASED UPON ARIZONA STATE GRID COORDINATES, EAST ZONE, MODIFIED TO 6000 MEAN ELEVATION.

ELEVATIONS BASED UPON U.S.G.S. DATUM

EXPLANATION

- 6060 — Limit of reservoir
- 6000 / 5900 — Contoured on base of basalt (Contour interval 100 feet)
- Direction of water infiltration from reservoir.
- Axis of basalt filled channel
- Limit of basalt

400 0 400 800

CONTOUR INTERVAL 10 FEET

CONTOUR MAP OF THE BASE OF THE BASALT FLOW

MINER FLAT DAM AND RESERVOIR SITE
WHITE MOUNTAIN APACHE INDIAN RESERVATION
NAVAJO COUNTY, ARIZONA

Figure 10

TOPOGRAPHIC MAP
MINER FLAT DAMSITE
WHITE MOUNTAIN APACHE RESERVATION
NAVAJO CO., ARIZONA

GEODETIC ENGINEERS, INC
Englewood, Colorado

DATE: JAN., 1982
FILE NO: 82202