

REPORT ON  
EXPLORATION/GROUTING PROGRAM  
DEWATERING WELL NO. 6

SAN ONOFRE NUCLEAR GENERATING STATION UNITS 2 & 3  
BECHTEL JOB 10079-003

FEBRUARY 1979

Boxet #50-361  
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REPORT ON  
EXPLORATION/GROUTING PROGRAM  
DEWATERING WELL NO. 6

SAN ONOFRE NUCLEAR GENERATING STATION UNITS 2 & 3  
BECHTEL JOB 10079-003

## 1.0 INTRODUCTION

During the initial demobilization of Dewatering Well No. 6, subsidence of the gravel pack around the well occurred. This prompted exploration which led to the discovery of a cavity at this well.

This report presents details of the Exploration/Grouting Program completed at Dewatering Well No. 6 located at the San Onofre Nuclear Generating Station (SONGS) plant site. It describes the procedures of the program and the subsurface conditions at Well No. 6 after the program was completed.

Geotechnical personnel carried out the technical tasks in two steps. Step 1 consisted of drilling 74 Stage 1, 2 and 3 holes to determine the extent of the cavity and to determine the characteristics of the cavity fill. Step 2 consisted of pressure grouting the holes in Step 1 to fill all possible areas of open cavity.

## 2.0 BACKGROUND

Dewatering Well No. 6 is located adjacent to the Unit 2 Auxiliary Building as shown in Figure 1. During demobilization of the well by backfilling with sand in May 1977, subsidence of the gravel pack around the well bore occurred. Subsequent investigation revealed the existence of a subsurface cavity.

The well casing and annulus were partially cleaned of loose sand and gravel by air lifting. The cavity was measured by mechanical caliper and sonar. A video scan of the 14-inch casing was also made. A total of 34 auger holes were drilled for purposes of exploration and backfill of the cavity with tremie grout. The results of these initial investigations have been described in presentations to the NRC, in reports documenting those presentations and in monthly status reports.

In April 1978, a total of 112 cubic yards of grout (site batch plant mix G-3) was placed by tremie method in nine auger holes to fill the open portion at the top of the cavity created by air lifting and to stabilize the cavity area for further investigative work.

A deep boring investigation similar to that done at Well No. 8 followed this initial grouting program. A total of 17 holes were drilled to the design depth of 200 feet and one hole was drilled to 154-foot depth. Data from these holes established the maximum drilling depths of the initial exploration/grout holes. During the Exploration/Grouting Program an additional four deep borings were drilled, two of which were abandoned prior to reaching design depth due to drilling difficulties. Details of the program are contained in a separate report entitled Deep Exploration Drilling Program - Dewatering Well No. 6. The Exploration/Grouting Program followed the deep hole drilling.

### 3.0 SUMMARY

The objectives of the Exploration/Grouting Program were to define the limits of the cavity around the well and to fill any existing areas of open cavity with grout. A total of 74 holes were drilled and 500 bags of cement placed during the program. The results of the drilling and sampling indicated that the cavity is a narrow, northwest trending linear feature deepening toward the well bore. It is filled with loose-to-dense sand. No open cavity was encountered. A series of angle holes drilled under the Auxiliary Building demonstrates that the cavity does not extend under the structure.

### 4.0 CONCLUSIONS

The following conclusions can be drawn from results of the Exploration/Grouting Program:

- A. The extent of the sand filled cavity is limited to a narrow zone. The cavity is less than 1-foot wide at its maximum depth of 140 feet from plant grade.

- B. Data obtained from angle holes extending beneath the Auxiliary Building demonstrate that the cavity does not extend under the building.
- C. The cavity is filled with loose-to-dense sand and grout and contains no voids.
- D. The pressure grouting injected lenses and dikes of grout into the sand resulting in a slight densification of the loose sand.

#### 5.0 DRILLING AND GROUTING

The Exploration/Grouting Program consisted of three drilling and grouting stages. Stage 1 holes were drilled in and around the existing cavity to determine its depth and lateral extent. Stage 2 holes were drilled after most Stage 1 holes were completed. These were drilled at various angles across the long axis of the cavity as defined by the Stage 1 holes. The purpose of the Stage 2 holes was to pressure grout any voids not detected and filled by the previous grouting. Stage 3 holes were drilled subsequent to completion of all adjacent Stage 1 and 2 holes to close out the grouting pattern and to check completeness of the program. A series of angle holes were drilled under the Auxiliary Building in each of the three stages to determine that no disturbed sand exists under the structure.

All holes were pressure grouted with a cement-grout mixture to fill any cavities present.

Holes were drilled on a grid system set up parallel to the plant grid system. The original Stage 1 hole locations, shown on Figure 2, were based on the cavity as defined by prior exploration. Modification of the Stage 1 pattern was made as more information was obtained during the Exploration/Grouting Program. Locations of Stage 2 holes were based on the configuration of the cavity interpreted from the Stage 1 borings. Stage 3 hole locations were determined from the information obtained from the Stage 1 and 2 holes. The final boring location plan is shown on Figure 3.

## 5.1 Drilling Methods and Materials

A Simco 400 hydraulic rotary track-mounted rig was used to drill both vertical and angle holes. A CME 750 modified hydraulic rotary drill was used to drill vertical and several steeply inclined angle holes.

Holes were drilled using rotary drilling techniques with Revert mud as a drilling fluid. Holes were advanced either by tri-cone bit, drag bit, or by carbide bit attached to BX or NX casing. Where sampling of grout was required, a diamond core barrel was sometimes used. Hole size varied from BX to approximately 4-1/4-inch diameter. Several holes were stopped prematurely due to drilling difficulties. These holes were pressure grouted or tremie grouted and replaced by drilling an additional hole adjacent to the original hole.

### 5.1.1 Stage 1 Vertical Holes

A total of 45 vertical Stage 1 holes were drilled in the cavity region and adjacent to the Auxiliary Building to determine the lateral and vertical extent of the disturbed sand surrounding Dewatering Well No. 6 and to grout any areas of open cavity or loose sands encountered.

### 5.1.2 Stage 2 Holes Along Axis of Defined Cavity

A total of 13 Stage 2 holes were drilled at angles varying from 70 degrees to 85 degrees from horizontal across the major axis of the cavity defined by Stage 1 borings. The purpose of these holes was to supplement Stage 1 grouting of the cavity fill materials. Gyroscopic surveys to determine hole drift were conducted in many of these holes (refer to Appendix A).

### 5.1.3 Stage 3 Vertical Holes

A total of seven vertical Stage 3 holes were drilled and grouted following completion of Stage 1 and 2 holes. These were done to complete closure of the grouting program and to check the completeness of the program. Locations and depths were determined from the previously drilled grout holes.

#### 5.1.4 Angle Holes Adjacent to and Under Auxiliary Building

A total of nine Stage 1, 2 and 3 holes were drilled and grouted adjacent to and beneath the structure. Angles ranged from 75 degrees to 85 degrees from horizontal. Gyroscopic surveys were performed on seven of these holes to check hole drift (refer to Appendix A). These angle holes established that no cavity exists under the Auxiliary Building.

#### 5.2 Sampling

Sampling was done to differentiate disturbed sand from native San Mateo Formation. Standard Penetration Tests (SPT) using a 2-inch O.D. split-spoon drive sampler were performed according to ASTM D 1586 (74) at 5-foot intervals in all Stage 1 holes. In Stage 3 holes, sampling was done at 5-foot intervals in native San Mateo and at 2.5-foot intervals where disturbed sand was encountered. In some Stage 2 holes only a visual inspection of drill cuttings was made. Other Stage 2 holes were sampled at 5- and 10-foot intervals. The drive hammer was set on a steel sled attached to the drill boom when performing SPT's on angle holes less than 85 degrees from horizontal. A log of each hole was made by the geologist supervising the drilling. Data recorded included: depths and blow counts of SPT's; descriptions of subsurface materials; drilling characteristics; rate of penetration; circulation loss; and any unusual difficulties encountered during the drilling. Samples were examined as soon as they were recovered from the sampler. After inspection they were placed in plastic bags for storage. Graphic logs of all holes are shown in Appendix B. SPT results (Figure 4) for all samples in disturbed sand in the cavity area illustrate that the materials encountered varied from loose-to-dense sand. The histograms show an increase in mean SPT results for Stage 3 holes as compared to Stage 1 and 2 holes.

#### 5.3 Grouting Methods and Materials

After each hole was drilled, it was pressure grouted. An example of a typical exploration/grout hole is shown on Figure 5.



Equipment used in the grouting program consisted of a Moyno 3-L-10 pump, a horizontal paddle-type mixer, and an 11 cubic foot capacity hold-over tank with vertical center shaft paddle. The grouting system provided continuous circulation of grout from the mixer tanks to the hole. A pressure gauge was located at the top of the hole to monitor grout pressure at the hole. The gauge was checked for accuracy by Bechtel Quality Control.

The grout mixes varied from 5:1 to 3/4:1 water-cement ratio by volume. Intraplast-N was used as an additive at a quantity of one percent by weight of cement to increase flowability and decrease shrinkage of the grout. Sand was not used in the grout program.

Grouting pressures measured at the top of the hole ranged from 10 to 60 psi. Most holes were grouted at 45 to 50 psi maximum pressure. Pressures were kept in this range to prevent damage to adjacent structures and also to help minimize surface leakage.

The grouting procedure involved several steps. After completion of the drilling of each hole, 1-1/2-inch diameter PVC was installed to the bottom of the hole. Slotted PVC was used to within 10 to 20 feet of the top of each hole and solid PVC used to the top of the hole. A 3-inch diameter nipple was then placed in the top of the hole and sealed at the surface with grout. Originally 5-foot lengths of NX casing were used but shortly into the program 10-foot lengths of 3-inch PVC were utilized. The grout connection was made directly to a threaded coupling glued to the PVC (see Figure 6).

Immediately prior to grouting, the hole was washed of Revert mud by placing a hose to the bottom and flushing with water and Fast-Break, an additive used to break down the Revert drilling fluid. The hole was then pressure grouted to refusal from the top in one stage. Refusal was determined to be when the hole accepted one-half cubic foot of grout or less in five minutes with a steady pressure maintained on the gauge. In some holes where surface leakage occurred, the grouting was stopped prior to reaching refusal and the hole backfilled with 1:1 grout. A replacement hole was added where this occurred.

## 6.0 RESULTS OF THE EXPLORATION/GROUTING PROGRAM

The configuration of the cavity was determined from the 74 borings completed at Well No. 6.

### 6.1 Cavity Definition

The cavity is a narrow, steep-sided linear feature extending approximately 22 feet northwest and 12 feet southeast of the well bore. West of the well, it varies from 8-1/2 feet wide at plant grade (Elevation 0) to less than one-half foot wide at its deepest point, Elevation -110 feet. East of the well the cavity varies from 8 feet wide at plant grade to less than one foot wide at Elevation -90 feet. The deepest and widest portion of the cavity is confined to within a radius of 7 feet from the well bore. The average depth of disturbed sand in the remaining portion of the cavity is 70 feet.

The upper region of the cavity between the well bore and Auxiliary Building resulted from erosion caused by rainfall and surface drainage traveling through existing borings into a portion of the cavity which was opened by airlift operations. Localized collapse of the roof during exploratory operations prior to the tremie backfilling with grout also contributed to upward migration of the cavity.

A contour map of the top of native San Mateo Formation (Figure 6) has been constructed from the deep boring and exploration/grout hole drilling data. The contours were constructed in a conservative manner. They reflect the deepest extent of disturbed sand found in the borings. In several holes undisturbed San Mateo Formation was encountered between zones of disturbed sand; however, the contours show the total zone as disturbed. An estimate of this conservatism can be demonstrated on the geologic sections (Figure 9) in which the cavity definition can be seen more clearly.

A stick model of the Deep Exploration Drilling Program and the Exploration/Grouting Program was constructed to illustrate the cavity in a three-dimensional view. Photographs of this model are included in Appendix D.

## 6.2 Materials in the Cavity

The cavity around Well No. 6 is filled with disturbed sand, sanded grout placed by tremie method (G-3) and Portland cement grout placed during the Exploration/Grouting Program. Thicknesses of grout varies from several inches to over 40 feet (refer to Figure 10).

No voids were encountered during the Exploration/Grouting Program. This was determined by observation of drill rates, drilling fluid circulation, and by the results of Standard Penetration Tests. Only grout and disturbed sand was encountered in the cavity. The sand fill in the cavity varies in density from loose-to-dense.

In many of the holes disturbed sand was found to overlie native San Mateo sand which was subsequently underlain by more disturbed sand at depth. This is displayed on isometric drawings and cross sections (refer to Figures 7 and 9).

## 6.3 Grouting

During the Exploration/Grouting Program, a total of 500 bags of cement were placed. Data relating to the Exploration/Grouting Program and grout logs are shown in Appendix C. During the early grouting, communication commonly occurred between drill holes. Grout travel between holes ranged from several feet to over 15 linear feet. The extensive grout travel indicates significant penetration within the cavity region. Communication and grout take decreased appreciably after the initial two weeks of grouting.

No voids were encountered in any of the exploration/grout holes. Some lenses of Portland cement grout were found in several of the later grout holes.

An isopach map (Figure 10) defining the thickness of G-3 and Portland cement grout placed in the cavity and an isopach map (Figure 11) defining the thickness of disturbed sand below plant grade was constructed. A planimeter measurement was made of these maps and also of the contour map of the top of the San Mateo Formation. A total of 120 cubic yards of grout

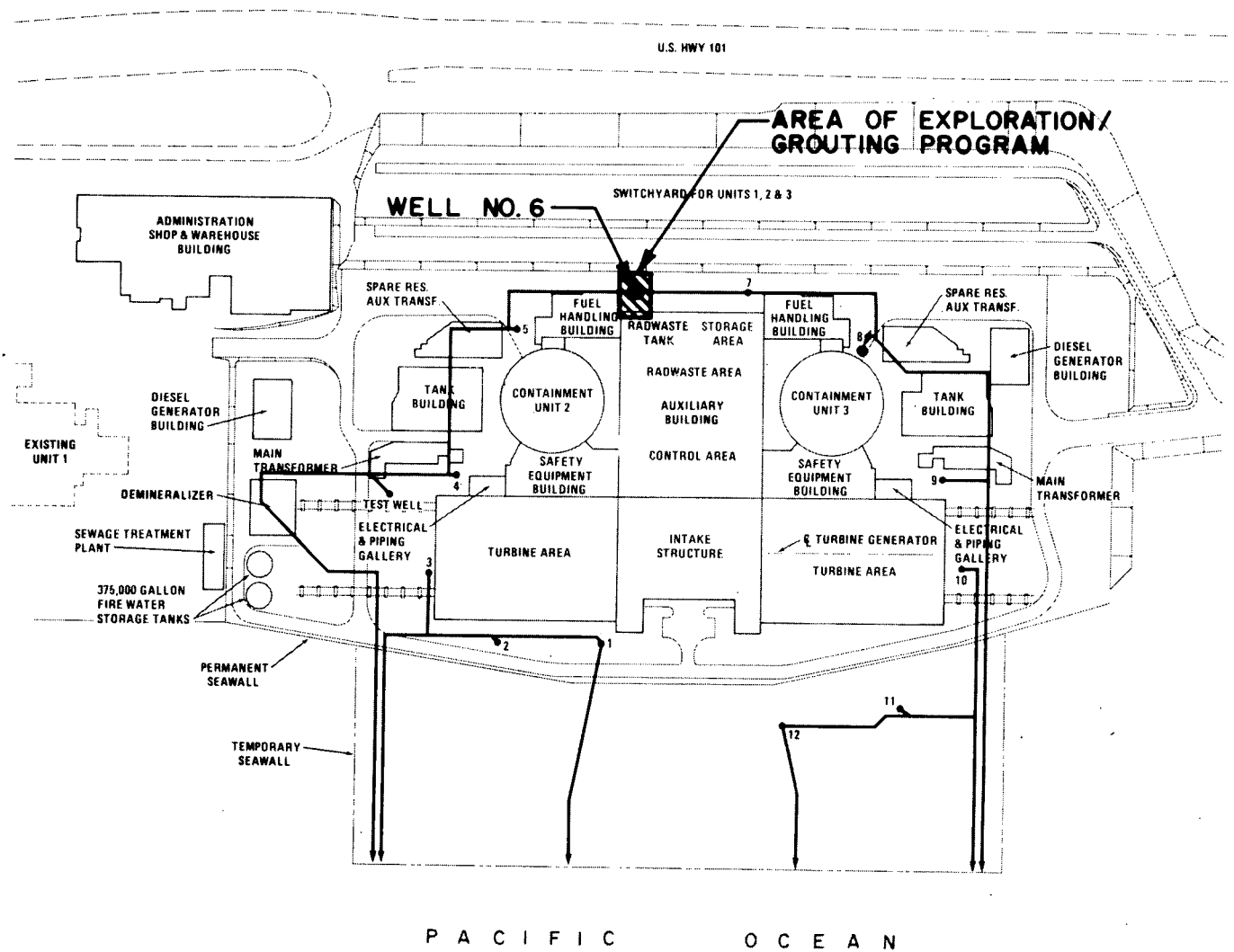
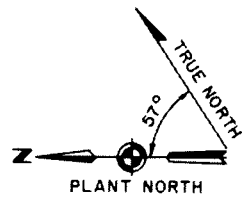
(G-3 and Portland cement grout) was calculated from the grout isopach map. The total amount of disturbed sand calculated from the disturbed sand isopach map was only 94 cubic yards.

#### 7.0 SUMMARY OF FOUNDATION CONDITIONS

Results of the Exploration/Grouting Program show that the total amount of disturbed sand remaining below ground surface (Elevation +30 feet) at the conclusion of the program is less than 100 cubic yards.

The cavity is confined to a narrow linear zone trending northwest-southeast from the well. No disturbed sand extends under the Auxiliary Building.

The drilling encountered no areas of open cavity. The cavity-fill materials consist of loose-to-dense sand, G-3 grout, or Portland cement grout.



UNITS 2 & 3

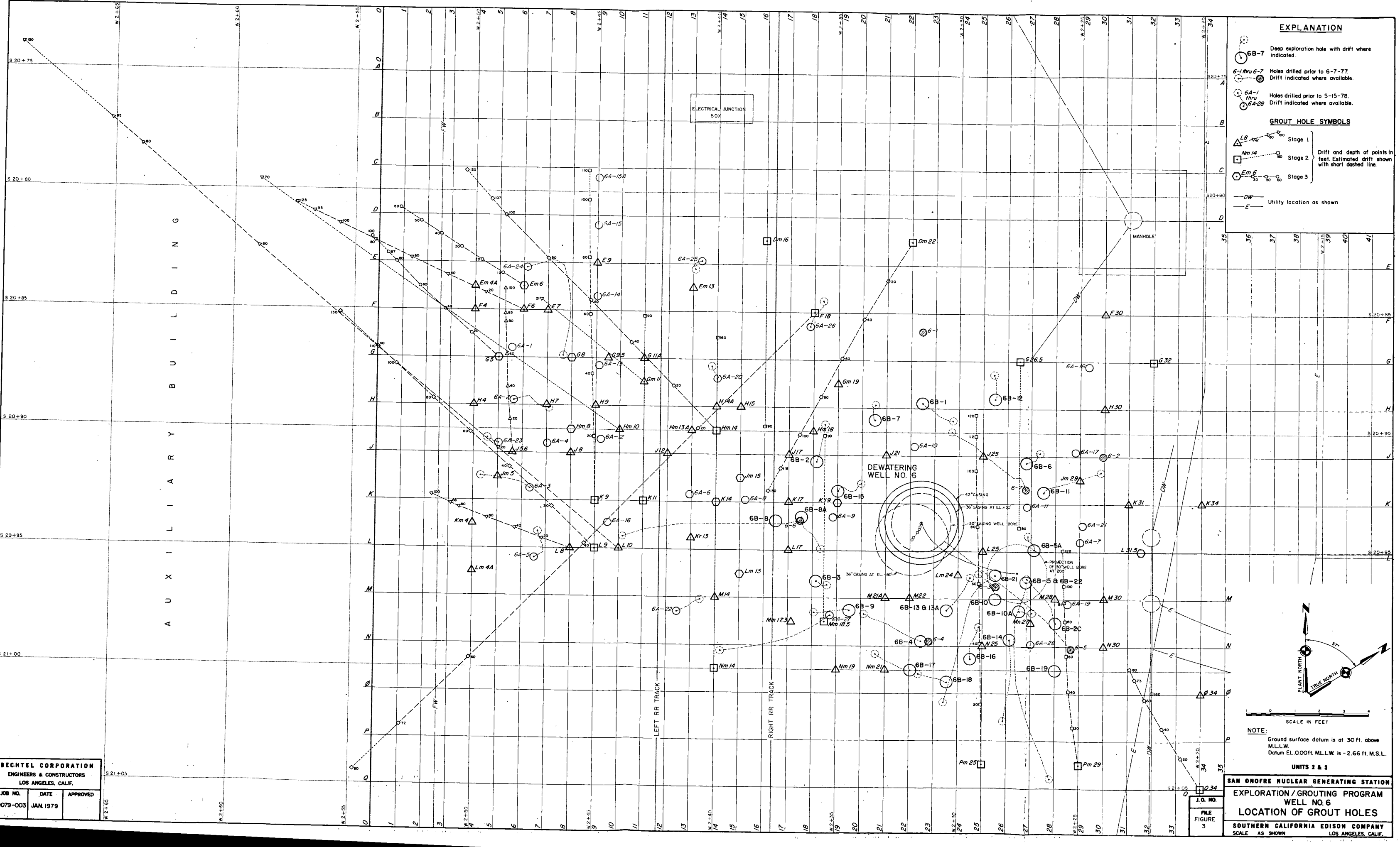
BECHTEL CORPORATION ENGINEERS & CONSTRUCTORS LOS ANGELES, CALIF.		
JOB NO.	DATE	APPROVED
10079-003	DEC. 1978	

J.O. NO.	SAN ONOFRE NUCLEAR GENERATING STATION
FILE	EXPLORATION/GROUTING PROGRAM
FIGURE	WELL NO. 6
1	LOCATION MAP
	SOUTHERN CALIFORNIA EDISON COMPANY
	SCALE N.T.S. LOS ANGELES, CALIF.

A U X I L I A R Y B U I L D I N G

EXPLANATION

- 6B-7 Deep exploration hole with drift where indicated.
  - 6-1 thru 6-7 Holes drilled prior to 6-7-77. Drift indicated where available.
  - 6A-1 thru 6A-28 Holes drilled prior to 5-15-78. Drift indicated where available.
- GROUT HOLE SYMBOLS**
- Stage 1
  - Stage 2
  - Stage 3
  - Utility location as shown



NOTE:  
Ground surface datum is at 30 ft. above M.L.L.W.  
Datum EL.000ft. M.L.L.W. is -2.66 ft. M.S.L.

UNITS 2 & 3

**SAN ONOFRE NUCLEAR GENERATING STATION**  
EXPLORATION / GROUTING PROGRAM  
WELL NO. 6  
**LOCATION OF GROUT HOLES**  
SOUTHERN CALIFORNIA EDISON COMPANY  
SCALE AS SHOWN LOS ANGELES, CALIF.

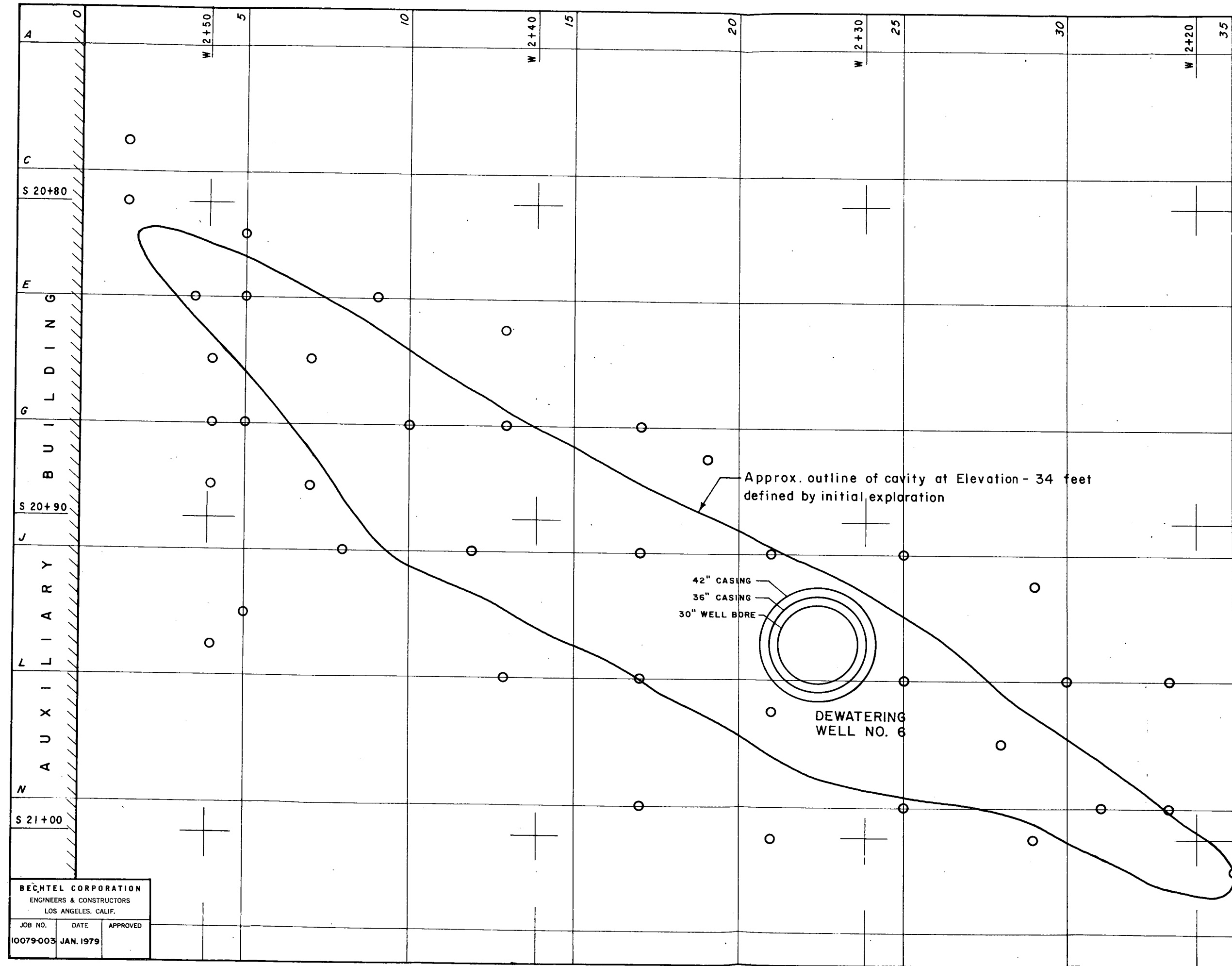
**BECHTEL CORPORATION**  
ENGINEERS & CONSTRUCTORS  
LOS ANGELES, CALIF.

JOB NO.	DATE	APPROVED
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FILE NO. 10079-003  
FIGURE 3

**EXPLANATION**

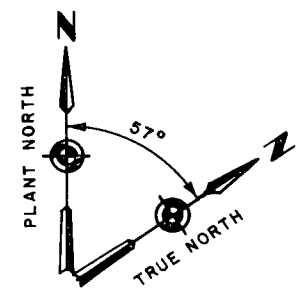
○ Stage I drill hole



Approx. outline of cavity at Elevation - 34 feet defined by initial exploration

42" CASING  
36" CASING  
30" WELL BORE

DEWATERING  
WELL NO. 6



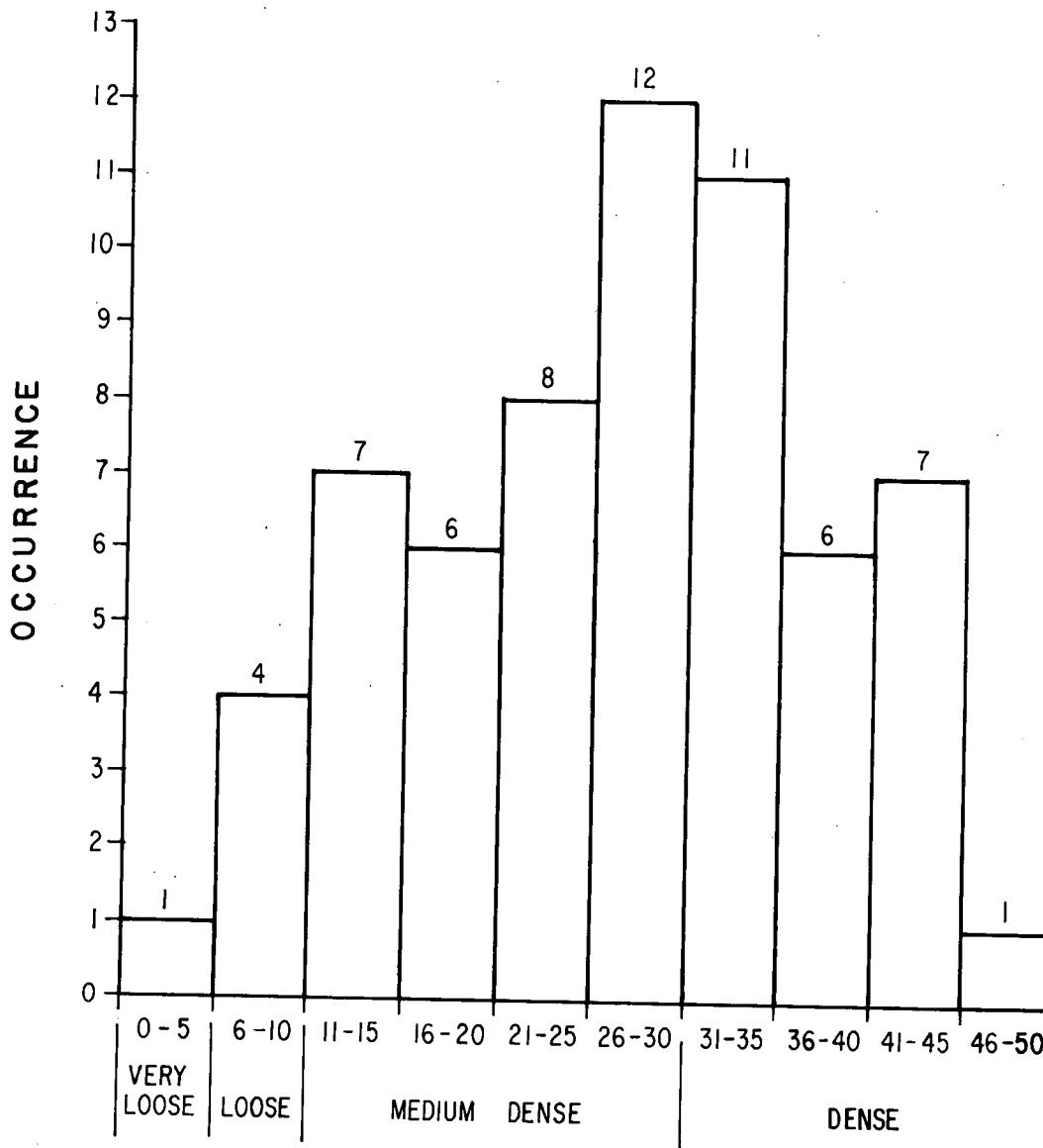
UNITS 2 & 3

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J.O. NO.	SAN ONOFRE NUCLEAR GENERATING STATION
FILE	EXPLORATION/GROUTING PROGRAM WELL NO. 6
FIGURE	PRELIMINARY PLAN OF DRILL HOLES
2	SOUTHERN CALIFORNIA EDISON COMPANY SCALE 1" = 3' LOS ANGELES, CALIF.

NOTE: Data taken from original drill logs.  
Excludes top 10 feet of each hole.



STANDARD PENETRATION TEST RESULTS IN DISTURBED SAND  
FOR STAGE I, STAGE II

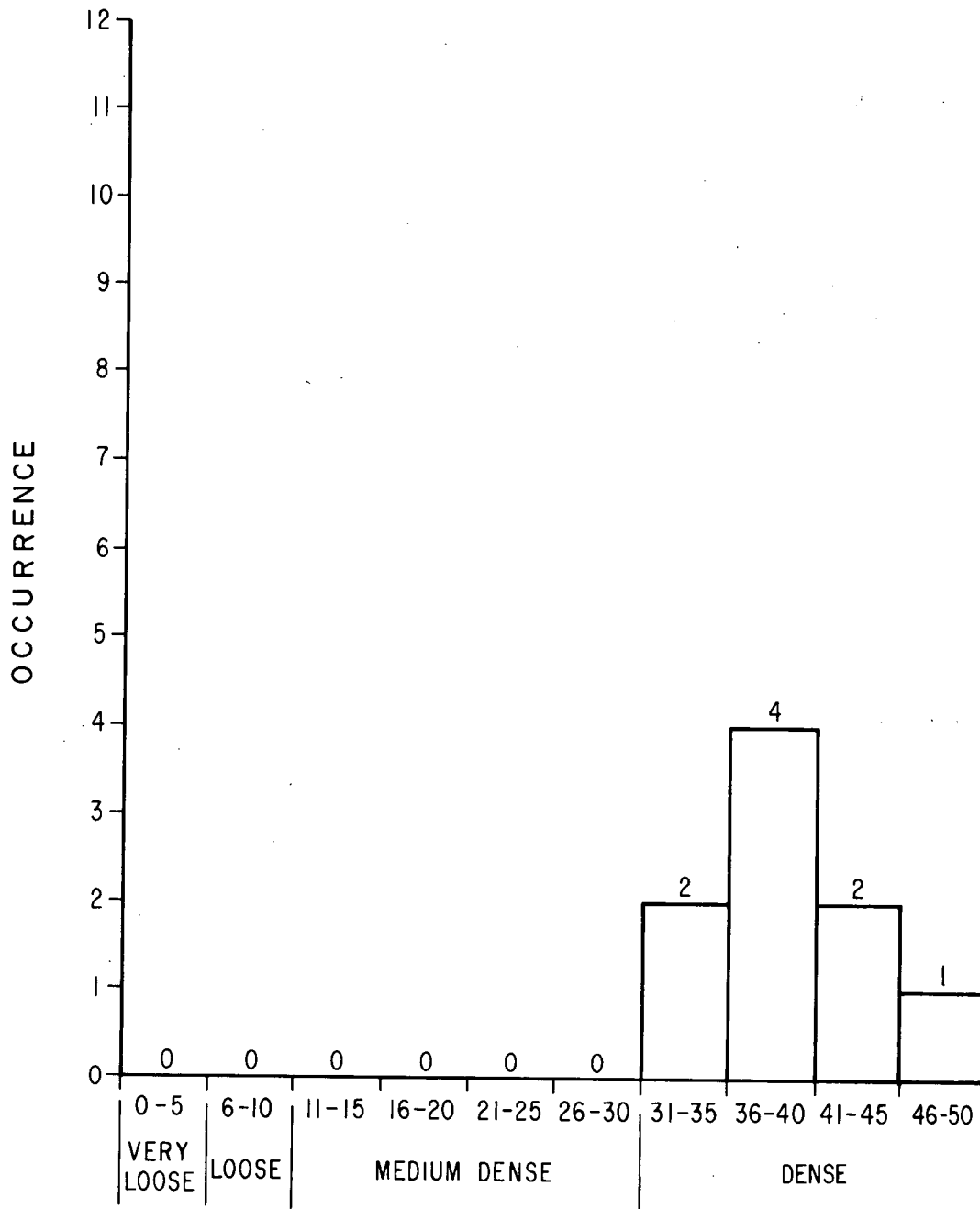
UNITS 2 & 3

BECHTEL CORPORATION ENGINEERS & CONSTRUCTORS LOS ANGELES, CALIF.		
JOB NO.	DATE	APPROVED
10079-003	DEC. 1978	

J.O. NO.	SAN ONOFRE NUCLEAR GENERATING STATION
FILE FIGURE 4	EXPLORATION/GROUTING PROGRAM WELL NO. 6
SHEET 1 OF 2	DISTRIBUTION OF S.P.T. RESULTS
	SOUTHERN CALIFORNIA EDISON COMPANY SCALE N.T.S. LOS ANGELES, CALIF.



NOTE: Data taken from original drill logs.  
Excludes top 10 feet of each hole.

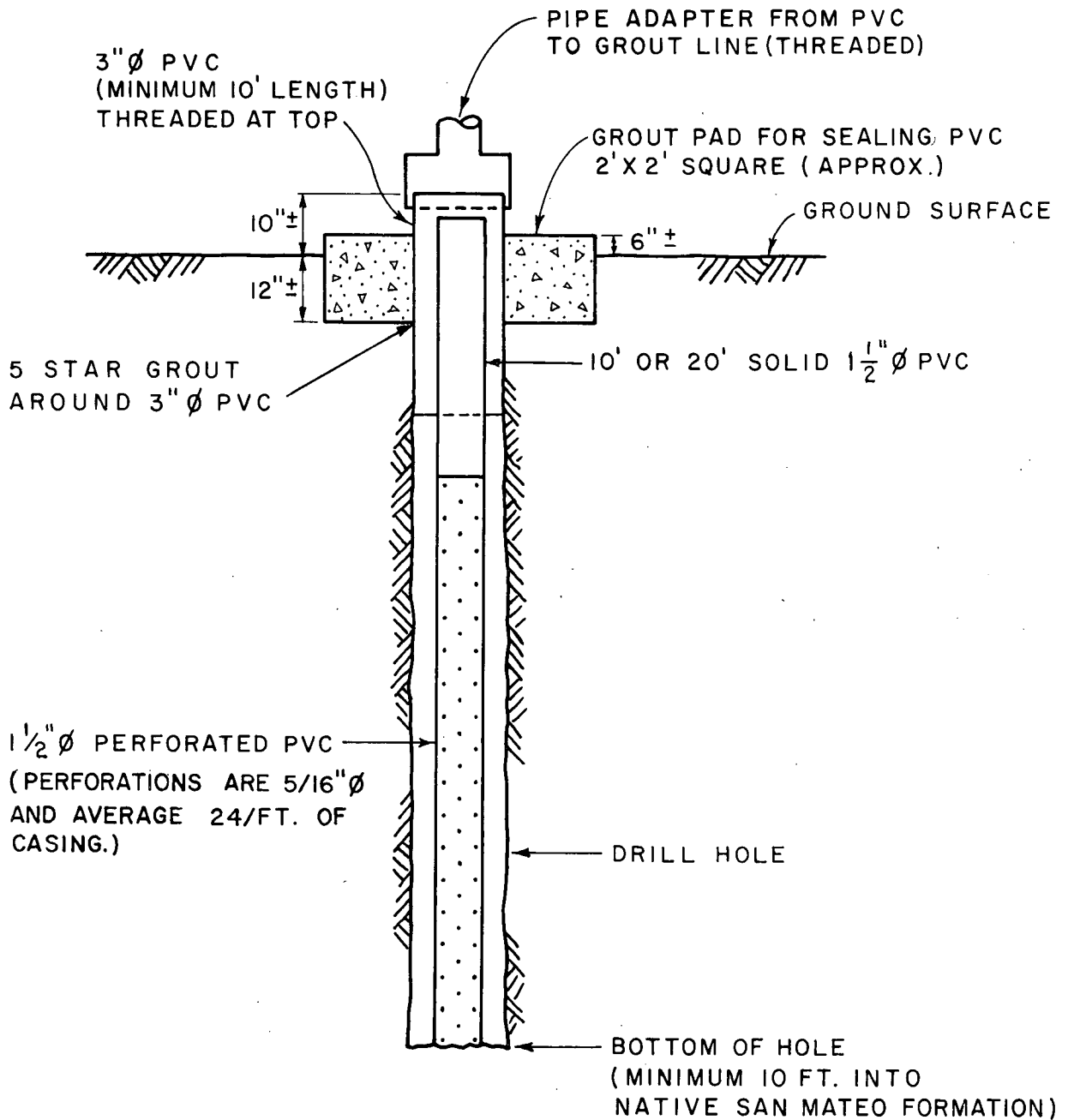


STANDARD PENETRATION TEST RESULTS IN DISTURBED SAND  
FOR STAGE III HOLES

UNITS 2 & 3

BECHTEL CORPORATION ENGINEERS & CONSTRUCTORS LOS ANGELES, CALIF.		
JOB NO. 10079-003	DATE DEC. 1978	APPROVED

J.O. NO.	SAN ONOFRE NUCLEAR GENERATING STATION
FILE	EXPLORATION/GROUTING PROGRAM
FIGURE	WELL NO. 6
4	DISTRIBUTION OF S.P.T. RESULTS
SHEET	SOUTHERN CALIFORNIA EDISON COMPANY
2 OF 2	SCALE N.T.S. LOS ANGELES, CALIF.



UNITS 2 & 3

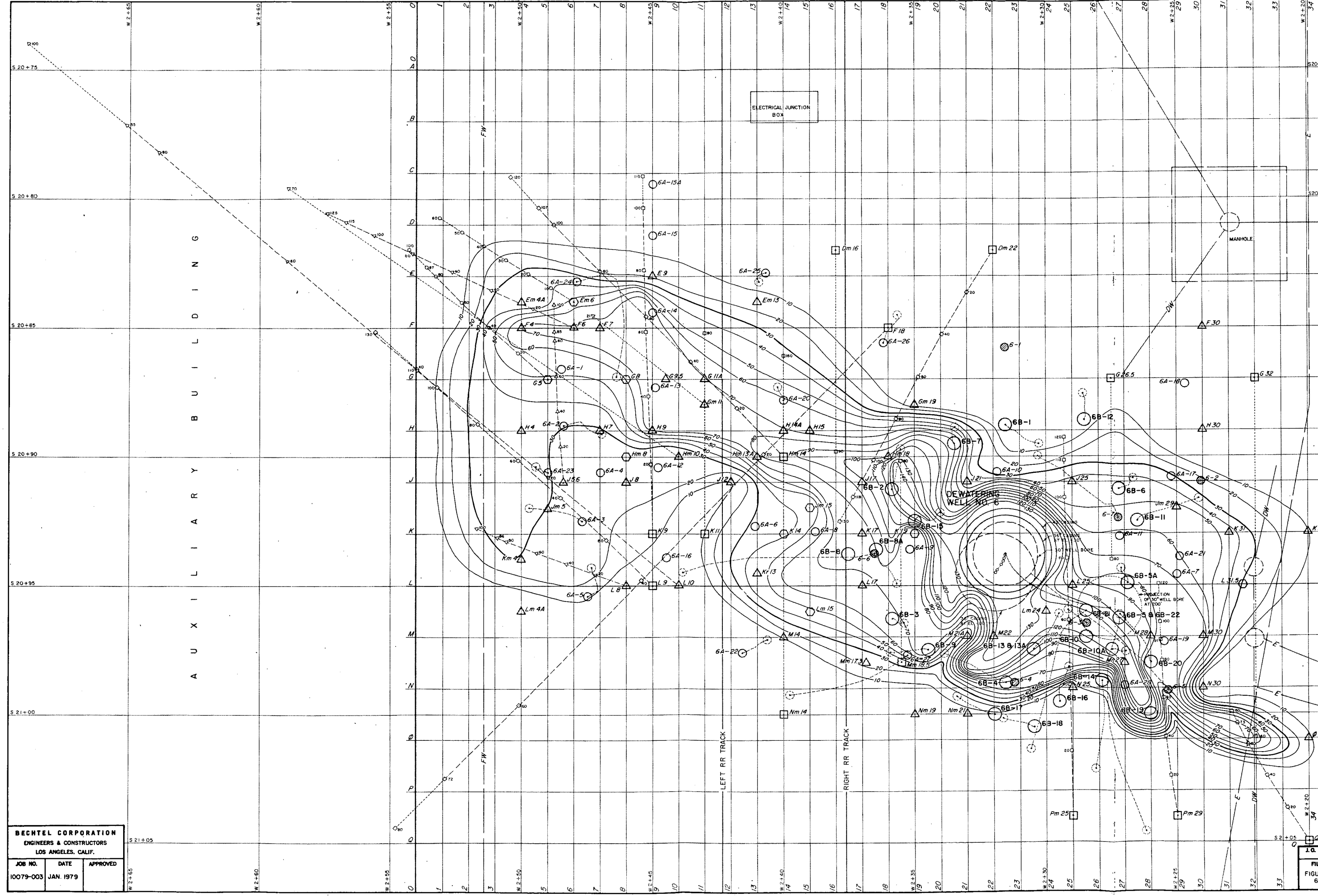
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JOB NO.	DATE	APPROVED
10079-003	JAN. 1979	

J.O. NO.	SAN ONOFRE NUCLEAR GENERATING STATION
FILE	EXPLORATION/GROUTING PROGRAM WELL NO. 6
FIGURE	TYPICAL EXPLORATION GROUT HOLE
5	SOUTHERN CALIFORNIA EDISON COMPANY SCALE N.T.S.
	LOS ANGELES, CALIF.

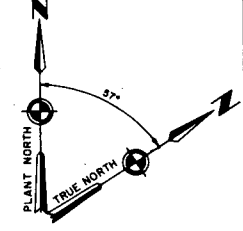
A U X I L I A R Y B U I L D I N G

EXPLANATION

- 6B-7 Deep exploration hole with drift where indicated
  - 6-1 thru 6-7 Holes drilled prior to 6-7-77 Drift indicated where available
  - 6A-1 thru 6A-28 Holes drilled prior to 5-15 78 Drift indicated where available
- GROUT HOLE SYMBOLS**
- Stage 1
  - Stage 2
  - Stage 3
- Drift and depth of points in feet. Estimated drift shown with short dashed line.
- DW Utility location as shown
  - E



- NOTES**
- Contours above elevation 10ft. include cavity fill sand, disturbed backfill, compacted backfill and native San Mateo Formation.
  - 30 ft. contour coincides with approximate elevation of bottom of building concrete base slab



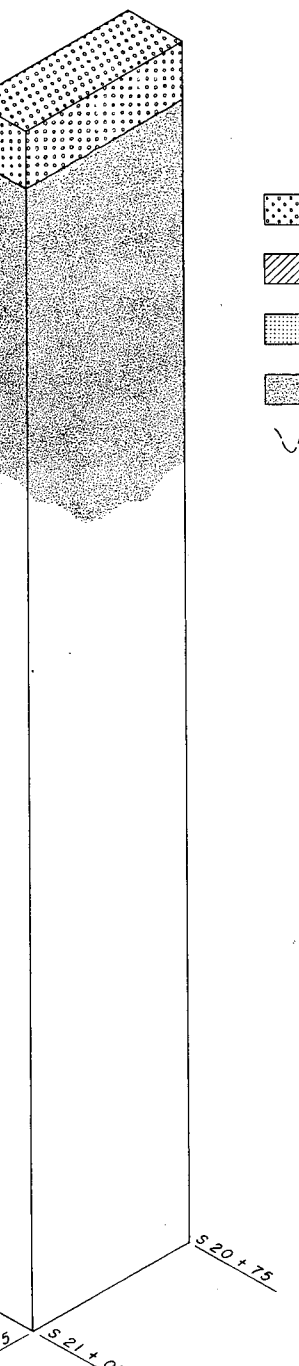
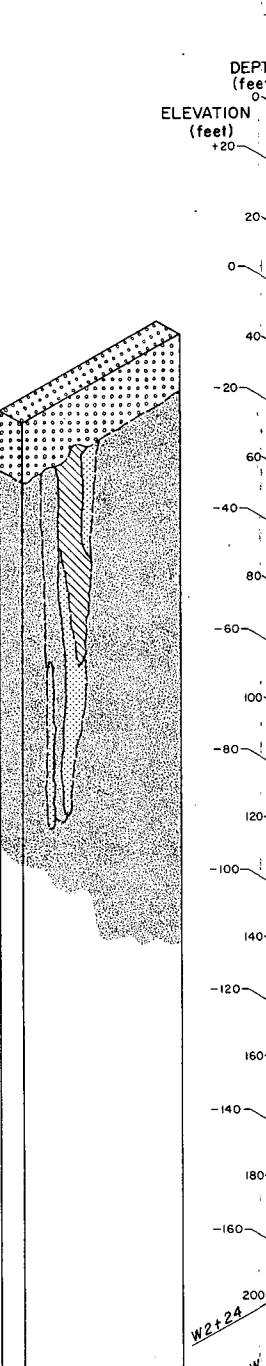
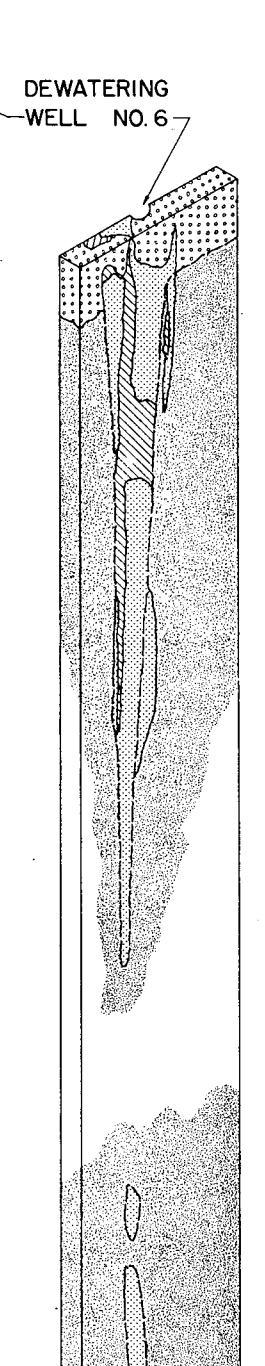
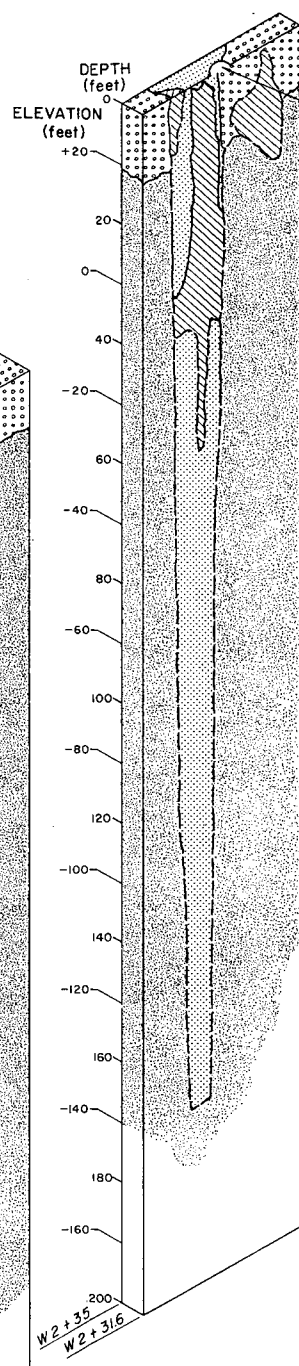
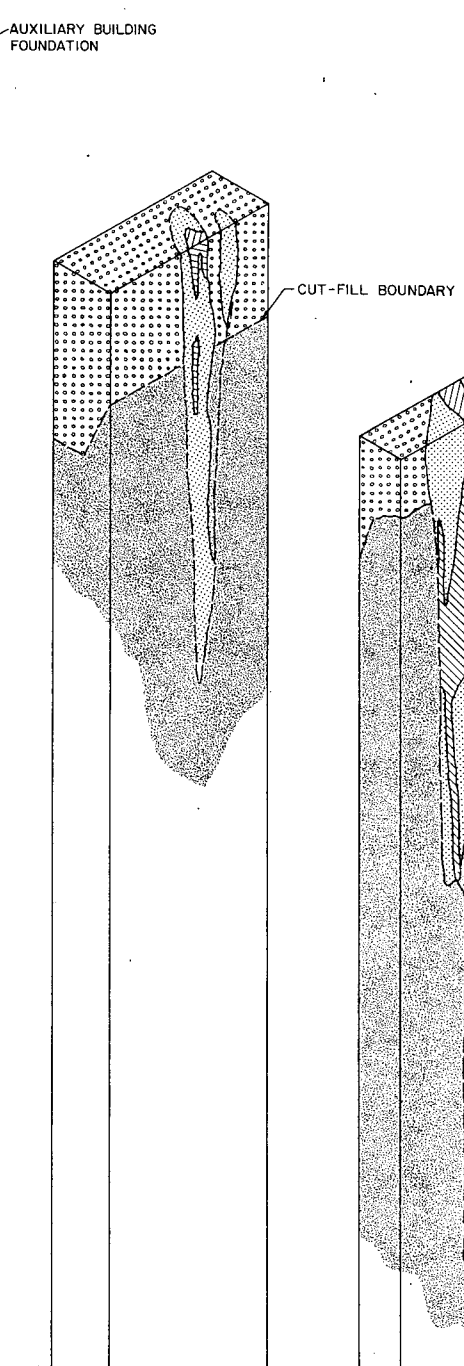
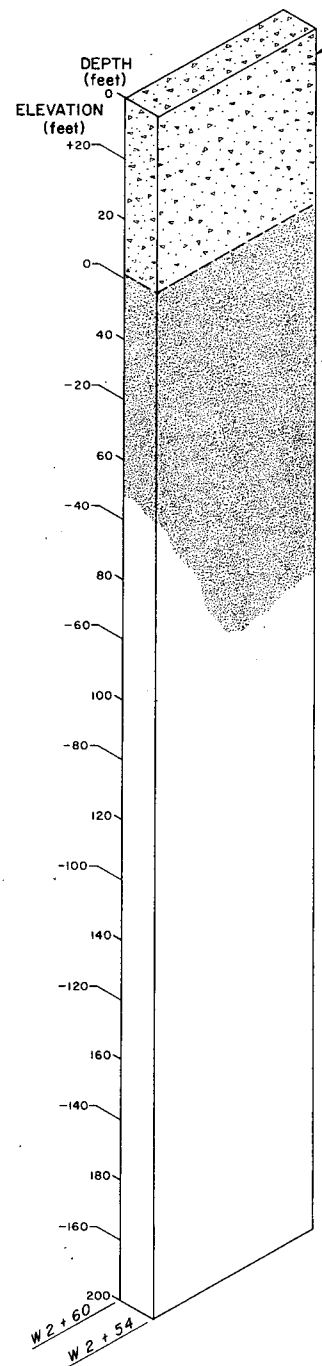
SCALE IN FEET

**NOTE:**  
Ground surface datum is at 30 ft above M.L.L.W.  
Datum EL. 0.00ft. M.L.L.W. is -266 ft. M.S.L.  
Contour interval 10 ft.  
UNITS 2 & 3






**BECHTEL CORPORATION**  
ENGINEERS & CONSTRUCTORS  
LOS ANGELES, CALIF.

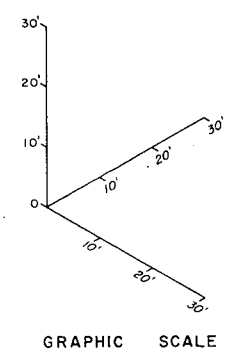
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10079-003	JAN. 1979	

**SAN ONOFRE NUCLEAR GENERATING STATION**  
EXPLORATION/GROUTING PROGRAM  
WELL NO. 6  
CONTOURS ON TOP OF SAN MATEO FM.  
FIGURE 6  
SOUTHERN CALIFORNIA EDISON COMPANY  
SCALE AS SHOWN LOS ANGELES, CALIF.



EXPLANATION OF SYMBOLS

-  Backfill sand
-  Grout (G-3, Portland cement grout)
-  Disturbed sand
-  San Mateo Formation
-  See sheet 2

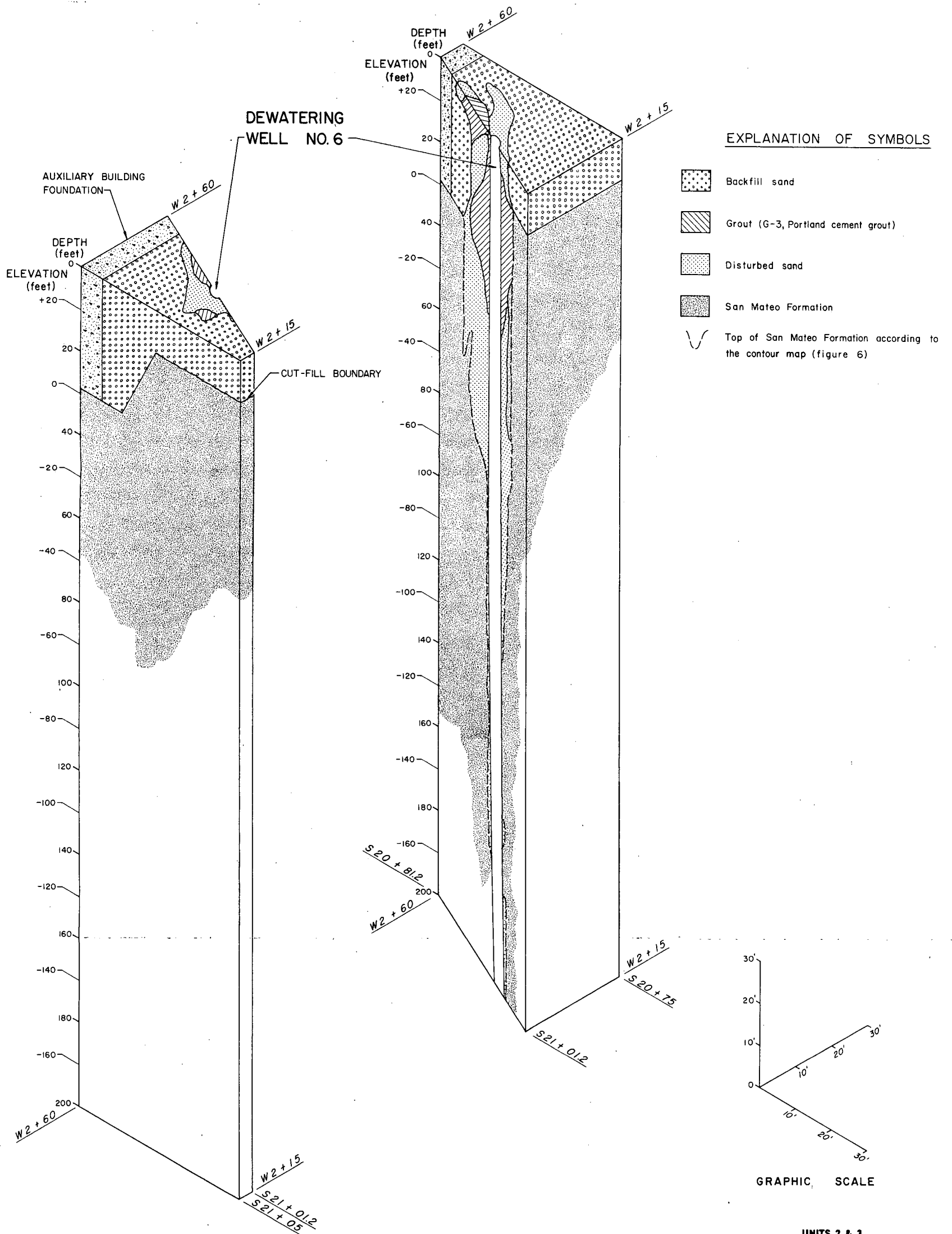


GRAPHIC SCALE






UNITS 2 & 3

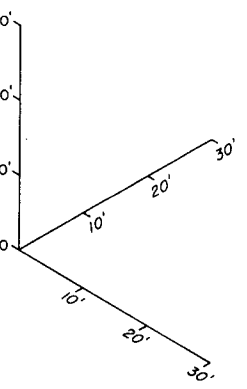
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JOB NO. 10079-003	DATE DEC. 1978	APPROVED

J.O. NO.	SAN ONOFRE NUCLEAR GENERATING STATION
FILE	EXPLORATION /GROUTING PROGRAM
FIGURE	WELL No. 6
SHEET	ISOMETRIC DRAWING OF CAVITY
1 OF 2	SOUTHERN CALIFORNIA EDISON COMPANY
	SCALE AS SHOWN LOS ANGELES, CALIF.



EXPLANATION OF SYMBOLS

-  Backfill sand
-  Grout (G-3, Portland cement grout)
-  Disturbed sand
-  San Mateo Formation
-  Top of San Mateo Formation according to the contour map (figure 6)



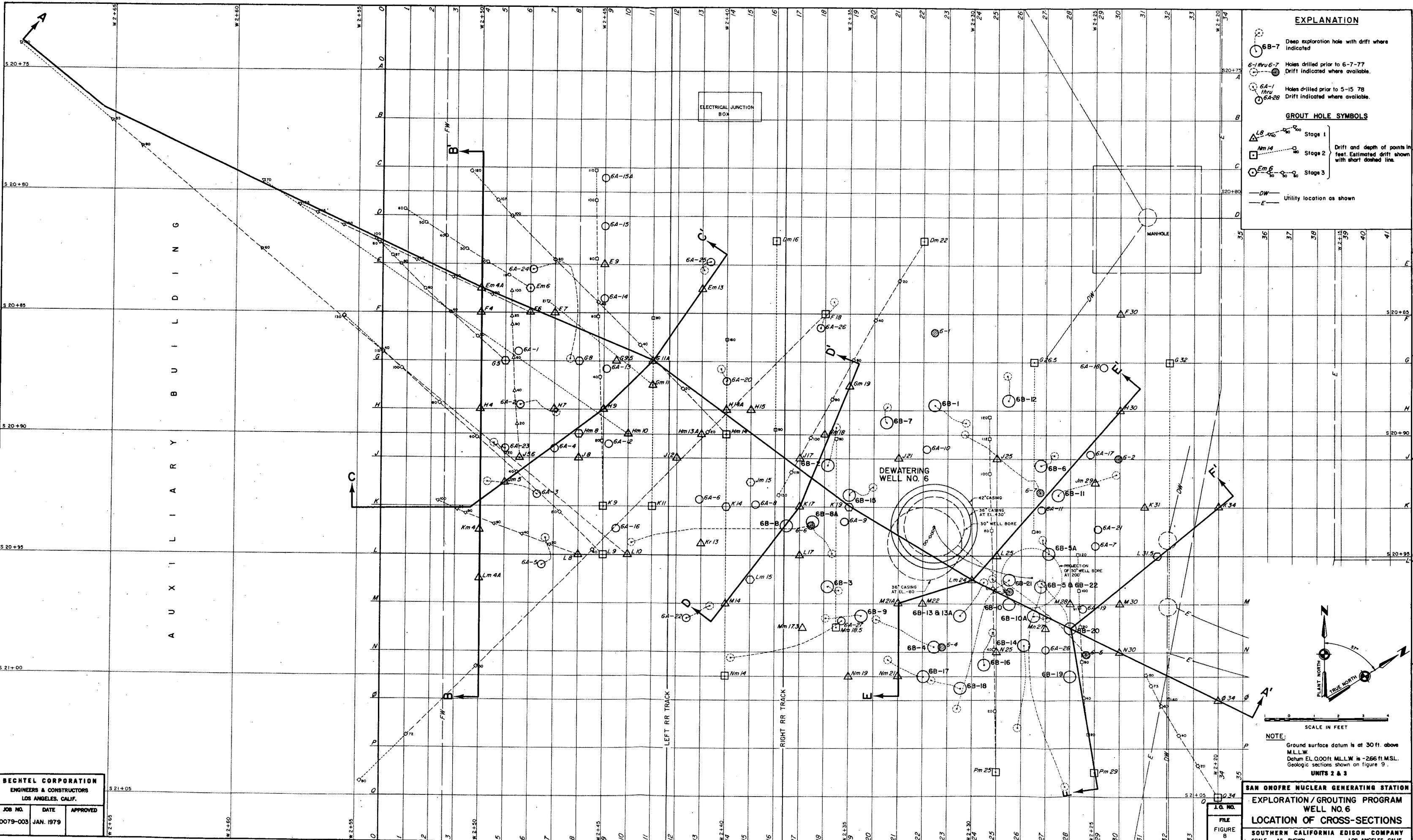
GRAPHIC SCALE

UNITS 2 & 3

BECHTEL CORPORATION  
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LOS ANGELES, CALIF.

JOB NO.	DATE	APPROVED
10079-003	DEC. 1978	

J.O. NO.	SAN ONOFRE NUCLEAR GENERATING STATION
FILE	EXPLORATION/GROUTING PROGRAM
FIGURE	WELL No. 6
SHEET	ISOMETRIC DRAWING OF CAVITY
2 OF 2	SOUTHERN CALIFORNIA EDISON COMPANY
	SCALE AS SHOWN LOS ANGELES, CALIF.



**EXPLANATION**

- 6B-7 Deep exploration hole with drift where indicated
- 6A-1 thru 6A-28 Holes drilled prior to 6-7-77  
○ Drift indicated where available.
- 6A-1 thru 6A-28 Holes drilled prior to 5-15-78  
○ Drift indicated where available.

**GROUT HOLE SYMBOLS**

- △ Lm 4A Stage 1 } Drift and depth of points in feet. Estimated drift shown with short dashed line.
- Nm 14 Stage 2 }
- Em 6 Stage 3 }

— DW — Utility location as shown  
— E — Utility location as shown

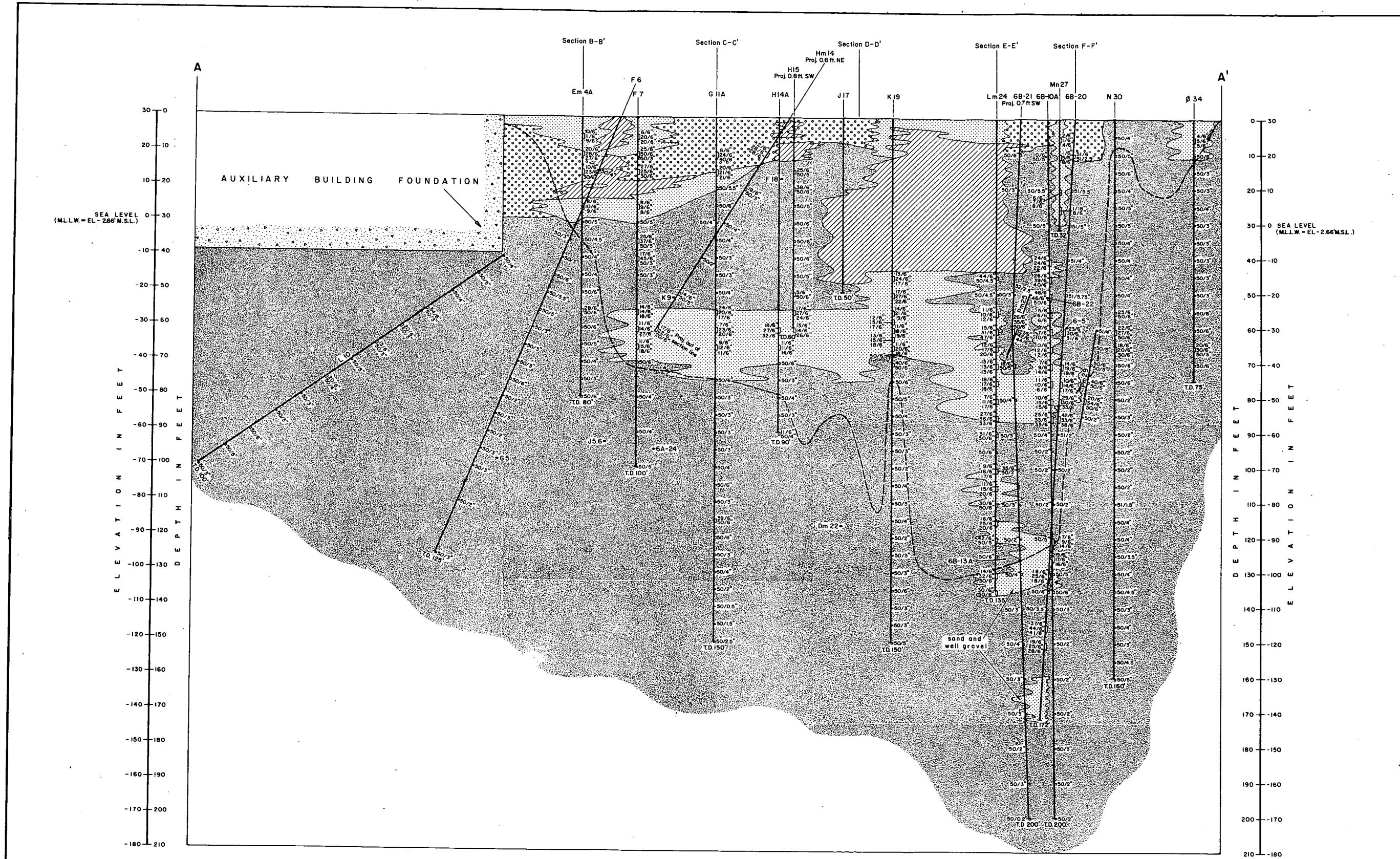
**NOTE:**  
Ground surface datum is at 30 ft. above M.L.L.W.  
Datum EL. 0.000 ft. M.L.L.W. is -266 ft. M.S.L.  
Geologic sections shown on figure 9.

**SAN ONOFRE NUCLEAR GENERATING STATION**  
**EXPLORATION/GROUTING PROGRAM**  
**WELL NO. 6**  
**LOCATION OF CROSS-SECTIONS**  
**SOUTHERN CALIFORNIA EDISON COMPANY**  
SCALE AS SHOWN

**BECHTEL CORPORATION**  
ENGINEERS & CONSTRUCTORS  
LOS ANGELES, CALIF.

JOB NO.	DATE	APPROVED
10079-003	JAN. 1979	

I.O. NO.  
FILE  
FIGURE  
8



SECTION A-A'

EXPLANATION OF SYMBOLS

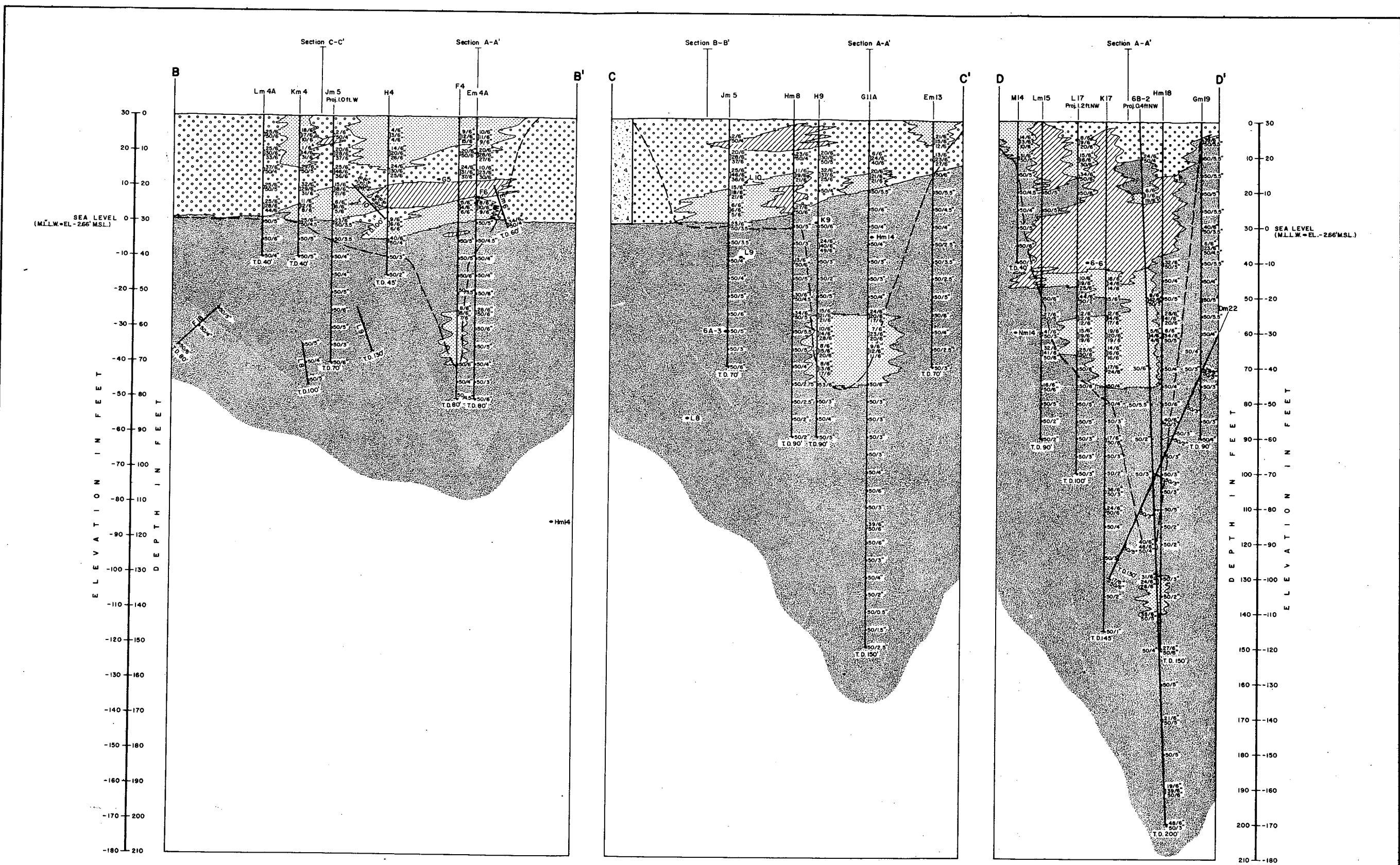
- Backfill sand
- Grout (undiff.)
- Disturbed sand
- San Mateo Fm.
- 31/8" Blow counts and interval with split spoon sampler
- Intersection of angle hole with plane of section. Portion of hole shown is a maximum of 1 foot projection off plane of section
- Dm 22\* Intersection of angle hole into plane of section
- Top of San Mateo Formation according to contour map (Figure 6)
- SCALE IN FEET  
VERTICAL: 0, 2, 4, 6  
HORIZONTAL: 0, 20, 30

Note: For location of sections see figure 8

BECHTEL CORPORATION ENGINEERS & CONSTRUCTORS LOS ANGELES, CALIF.		
JOB NO. 10079-003	DATE JAN. 1979	APPROVED

I.O. NO.		SAN ONOFRE NUCLEAR GENERATING STATION	
FILE	EXPLORATION/GROUTING PROGRAM		
FIGURE	WELL No. 6		
SHEET	CROSS-SECTIONS		
1 OF 3	SOUTHERN CALIFORNIA Edison COMPANY		
SCALE AS SHOWN		LOS ANGELES, CALIF.	

UNITS 2 & 3



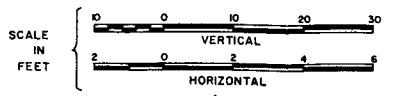
SECTION B-B'

SECTION C-C'

SECTION D-D'

**BECHTEL CORPORATION**  
 ENGINEERS & CONSTRUCTORS  
 LOS ANGELES, CALIF.

JOB NO.	DATE	APPROVED
10079-003	JAN. 1979	

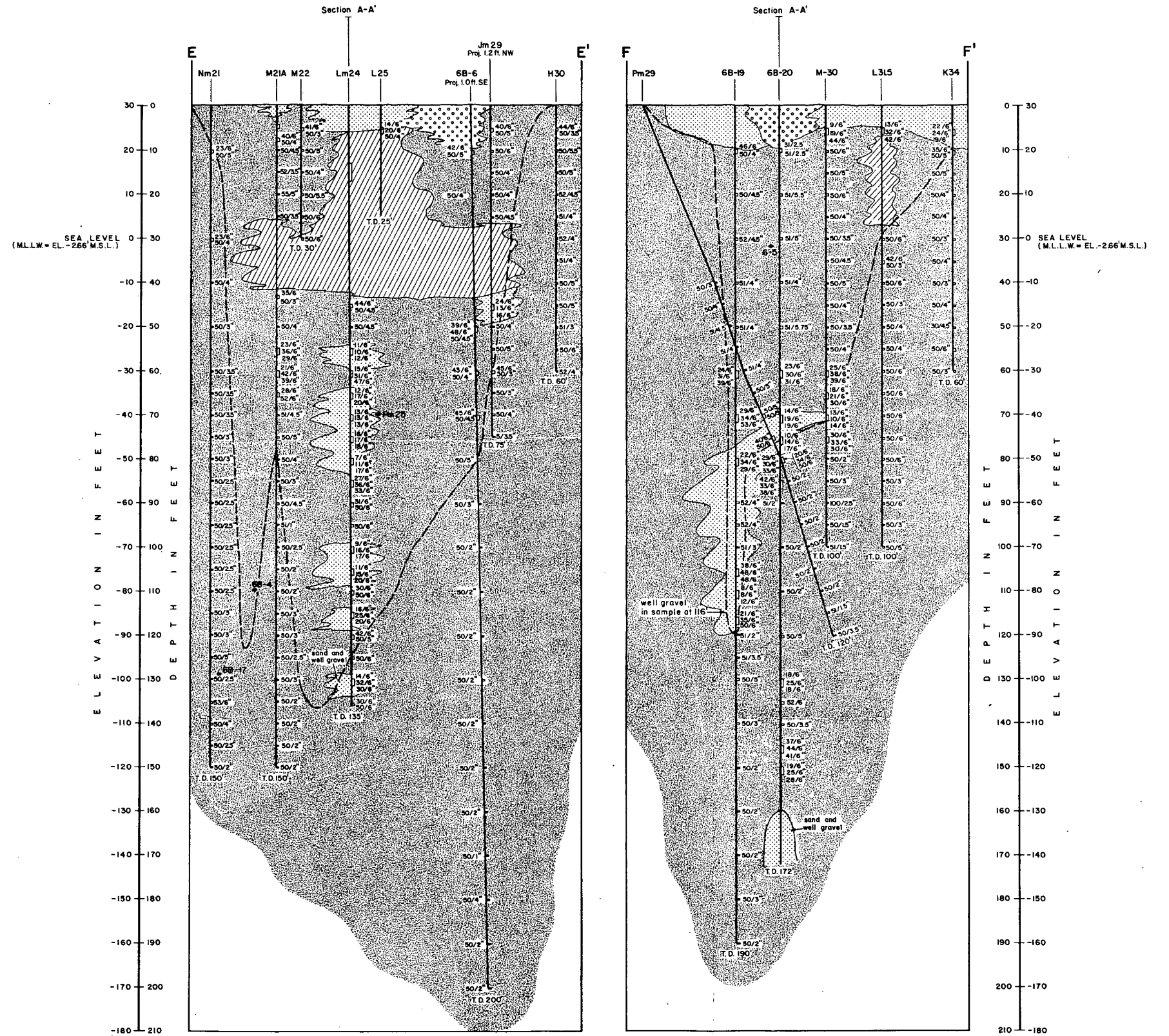


Notes: 1. For location of sections see figure 9  
 2. For explanation of symbols see figure 9 sheet 1

**UNITS 2 & 3**

J.O. NO.	<b>SAN ONOFRE NUCLEAR GENERATING STATION</b>
FILE	<b>EXPLORATION / GROUTING PROGRAM</b>
FIGURE	<b>WELL No. 6</b>
SHEET	<b>CROSS-SECTIONS</b>
2 OF 3	<b>SOUTHERN CALIFORNIA Edison COMPANY</b>
	SCALE AS SHOWN LOS ANGELES, CALIF.



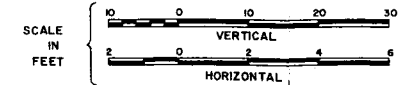


SECTION E-E'

SECTION F-F'

UNITS 2 & 3

BECHTEL CORPORATION ENGINEERS & CONSTRUCTORS LOS ANGELES, CALIF.		
JOB NO.	DATE	APPROVED
10079-003	JAN. 1979	



Notes:  
1. For location of sections see figure 8  
2. For explanation of symbols see figure 9 sheet 1

J.O. NO.	SAN ONOFRE NUCLEAR GENERATING STATION
FILE	EXPLORATION / GROUTING PROGRAM
FIGURE	WELL No. 6
SHEET	CROSS-SECTIONS
3 OF 3	SOUTHERN CALIFORNIA EDISON COMPANY
	SCALE AS SHOWN LOS ANGELES, CALIF.

A U X I L I A R Y B U I L D I N G

EXPLANATION

- 6B-7 Deep exploration hole with drift where indicated
  - 6-1 thru 6-7 Holes drilled prior to 6-7-77 Drift indicated where available.
  - 6A-1 thru 6A-28 Holes drilled prior to 5-15 78 Drift indicated where available.
- GROUT HOLE SYMBOLS**
- Stage 1
  - Stage 2
  - Stage 3
- Drift and depth of points in feet. Estimated drift shown with short dashed line.
- DW Utility location as shown
  - E

**BECHTEL CORPORATION**  
ENGINEERS & CONSTRUCTORS  
LOS ANGELES, CALIF.

JOB NO.	DATE	APPROVED
10079-003	JAN. 1979	

**SAN ONOFRE NUCLEAR GENERATING STATION**  
EXPLORATION / GROUTING PROGRAM  
WELL NO. 6  
ISOPACH OF GROUT THICKNESS  
SOUTHERN CALIFORNIA EDISON COMPANY  
SCALE AS SHOWN LOS ANGELES, CALIF.

**NOTE:**  
Ground surface datum is at 30 ft. above M.L.L.W.  
Datum EL. 0.000 ft. M.L.L.W. is -266 ft. M.S.L.  
Contour interval 10 ft.  
UNITS 2 & 3

SCALE IN FEET

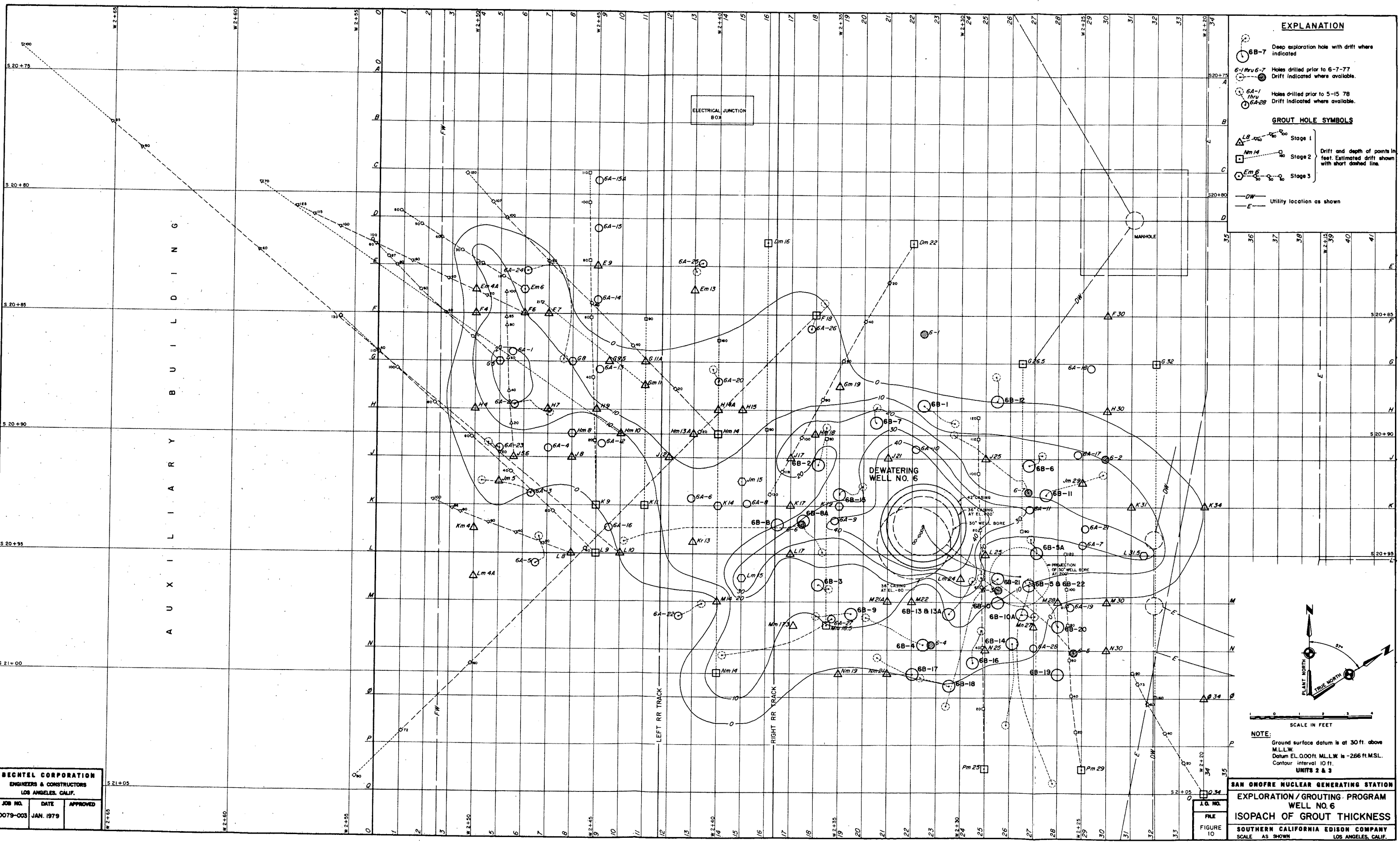
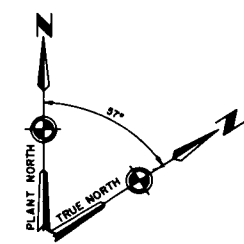
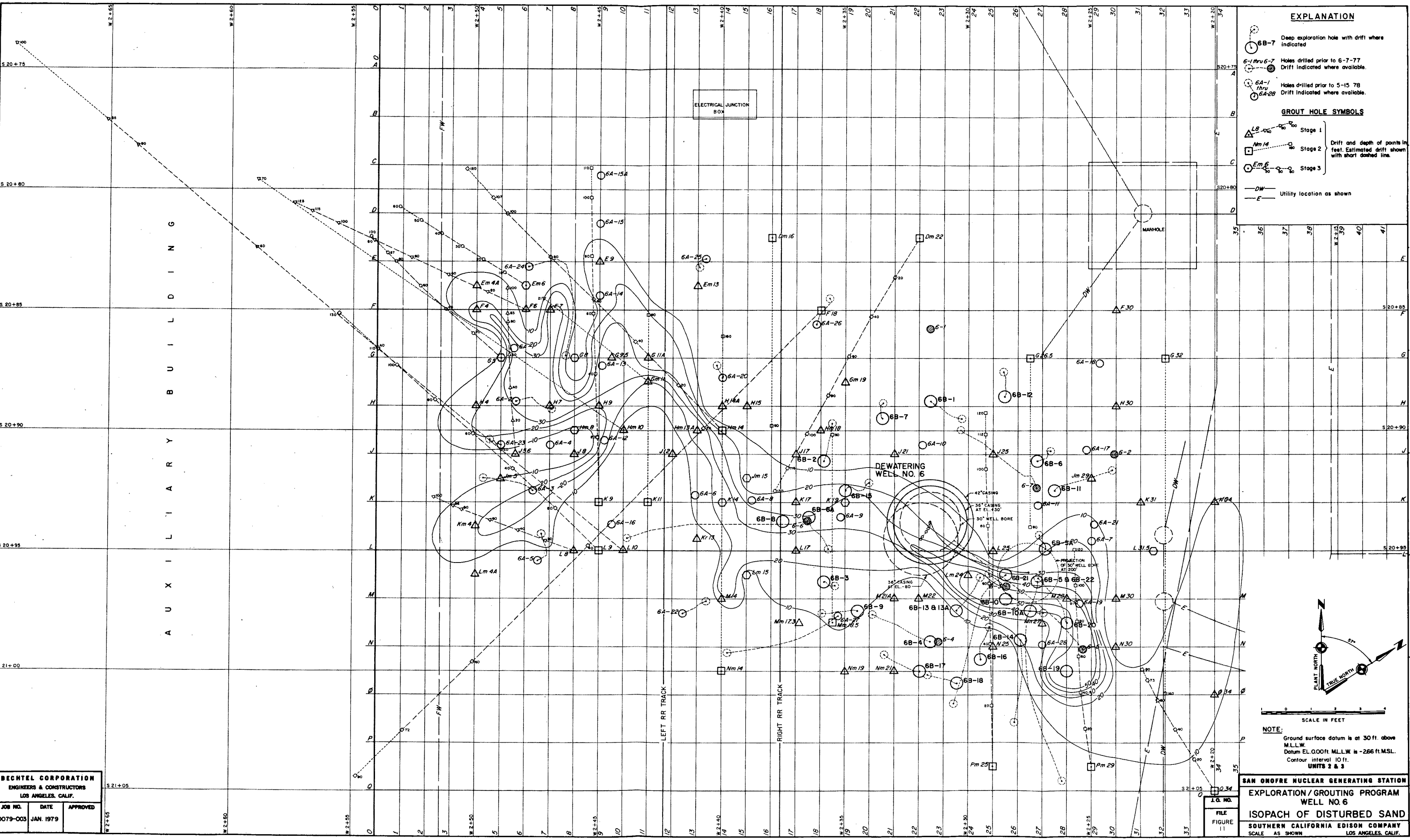


FIGURE 10

**EXPLANATION**

- 6B-7 Deep exploration hole with drift where indicated
  - 6-1 thru 6-7 Holes drilled prior to 6-7-77  
○ Drift indicated where available
  - 6A-1 thru 6A-28 Holes drilled prior to 5-15-78  
○ Drift indicated where available
- GROUT HOLE SYMBOLS**
- △ Lm 4A Stage 1
  - △ Nm 14 Stage 2
  - △ Em 6 Stage 3
- Drift and depth of points in feet. Estimated drift shown with short dashed line.
- DW Utility location as shown
  - F Utility location as shown



**NOTE:**  
 Ground surface datum is at 30 ft. above M.L.L.W.  
 Datum EL. 0.00ft. M.L.L.W. is -266 ft. M.S.L.  
 Contour interval 10 ft.  
 UNITS 2 & 3

**SAN ONOFRE NUCLEAR GENERATING STATION**  
**EXPLORATION/GROUTING PROGRAM**  
**WELL NO. 6**  
**ISOPACH OF DISTURBED SAND**  
 SOUTHERN CALIFORNIA EDISON COMPANY  
 SCALE AS SHOWN  
 LOS ANGELES, CALIF.

**BECHTEL CORPORATION**  
 ENGINEERS & CONSTRUCTORS  
 LOS ANGELES, CALIF.

JOB NO.	DATE	APPROVED
10079-003	JAN. 1979	

APPENDIX A

Appendix A includes results of the gyroscopic multi-shot surveys performed by Eastman Whipstock during the exploration/grouting program. The computer printouts of the surveys and directional plots are included for the following holes:

Dm 22  
Em 6  
F 6  
F 18  
G 5  
Hm 14  
J 5.6  
K 9  
L 8  
L 9  
L 10  
Pm 25  
Pm 29  
Q 34

The above holes were surveyed to establish direction and inclination.

BECHTEL POWER CORP.-- WELL 6 #D<sub>m</sub> -22 --EASTMAN GYRO MULTI-SHOT SURVEY  
SAN ONOFRE POWER PLANT

NORTH FOR THIS SURVEY IS "PLANT NORTH", N 57 00 W

DATE: 28 SEPTEMBER 1978

JOB NO: F-0978-G0067

GYRO SURVEY BY: EASTMAN WHIPSTOCK, INC.

FILE: F135-6

PITT

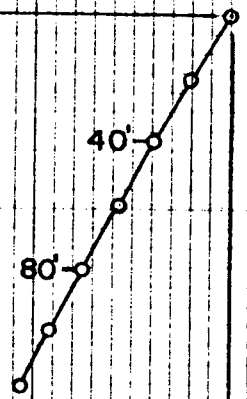
VERTICAL SECTION IS IN  
PLANE OF BOTTOM HOLE CLOSURE.

RECORD OF SURVEY

ANGLE AVERAGING METHOD

MEASURED DEPTH FEET	DRIFT ANGLE D M	DRIFT DIRECTION D M	TRUE VERTICAL DEPTH FEET	VERTICAL SECTION FEET	RECTANGULAR COORDINATES FEET		DOG LEG SEVERITY DEG/100FT
0.	5 30	S 31 30 W	0.00	0.00	0.00	0.00	0.0
NORTH FOR THIS SURVEY IS "PLANT NORTH", N 57 00 W							
20.	5 30	S 31 30 W	19.91	1.92	1.63 S	1.00 W	0.0
40.	5 20	S 29 0 W	39.82	3.80	3.27 S	1.95 W	1.4
60.	5 25	S 27 30 W	59.73	5.68	4.92 S	2.84 W	0.8
80.	5 10	S 28 0 W	79.65	7.52	6.55 S	3.70 W	1.3
100.	5 10	S 28 30 W	99.56	9.32	8.13 S	4.55 W	0.2
118.	5 15	S 30 0 W	117.49	10.95	9.56 S	5.35 W	0.9

FINAL CLOSURE - DIRECTION: S 29 DEGS 13 MINS 41 SECS W  
 DISTANCE: 10.95 FEET



DEPTH-118'  
SOUTH-9.56'  
WEST -5.35'  
CLOSURE-10.95' S 29° 13' 41" W

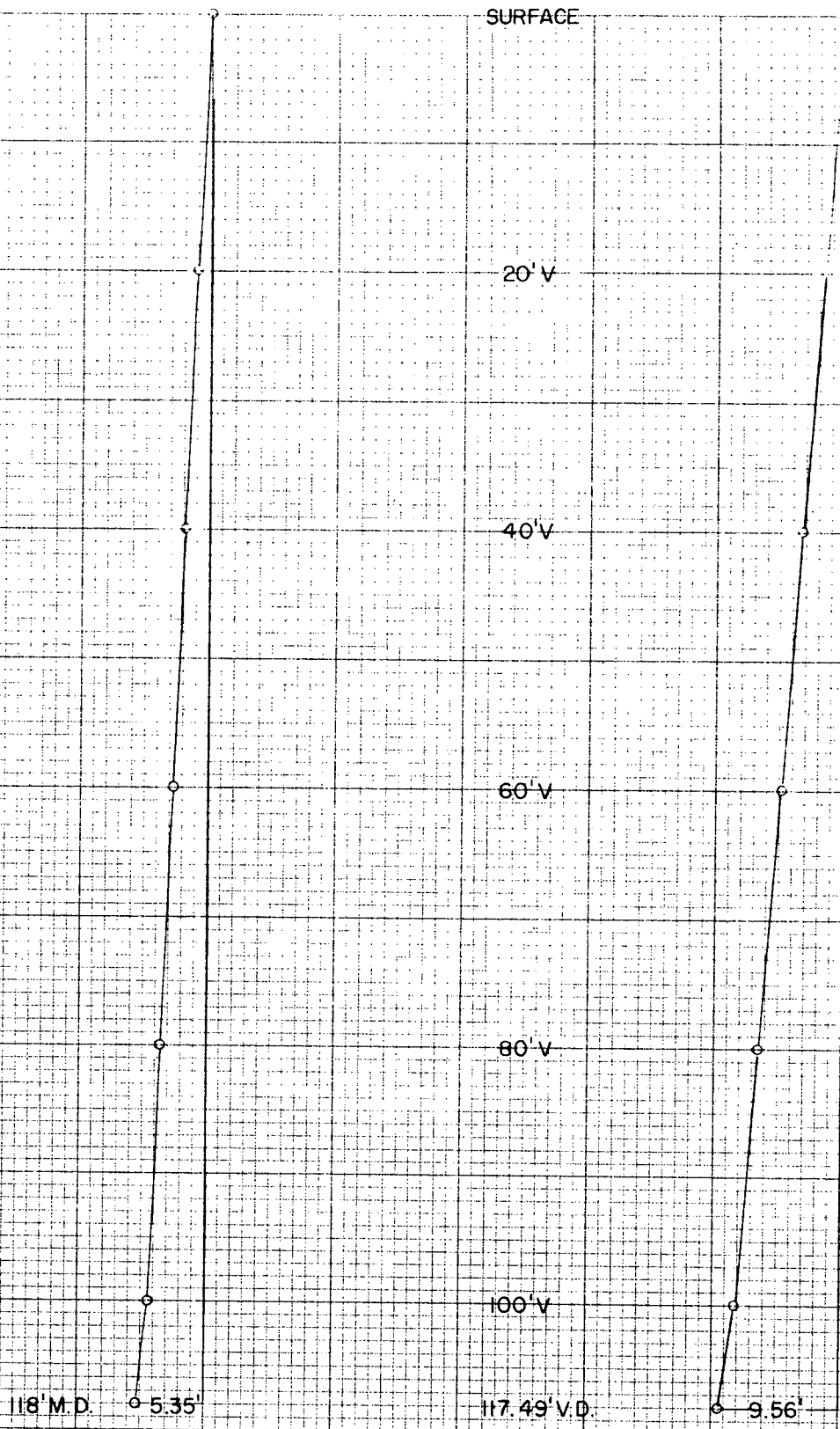
WELL 6 D<sub>m</sub>-22

JOB N<sup>o</sup> P-0978-G0067

SURFACE

WELL: 6 D -22

SCALE  
VERTICAL 1"=10'



EAST

NORTH



BECHTEL POWER CORP. --- WELL 8 #2m-5 --- EASTMAN GYRO MULTI-SHOT SURVEY  
SAN ONOFRE POWER PLANT

NORTH FOR THIS SURVEY IS "PLANT NORTH", N 57 00 W

DATE: 11 OCTOBER 1978  
JOB NO: P-1078-50102  
GYRO SURVEY BY: EASTMAN WHIPSTOCK, INC.  
FILE: F135-15  
PITT

VERTICAL SECTION IS IN  
PLANE OF BOTTOM HOLE CLOSURE.

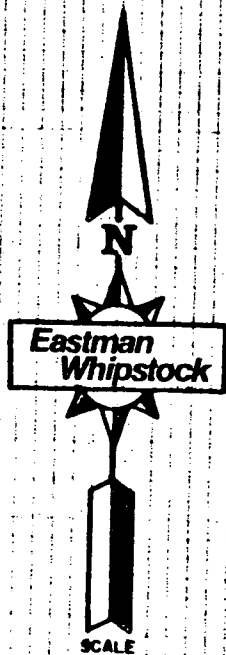
RECORD OF SURVEY

ANGLE AVERAGING METHOD

MEASURED DEPTH FEET	DRIFT ANGLE D M	DRIFT DIRECTION D	TRUE VERTICAL DEPTH FEET	VERTICAL SECTION FEET	RECTANGULAR COORDINATES FEET
0.	5 55	N 58 W	0.00	0.00	0.00
10.	5 55	N 58 W	9.95	1.03	0.55 N 0.87 W
20.	5 50	N 58 W	19.89	2.05	1.09 N 1.74 W
30.	5 45	N 57 W	29.64	3.06	1.63 N 2.59 W
40.	5 45	N 57 W	39.79	4.07	2.18 N 3.43 W
50.	5 40	N 57 W	49.74	5.06	2.72 N 4.27 W

NORTH FOR THIS SURVEY IS 'PLANT NORTH', N 57 00 W

FINAL CLOSURE - DIRECTION: N 57 DEGS 30 MINS 21 SECS W  
 DISTANCE: 5.06 FEET



SCALE

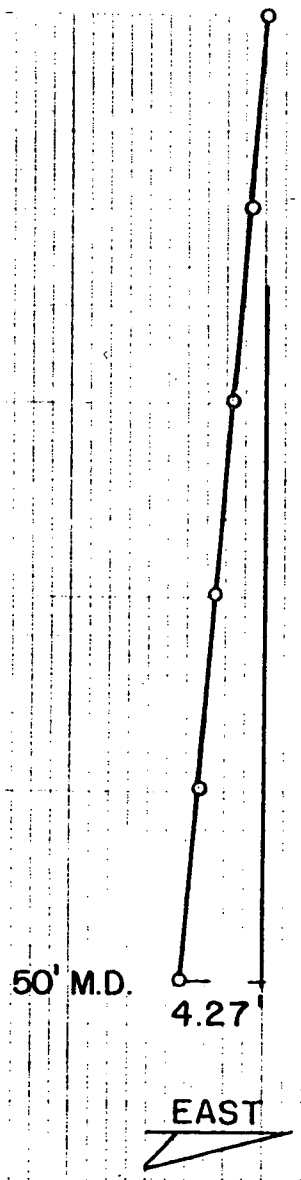
1" = 5'

DEPTH-50'  
NORTH-2.72'  
WEST -4.27'  
CLOSURE-5.06' N 57° 30' 21" W



WELL NR: 6 NR E<sub>M</sub>-6

JOB NR P-1078-G0102

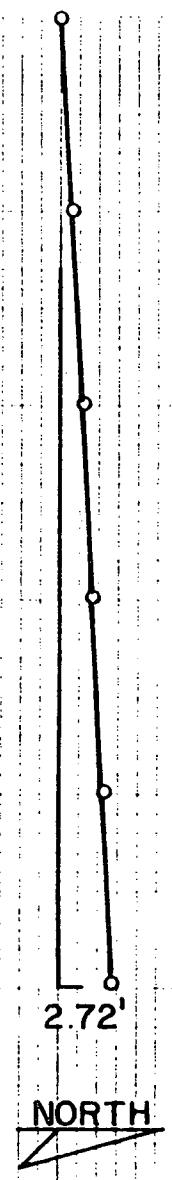


SURFACE

20' V

40' V

49.74' V.D.



WELL 6 N° E-6

SCALE  
1"=10'

VERTICAL SECTION

BECHTEL POWER CORP.-- WELL 6 #F-6 --EASTMAN GYRO MULTI-SHOT SURVEY  
SAN ONOFRE POWER PLANT

NORTH FOR THIS SURVEY IS "PLANT NORTH", N 57 00 W

DATE: 29 SEPTEMBER 1978  
JOB NO: F-0978-G0069  
GYRO SURVEY BY: EASTMAN WHIPSTOCK, INC.  
FILE: F135-7  
PITT

VERTICAL SECTION IS IN  
PLANE OF BOTTOM HOLE CLOSURE.

RECORD OF SURVEY

ANGLE AVERAGING METHOD

MEASURED DEPTH FEET	DRIFT ANGLE D M	DRIFT DIRECTION D	TRUE VERTICAL DEPTH FEET	VERTICAL SECTION FEET	RECTANGULAR COORDINATES FEET	
0.	5 0	N 65 W	0.00	0.00	0.00	0.00
NORTH FOR THIS SURVEY IS "PLANT NORTH", N 57 00 W						
20.	5 0	N 65 W	19.92	1.74	0.74 N	1.58 W
40.	4 50	N 65 W	39.85	3.46	1.46 N	3.13 W
60.	4 50	N 65 W	59.78	5.14	2.17 N	4.66 W
80.	4 40	N 65 W	79.71	6.80	2.87 N	6.16 W
100.	4 35	N 64 W	99.65	8.41	3.57 N	7.62 W
115.	4 30	N 65 W	114.60	9.60	4.06 N	8.69 W

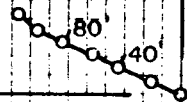
FINAL CLOSURE - DIRECTION: N 64 DEGS 51 MINS 15 SECS W  
 DISTANCE: 9.60 FEET



SCALE

1" = 10'

DEPTH - 115'  
NORTH - 4.08'  
WEST - 8.69'  
CLOSURE - 9.60' N 64° 5' 15" W



WELL 6 N<sup>o</sup> F-6

JOB N<sup>o</sup> P-0978-G0069

SURFACE

WELL 6 N<sup>o</sup> F-6

20' V.

VERTICAL SECTION

40' V.

SCALE  
1" = 10'

60' V.

80' V.

100' V.

115' M.D.

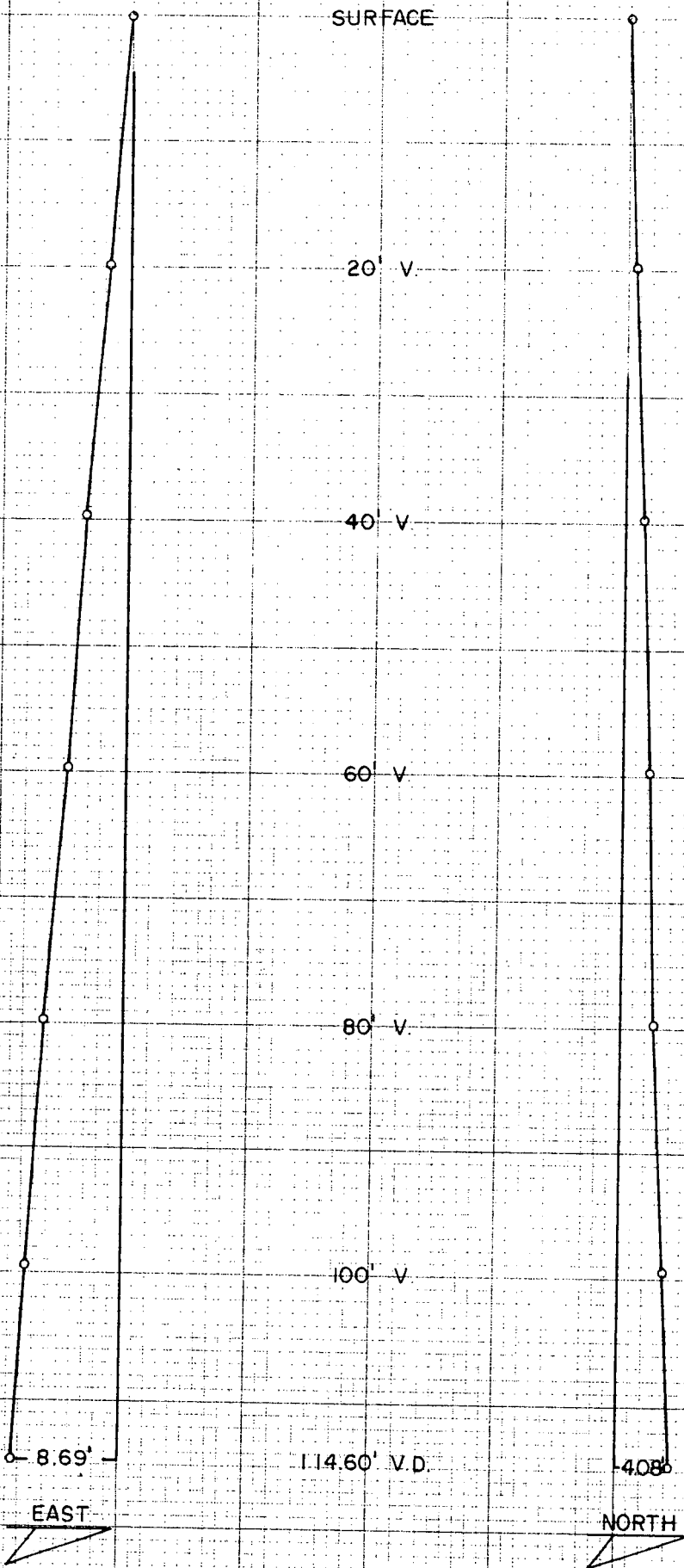
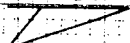
8.69'

114.60' V.D.

408'

EAST

NORTH





BECHTEL POWER CORP.-- HOLE 6 #F-18 --EASTMAN GYRO MULTI-SHOT SURVEY  
SAN ONOFRE POWER PLANT

NORTH FOR THIS SURVEY IS "PLANT NORTH", N 57 00 W

DATE: 6 SEPTEMBER 1978  
JOB NO: F-0978-G0016  
GYRO SURVEY BY: EASTMAN WHIPSTOCK, INC.  
FILE: F134-9  
PITT

VERTICAL SECTION IS IN  
PLANE OF BOTTOM HOLE CLOSURE.

RECORD OF SURVEY

ANGLE AVERAGING METHOD

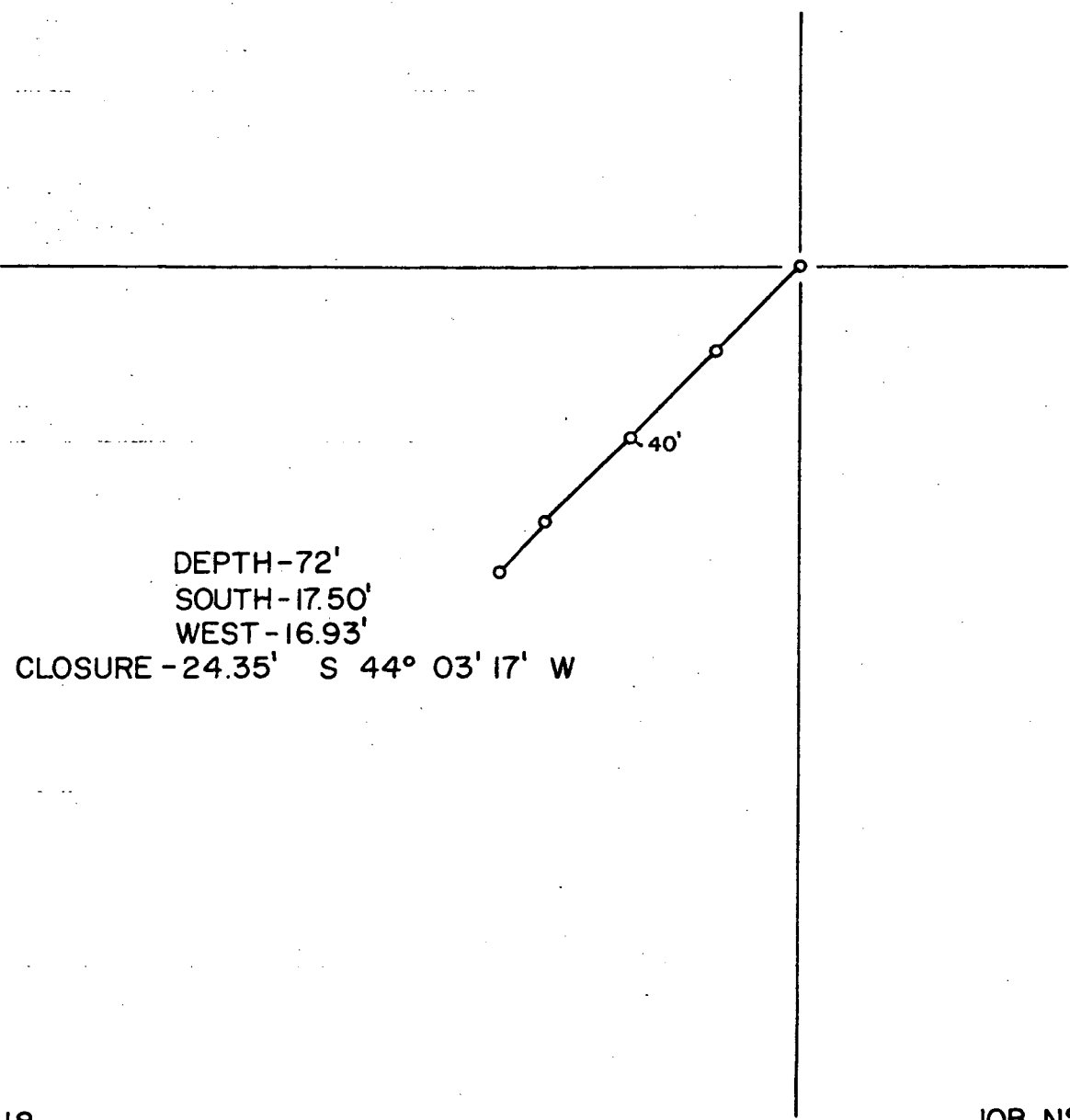
MEASURED DEPTH FEET	DRIFT ANGLE D M	DRIFT DIRECTION D M	TRUE VERTICAL DEPTH FEET	VERTICAL SECTION FEET	R E C T A N G U L A R C O O R D I N A T E S FEET	
0.	20 0	S 44 0 W	0.00	0.00	0.00	0.00
NORTH FOR THIS SURVEY IS "PLANT NORTH", N 57 00 W						
20.	20 0	S 44 0 W	18.79	6.84	4.92 S	4.75 W
40.	19 30	S 43 30 W	37.62	13.60	9.80 S	9.43 W
60.	19 45	S 44 30 W	56.46	20.32	14.63 S	14.09 W
72.	19 30	S 45 0 W	67.76	24.35	17.50 S	16.93 W

FINAL CLOSURE - DIRECTION: S 44 DEGS 3 MINS 17 SECS W  
 DISTANCE: 24.35 FEET



SCALE

1"=10'



DEPTH-72'  
SOUTH-17.50'  
WEST-16.93'  
CLOSURE -24.35' S 44° 03' 17' W

HOLE 6-Nº F-18

JOB Nº P-0978-G0016

SURFACE

HOLE 6 N<sup>o</sup> F-18

SCALE

1" = 10'

20'V

40'V

60'V

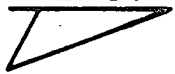
72' M. D.

16.93'

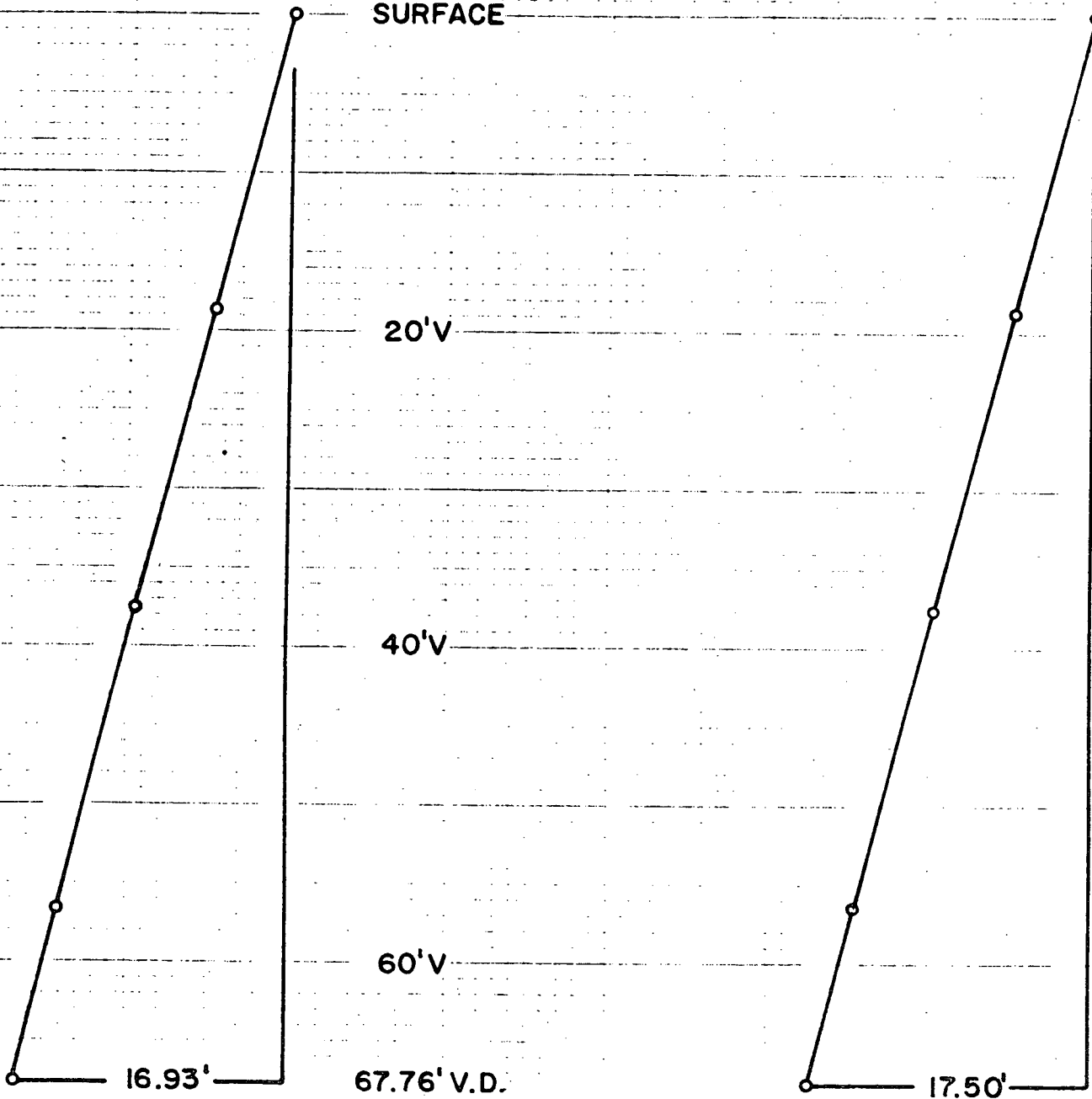
67.76' V.D.

17.50'

EAST



NORTH



BECHTEL POWER CORP.--- WELL 6 #G-5 ---EASTMAN GYRO MULTI-SHOT SURVEY  
SAN ONOFRE POWER PLANT

NORTH FOR THIS SURVEY IS 'PLANT NORTH', N 57 00 W

DATE: 3 OCTOBER 1978  
JOB NO: P-1078-G0077  
GYRO SURVEY BY: EASTMAN WHIPSTOCK, INC.  
FILE: F135-10  
PITT

VERTICAL SECTION IS IN  
PLANE OF BOTTOM HOLE CLOSURE.

RECORD OF SURVEY

ANGLE AVERAGING METHOD

MEASURED DEPTH FEET	DRIFT ANGLE D M	DRIFT DIRECTION D	TRUE VERTICAL DEPTH FEET	VERTICAL SECTION FEET	RECTANGULAR COORDINATES FEET
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0.	4 20	N 48 W	0.00	0.00	0.00 0.00
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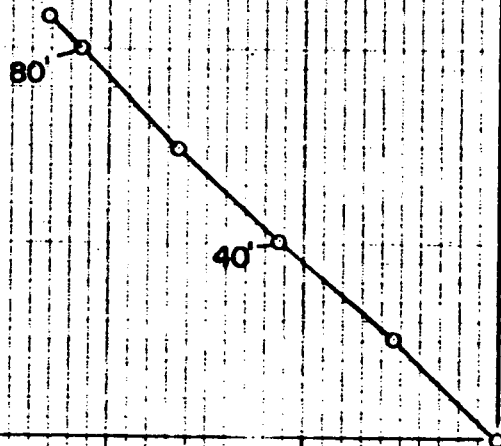
NORTH FOR THIS SURVEY IS "PLANT NORTH", N 57 00 W

20.	4 25	N 48 W	19.94	1.53	1.02 N 1.13 W
40.	4 5	N 48 W	39.89	3.01	2.01 N 2.24 W
60.	4 5	N 46 W	59.84	4.43	2.98 N 3.28 W
80.	4 5	N 43 W	79.79	5.85	4.00 N 4.28 W
87.	4 5	N 42 W	86.77	6.35	4.37 N 4.61 W

FINAL CLOSURE - DIRECTION: N 46 DEGS 33 MINS 37 SECS W  
 DISTANCE: 6.35 FEET



DEPTH-87'  
NORTH-4.37'  
WEST -4.61'  
CLOSURE-6.35' N 46°33'37" W



WELL N<sup>o</sup> 6 N<sup>o</sup> G-5

JOB N<sup>o</sup> P-1078-G0077

SURFACE

WELL 6-N-G-5

SCALE  
1"=10'

VERTICAL SECTION

20' V

40' V

60' V

80' V

46' V

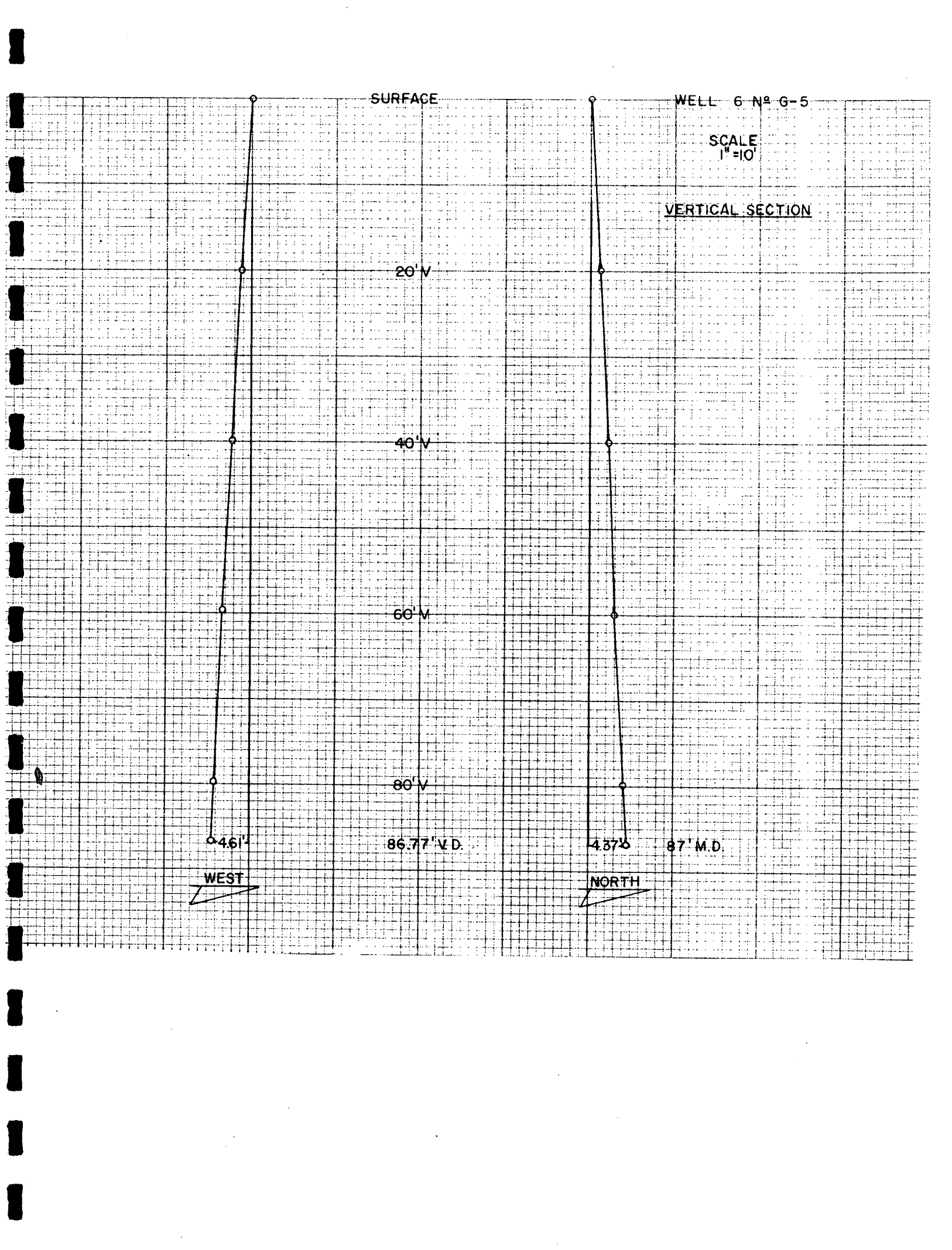
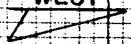
86.77' V.D.

43.7' V

87' M.D.

WEST

NORTH





BECHTEL POWER CORP.-- WELL 6 #H<sub>m</sub> -14 --EASTMAN GYRO MULTI-SHOT SURVEY  
SAN ONOFRE POWER PLANT

NORTH FOR THIS SURVEY IS 'PLANT NORTH', N 57 00 W

DATE: 27 SEPTEMBER 1978  
JOB NO: P-0978-G0064  
GYRO SURVEY BY: EASTMAN WHIPSTOCK, INC.  
FILE: F135-5  
PITT

VERTICAL SECTION IS IN  
PLANE OF BOTTOM HOLE CLOSURE.

RECORD OF SURVEY

ANGLE AVERAGING METHOD

MEASURED DEPTH FEET	DRIFT ANGLE D M	DRIFT DIRECTION D M	TRUE VERTICAL DEPTH FEET	VERTICAL SECTION FEET	R E C T A N G U L A R C O O R D I N A T E S FEET	
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0.	7 25	N 43 30 W	0.00	0.00	0.00	0.00
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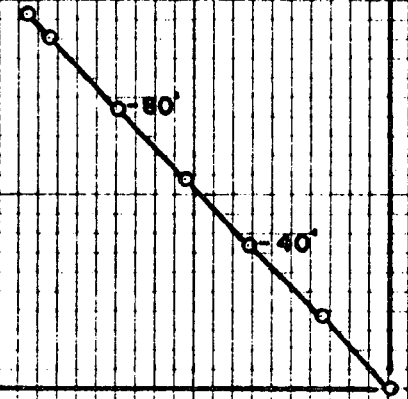
NORTH FOR THIS SURVEY IS 'PLANT NORTH', N 57 00 W

20.	7 25	N 43 30 W	19.83	2.58	1.87 N	1.78 W
40.	7 5	N 44 30 W	39.67	5.11	3.69 N	3.53 W
60.	7 0	N 44 30 W	59.52	7.56	5.44 N	5.25 W
80.	7 15	N 45 30 W	79.37	10.04	7.19 N	7.00 W
100.	7 15	N 43 0 W	99.21	12.56	9.00 N	8.76 W
107.	7 10	N 42 0 W	106.15	13.44	9.65 N	9.36 W

FINAL CLOSURE - DIRECTION: N 44 DEGS 7 MINS 43 SECS W  
 DISTANCE: 13.44 FEET



DEPTH - 107'  
NORTH - 9.65'  
WEST - 9.36'  
CLOSURE - 13.44' N 44° 07' 43" W

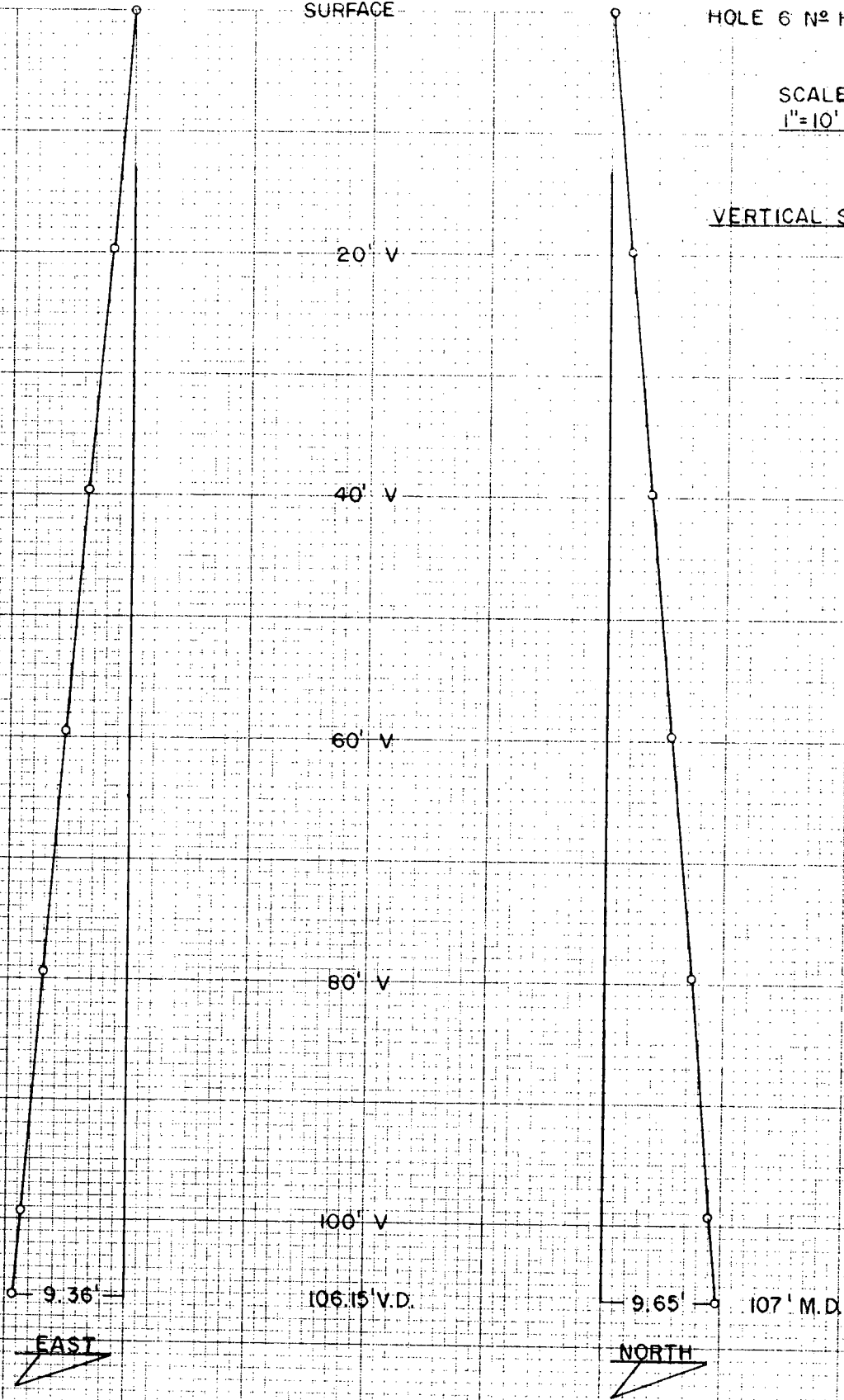


SURFACE

HOLE 6 N<sup>o</sup> H<sub>14</sub>

SCALE  
1"=10'

VERTICAL SECTION



BECHTEL POWER CORP. --- HOLE: 6 #J5.6 --- EASTMAN GYRO MULTI-SHOT  
SAN ONOFRE POWER PLANT

NORTH FOR THIS SURVEY IS "PLANT NORTH", N 57 00 W

DATE: 15 SEPTEMBER 1978  
JOB NO: P-0978-G0037  
GYRO SURVEY BY: EASTMAN WHIPSTOCK, INC.  
FILE: F134-18  
FITT

VERTICAL SECTION IS IN  
PLANE OF BOTTOM HOLE CLOSURE.

RECORD OF SURVEY

ANGLE AVERAGING METHOD

MEASURED DEPTH FEET	DRIFT ANGLE D M	DRIFT DIRECTION D	TRUE VERTICAL DEPTH FEET	VERTICAL SECTION FEET	R E C T A N G U L A R C O O R D I N A T E S FEET	
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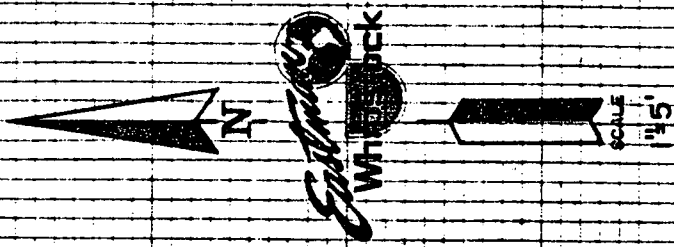
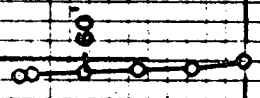
0.	4 0	N 5 W	0.00	0.00	0.00	0.00
----	-----	-------	------	------	------	------

NORTH FOR THIS SURVEY IS "PLANT NORTH", N 57 00 W

20.	4 0	N 5 W	19.95	1.39	1.39 N	0.12 W
40.	3 50	N 3 W	39.90	2.76	2.75 N	0.22 W
60.	3 55	N 2 W	59.86	4.11	4.10 N	0.28 W
80.	4 0	N 2 W	79.81	5.49	5.48 N	0.32 W
85.	4 0	N 2 W	84.80	5.84	5.83 N	0.34 W

FINAL CLOSURE - DIRECTION: N 3 DEGS 17 MINS 59 SECS W  
 DISTANCE: 5.84 FEET

DEPTH - 85'  
NORTH - 5.83'  
WEST - 0.34'  
CLOSURE - 6.84' N 03°17'59" W



HOLE: 6 NE J5.6

JOB N.S. P-0978-30037

SURFACE

HOLE: 6" N<sup>o</sup> J5.6

SCALES

VERTICAL 1"=10'  
HORIZONTAL 1"=5'

VERTICAL SECTION

20' V.

40' V.

60' V.

80' V.

84.80' V.D.

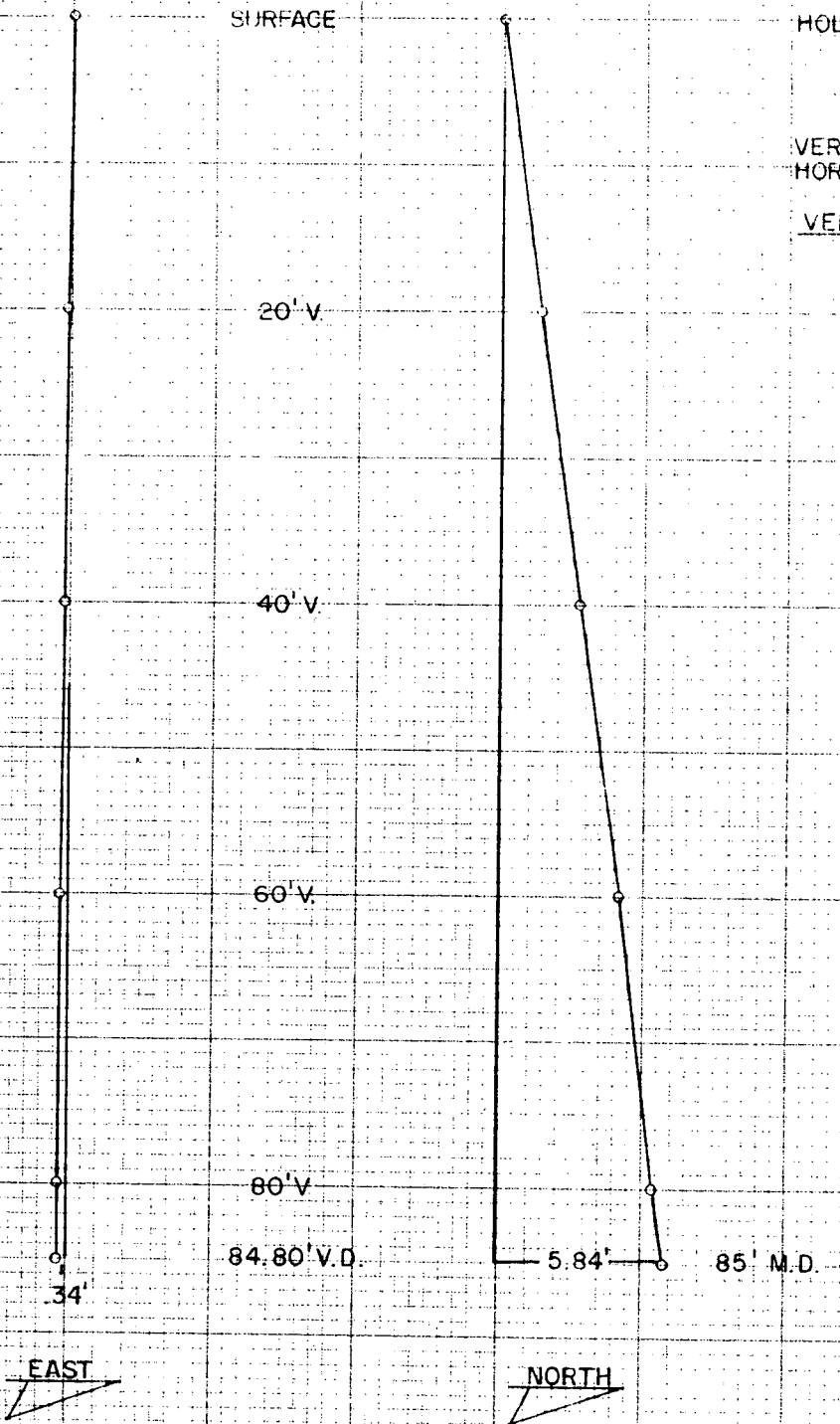
34'

5.84'

85' M.D.

EAST

NORTH





BECHTEL POWER CORP.-- WELL 6 4K-9 --EASTMAN GYRO MULTI-SHOT SURVEY  
SAN GNOFRE POWER PLANT

NORTH FOR THIS SURVEY IS "PLANT NORTH", N 57 00 W

DATE: 5 OCTOBER 1978

JOB NO: P-1078-G0085

GYRO SURVEY BY: EASTMAN WHIPSTOCK, INC.

FILE: F135-12

PITT

VERTICAL SECTION IS IN  
PLANE OF BOTTOM HOLE CLOSURE.

RECORD OF SURVEY

ANGLE AVERAGING METHOD

MEASURED DEPTH FEET	DRIFT ANGLE D M	DRIFT DIRECTION D M	TRUE VERTICAL DEPTH FEET	VERTICAL SECTION FEET	RECTANGULAR COORDINATES FEET	
0.	7 45	N 1 30 W	0.00	0.00	0.00	0.00
NORTH FOR THIS SURVEY IS "PLANT NORTH", N 57 00 W						
20.	7 45	N 1 30 W	19.82	2.70	2.70 N	0.07 W
40.	7 30	N 2 30 W	39.64	5.35	5.35 N	0.16 W
60.	6 50	N 2 0 W	59.48	7.85	7.84 N	0.26 W
80.	7 0	N 1 0 W	79.34	10.25	10.25 N	0.32 W
100.	6 55	N 0 0 W	99.19	12.68	12.67 N	0.35 W

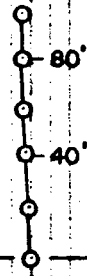
FINAL CLOSURE - DIRECTION: N 1 DEGS 33 MINS 40 SECS W  
 DISTANCE: 12.68 FEET



SCALE

1"=10'

DEPTH-100'  
NORTH-12.67'  
WEST -0.35'  
CLOSURE-12.68' N 01° 33' 40" W



WELL 6 N° K-9

JOB N° P-1078-G0085

WELL 6 No. K-9

SCALE  
1"=10'

VERTICAL SECTION

SURFACE

20' V

40' V

60' V

80' V

99.19' V.D.

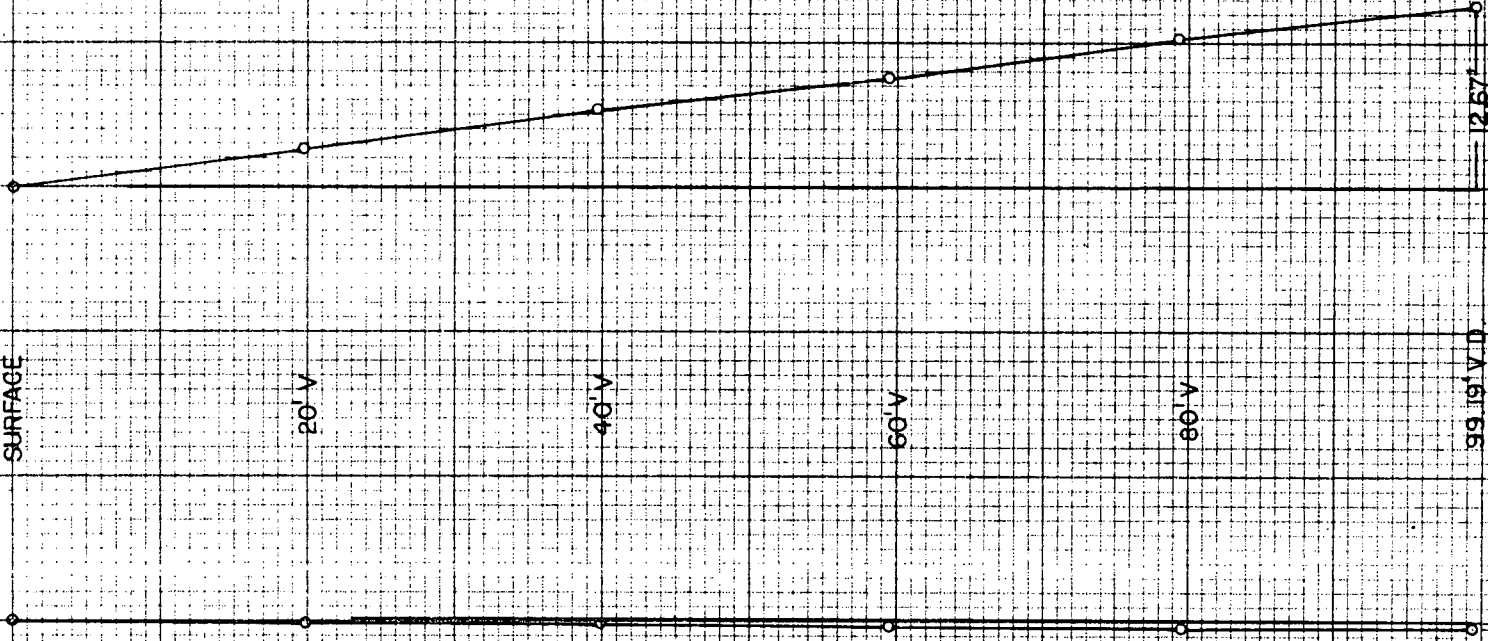
100' M.D.

35'

12.57'

EAST

NORTH



BECHTEL POWER CORP. --- HOLE 6 #L-8 --- EASTMAN GYRO MULTI-SHOT SURVEY  
SAN ONOFRE POWER PLANT

NORTH FOR THIS SURVEY IS "PLANT NORTH", N 57 00 W

DATE: 11 SEPTEMBER 1978  
JOB NO: P-0978-G0023  
SURVEY BY: EASTMAN WHIPSTOCK, INC.  
FILE: F134-13  
FITT

VERTICAL SECTION IS IN  
PLANE OF BOTTOM HOLE CLOSURE.

RECORD OF SURVEY

ANGLE AVERAGING METHOD

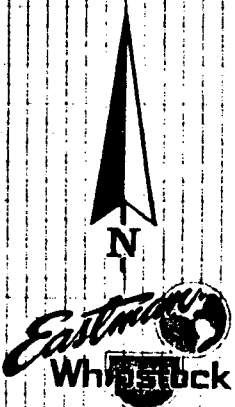
MEASURED DEPTH FEET	DRIFT ANGLE D M	DRIFT DIRECTION D M	TRUE VERTICAL DEPTH FEET	VERTICAL SECTION FEET	R E C T A N G U L A R C O O R D I N A T E S FEET	
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0.	3 30	N 70 0 W	0.00	0.00	0.00	0.00
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NORTH FOR THIS SURVEY IS "PLANT NORTH", N 57 00 W

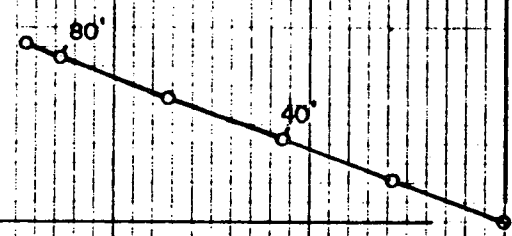
20.	3 30	N 70 0 W	19.96	1.22	0.42 N	1.15 W
40.	3 30	N 69 0 W	39.93	2.44	0.85 N	2.29 W
60.	3 30	N 69 30 W	59.89	3.66	1.28 N	3.43 W
80.	3 30	N 69 0 W	79.85	4.88	1.71 N	4.57 W
86.	3 30	N 68 0 W	85.84	5.25	1.84 N	4.92 W

FINAL CLOSURE - DIRECTION: N 69 DEGS 25 MINS 49 SECS W  
 DISTANCE: 5.25 FEET



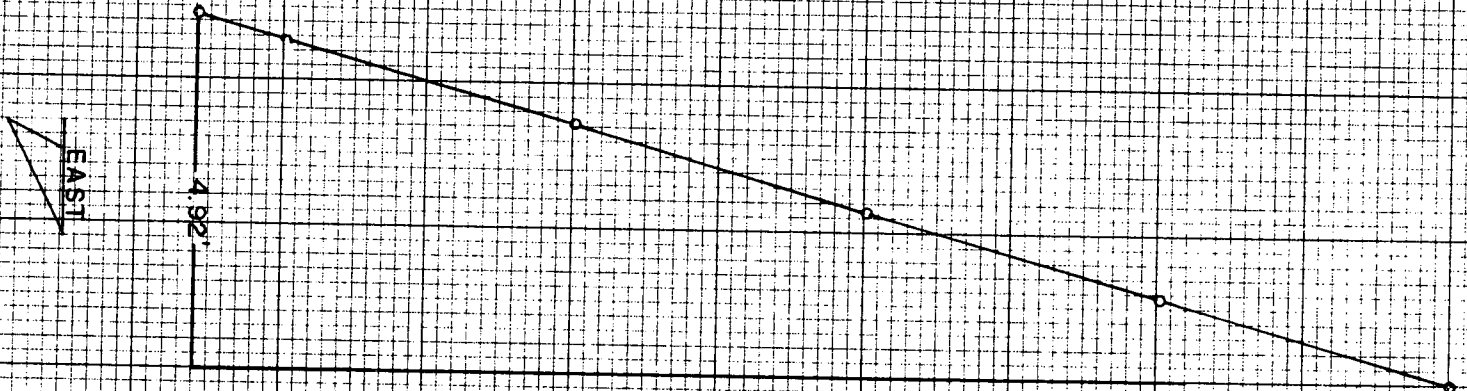
1" = 2'

DEPTH - 86'  
NORTH - 1.84'  
WEST - 4.92'  
CLOSURE - 5.25' N 69° 25' 49" W



HOLE: 6-L-8

JOB N° P-0978-G0023



SURFACE

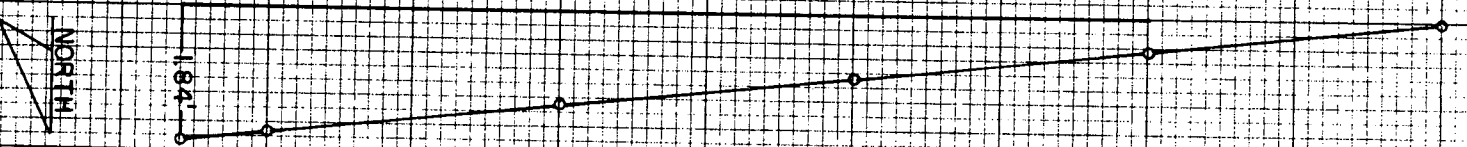
20' V

40' V

60' V

80' V

85.84 V.D.



HOLE 6-N-L-8

86' M.D.

SCALES

VERTICAL 1"=10'

HORIZONTAL 1"=2'

VERTICAL SECTION





BECHTEL POWER CORP. --- WELL 6 #L-9 --- EASTMAN GYRO MULTI-SHOT  
SAN ONFRE POWER PLANT

NORTH FOR THIS SURVEY IS "PLANT NORTH", N 57 00 W

DATE: 25 SEPTEMBER 1978

JOB NO: P-0978-G0061

GYRO SURVEY BY: EASTMAN WHIPSTOCK, INC.

FILE: F135-3

PITT

VERTICAL SECTION IS IN  
PLANE OF BOTTOM HOLE CLOSURE.

RECORD OF SURVEY

ANGLE AVERAGING METHOD

MEASURED DEPTH FEET	DRIFT ANGLE D M	DRIFT DIRECTION D	TRUE VERTICAL DEPTH FEET	VERTICAL SECTION FEET	RECTANGULAR COORDINATES FEET	
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0.	7 10	N 45 W	0.00	0.00	0.00	0.00
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NORTH FOR THIS SURVEY IS "PLANT NORTH", N 57 00 W

20.	7 10	N 45 W	19.84	2.49	1.76 N	1.76 W
40.	6 30	N 48 W	39.70	4.87	3.40 N	3.49 W
60.	6 0	N 48 W	59.58	7.05	4.86 N	5.11 W
80.	6 5	N 48 W	79.47	9.15	6.27 N	6.67 W
100.	6 0	N 47 W	99.36	11.26	7.69 N	8.22 W
110.	6 0	N 47 W	109.31	12.31	8.40 N	8.99 W

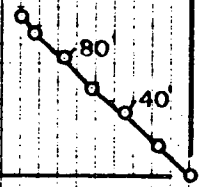
FINAL CLOSURE - DIRECTION: N 46 DEGS 55 MINS 53 SECS W  
 DISTANCE: 12.31 FEET



SCALE

1" = 10'

DEPTH - 110'  
NORTH - 8.40'  
WEST - 8.99'  
CLOSURE - 12.31' N 46° 55' 53" W



WELL 6 N<sup>o</sup> L-9

JOB N<sup>o</sup> P-0978-G0061

SURFACE

WELL 6 N° L-9

VERTICAL SECTION

SCALE

1"=10'

20' V

40' V

60' V

80' V

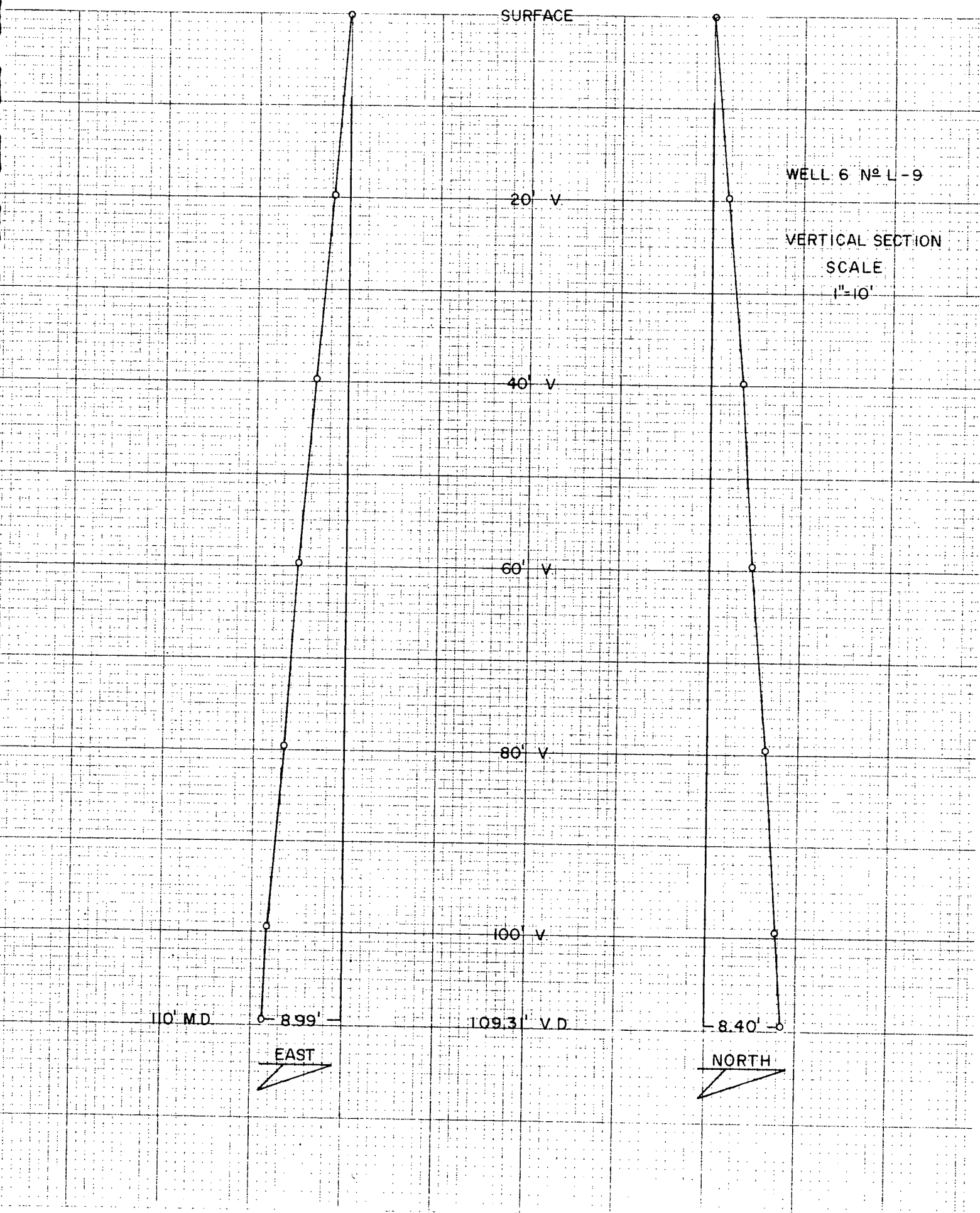
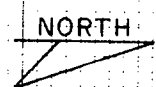
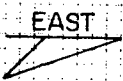
100' V

110' M.D.

8.99'

109.3' V.D.

8.40'



BECHTEL POWER CORP.-- HOLE 6 # L-10 --EASTMAN GYRO MULTI-SHOT SURVEY  
SAN ONOFRE POWER PLANT

NORTH FOR THIS SURVEY IS "PLANT NORTH:", N 57 00 W

DATE: 30 AUGUST 1978  
JOB NO: P-0878-G1060  
GYRO SURVEY BY: EASTMAN WHIPSTOCK, INC.  
FILE: F 134-5  
PITT.

VERTICAL SECTION IS IN  
PLANE OF BOTTOM HOLE CLOSURE.

RECORD OF SURVEY

ANGLE AVERAGING METHOD

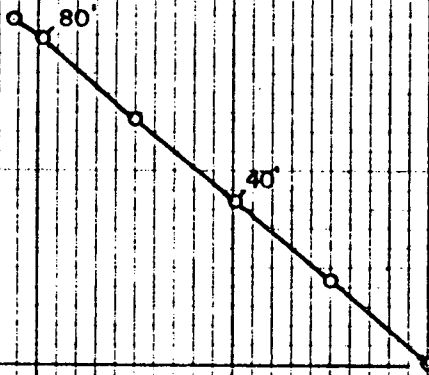
MEASURED DEPTH FEET	DRIFT ANGLE D M	DRIFT DIRECTION D M	TRUE VERTICAL DEPTH FEET	VERTICAL SECTION FEET	RECTANGULAR COORDINATES FEET	
0.	19 0	N 50 0 W	0.00	0.00	0.00	0.00
NORTH FOR THIS SURVEY IS 'PLANT NORTH', N 57 00 W						
20.	19 0	N 50 0 W	18.91	6.51	4.19 N	4.99 W
40.	19 0	N 50 0 W	37.82	13.02	8.37 N	9.98 W
60.	19 0	N 49 30 W	56.73	19.53	12.58 N	14.95 W
80.	19 0	N 49 30 W	75.64	26.05	16.81 N	19.90 W
85.	19 0	N 49 30 W	80.37	27.67	17.86 N	21.13 W

FINAL CLOSURE - DIRECTION: N 49 DEGS 47 MINS 39 SECS W  
 DISTANCE: 27.67 FEET



SCALE  
1" = 10'

DEPTH - 85'  
NORTH - 17.86'  
WEST - 21.13'  
CLOSURE - 27.67' N 49° 47' 39" W



HOLE: 6-L-10

JOB N° P-0878-G1060

SURFACE

HOLE 6 N<sup>o</sup> L-10

SCALES

VERTICAL 1"=10'  
HORIZONTAL 1"=2'

VERTICAL SECTION

20'V

40'V

60'V

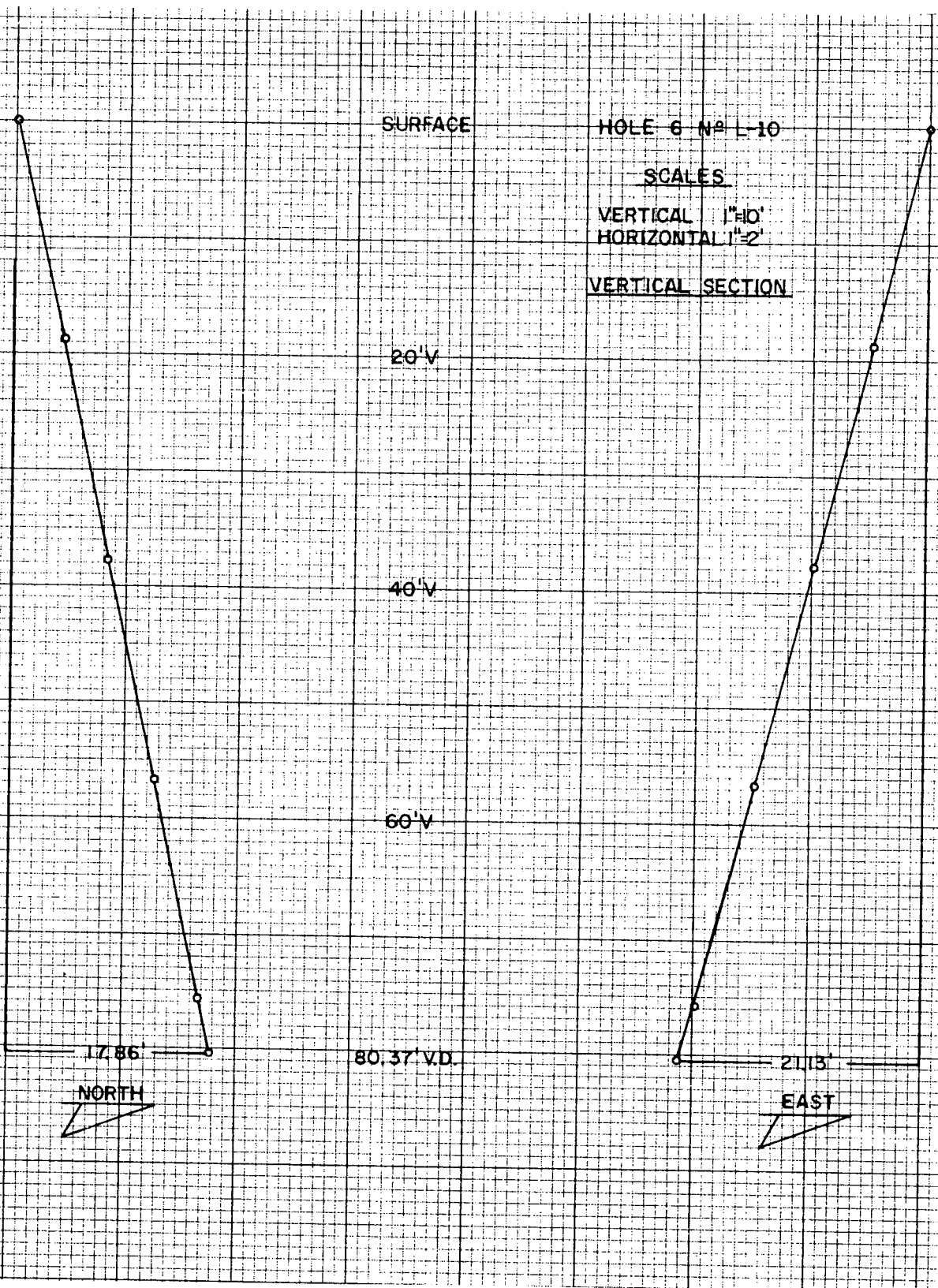
80.37' V.D.

17.86'

NORTH

21.13'

EAST





BECHTEL POWER CORP.-- WELL 6 #P<sub>m</sub> -25 --EASTMAN GYRO MULTI-SHOT SURVEY  
SAN ONOFRE POWER PLANT

NORTH FOR THIS SURVEY IS "PLANT NORTH", N 57 00 W

DATE: 25 SEPTEMBER 1978  
JOB NO: P-0978-G0060  
GYRO SURVEY BY: EASTMAN WHIPSTOCK, INC  
FILE: F135-4  
PITT

VERTICAL SECTION IS IN  
PLANE OF BOTTOM HOLE CLOSURE.

RECORD OF SURVEY

ANGLE AVERAGING METHOD

MEASURED DEPTH FEET	DRIFT ANGLE D M	DRIFT DIRECTION D M	TRUE VERTICAL DEPTH FEET	VERTICAL SECTION FEET	RECTANGULAR COORDINATES FEET	
0.	7 20	N 1 0 W	0.00	0.00	0.00	0.00
NORTH FOR THIS SURVEY IS "PLANT NORTH", N 57 00 W						
20.	7 20	N 1 0 W	19.84	2.55	2.55 N	0.04 W
40.	7 30	N 1 30 W	39.67	5.13	5.13 N	0.10 W
60.	7 0	N 0 30 W	59.51	7.66	7.66 N	0.14 W
80.	6 45	N 2 30 W	79.37	10.05	10.05 N	0.21 W
100.	6 45	N 1 0 W	99.23	12.40	12.40 N	0.28 W
112.	7 5	N 0 0 W	111.14	13.85	13.85 N	0.29 W

FINAL CLOSURE - DIRECTION: N 1 DEGS 12 MINS 29 SECS W  
 DISTANCE: 13.85 FEET



SCALE  
1"=5'

DEPTH-112'  
NORTH-13.85'  
WEST -0.29'  
CLOSURE-13.85' N 12' 29" W



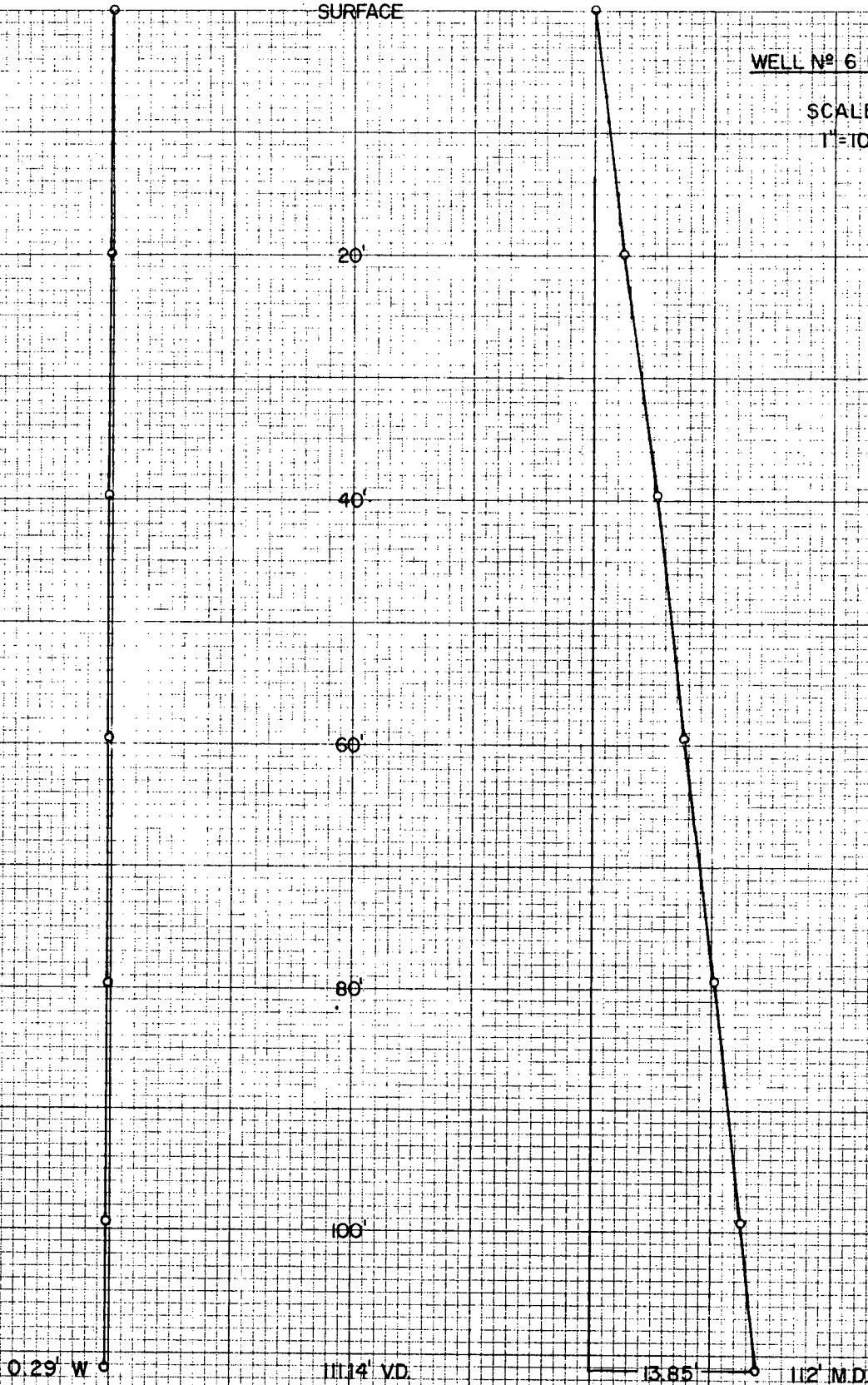
WELL No 6 P<sub>m</sub> -25

JOB No P-0978-G0060

SURFACE

WELL N<sup>o</sup> 6 P. -25

SCALE  
1"=10'



BY: EASTMAN WHIPSTOCK, INC.

BECHTEL POWER CORP.-- WELL 6 #P<sub>m</sub> 29 --EASTMAN GYRO MULTI-SHOT SURVEY  
SAN ONOFRE POWER PLANT

NORTH FOR THIS SURVEY IS "PLANT NORTH", N 57 00 W

DATE: 8 SEPTEMBER 1978  
JOB NO: F-0978-G0020  
GYRO SURVEY BY: EASTMAN WHIPSTOCK, INC.  
FILE: F134-11  
PITT

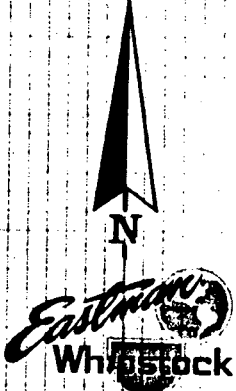
VERTICAL SECTION IS IN  
PLANE OF BOTTOM HOLE CLOSURE.

RECORD OF SURVEY

ANGLE AVERAGING METHOD

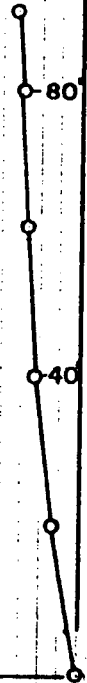
MEASURED DEPTH FEET	DRIFT ANGLE D M	DRIFT DIRECTION D M	TRUE VERTICAL DEPTH FEET	VERTICAL SECTION FEET	RECTANGULAR COORDINATES FEET	
0.	4 35	N 8 30 W	0.00	0.00	0.00	0.00
NORTH FOR THIS SURVEY IS "PLANT NORTH", N 57 00 W						
20.	4 35	N 8 30 W	19.94	1.60	1.58 N	0.24 W
40.	4 20	N 5 30 W	39.88	3.15	3.12 N	0.43 W
60.	4 15	N 1 30 W	59.82	4.65	4.62 N	0.52 W
80.	4 10	N 3 30 W	79.77	6.11	6.08 N	0.58 W
91.	4 10	N 0 30 W	90.74	6.91	6.88 N	0.61 W

FINAL CLOSURE - DIRECTION: N 5 DEGS 3 MINS 23 SECS W  
 DISTANCE: 6.91 FEET



SCALE  
1" = 2'

DEPTH - 91'  
NORTH - 6.88'  
WEST - 0.61'  
CLOSURE - 6.91' N 05° 03' 23"W



WELL: 6 N 2 P<sub>m</sub> 29

JOB N 2 P-0978-G0020

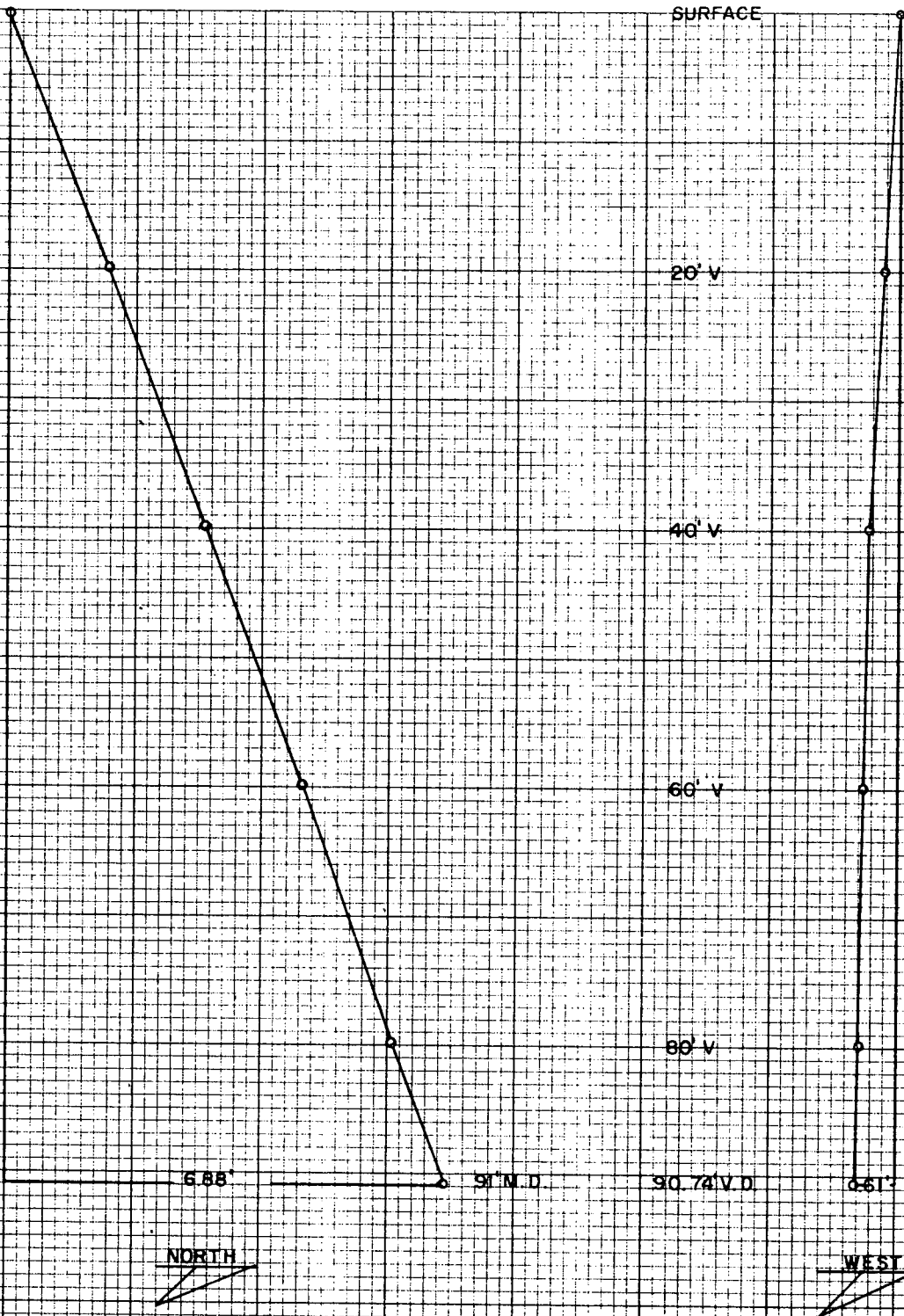
SURFACE

WELL 6 NA P<sub>m</sub> 29

SCALES

VERTICAL 1"=10'  
HORIZONTAL 1"=2'

VERTICAL SECTION





BECHTEL POWER CORP.--- HOLE: 6 #R-34 --EASTMAN GYRO MULTI-SHOT SURVEY  
SAN ONOFRE POWER PLANT

NORTH FOR THIS SURVEY IS "PLANT NORTH", N 57 00 W

DATE: 12 SEPTEMBER 1978  
JOB NO: P-0978-G0026  
GYRO SURVEY BY: EASTMAN WHIPSTOCK, INC.  
FILE: F134-15  
FITT

VERTICAL SECTION IS IN  
PLANE OF BOTTOM HOLE CLOSURE.

RECORD OF SURVEY

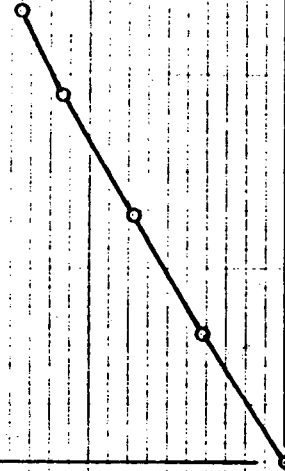
ANGLE AVERAGING METHOD

MEASURED DEPTH FEET	DRIFT ANGLE D M	DRIFT DIRECTION D	TRUE VERTICAL DEPTH FEET	VERTICAL SECTION FEET	R E C T A N G U L A R C O O R D I N A T E S FEET	
0.	4 25	N 32 W	0.00	0.00	0.00	0.00
NORTH FOR THIS SURVEY IS "PLANT NORTH", N 57 00 W						
20.	4 25	N 32 W	19.94	1.54	1.31 N	0.82 W
40.	4 5	N 31 W	39.89	3.02	2.57 N	1.59 W
60.	4 0	N 29 W	59.84	4.43	3.79 N	2.30 W
73.	4 15	N 23 W	72.80	5.36	4.63 N	2.71 W

FINAL CLOSURE - DIRECTION: N 30 DEGS 17 MINS 31 SECS W  
 DISTANCE: 5.36 FEET



DEPTH- 73'  
NORTH- 4.63'  
WEST - 2.71'  
CLOSURE- 5.36' N 30° 17' 31" W



SURFACE

HOLE: 6 N<sup>o</sup>Q-34

SCALES

VERTICAL 1"=10'  
HORIZONTAL 1"=2'

20' V

40' V

60' V

2.71'

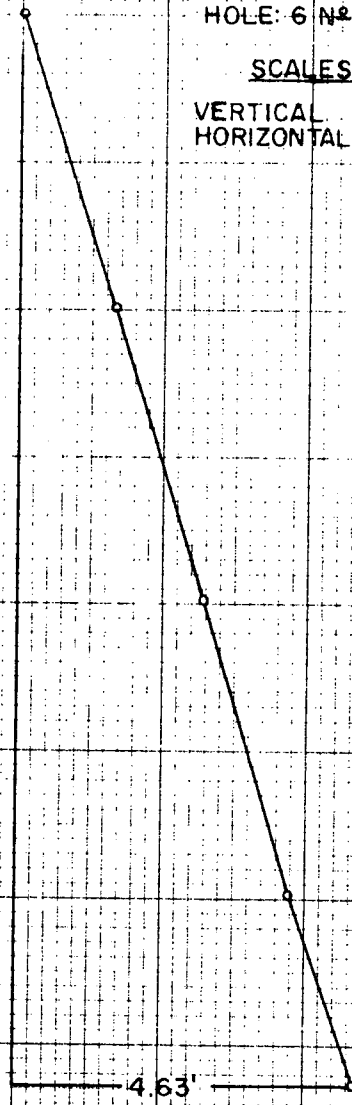
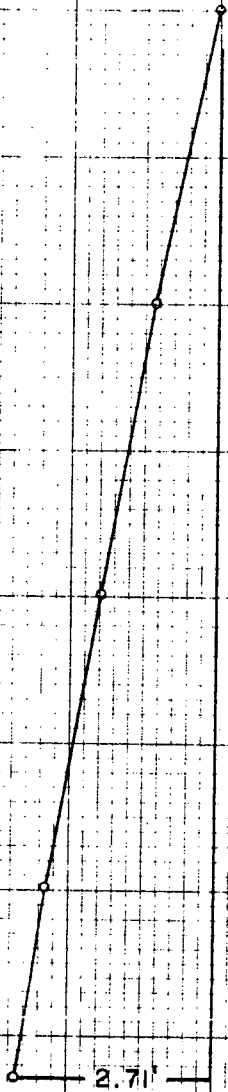
72.80' V. D.

4.63'

73' M. D.

EAST

NORTH



APPENDIX B

This appendix presents graphic logs of the 74 exploration/grouting holes drilled from July 25 through October 13, 1978.

Logging of the holes was performed by qualified Bechtel geotechnical personnel. Original logs of the holes were completed and checked in the field and will be retained in the Hydro and Community Facilities Division, Geotechnical Services files.

APPENDIX B

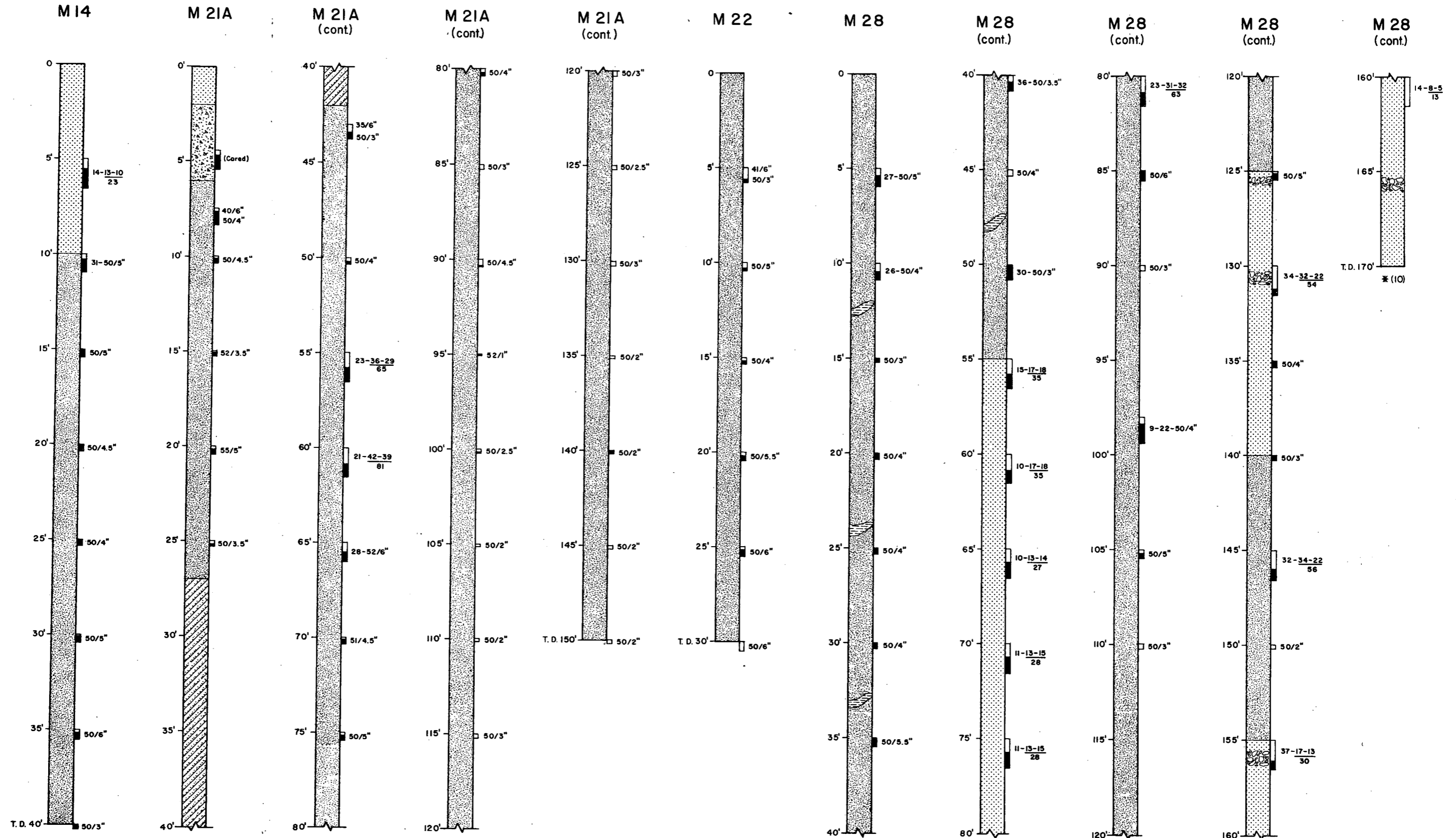
EXPLORATION/GROUT HOLES - WELL NO. 6

Hole #	Total Depth (Ft.)	Stage	Coordinates	
			S	W
E 9	17	1	20 + 83	2 + 45
Em 4A	80	1	20 + 84	2 + 50
Em 13	70	1	20 + 84	2 + 41
F 4	80	1	20 + 85	2 + 50
F 6	125	1	20 + 85	2 + 48
F 7	100	1	20 + 85	2 + 47
F 30	80	1	20 + 85	2 + 24
G 9.5	40	1	20 + 87	2 + 44.5
G 11A	150	1	20 + 87	2 + 43
Gm 11	21	1	20 + 88	2 + 43
Gm 19	90	1	20 + 88	2 + 35
H 4	45	1	20 + 89	2 + 50
H 7	75	1	20 + 89	2 + 47
H 9	90	1	20 + 89	2 + 45
H 14A	90	1	20 + 89	2 + 40
H 15	60	1	20 + 89	2 + 39
H 30	60	1	20 + 89	2 + 24
Hm 10	70	1	20 + 90	2 + 44
Hm 13A	85	1	20 + 90	2 + 41
Hm 18	150	1	20 + 90	2 + 36
J 5.6	100	1	20 + 91	2 + 48.4
J 8	55	1	20 + 91	2 + 46
J 12	31.5	1	20 + 91	2 + 42
J 17	50	1	20 + 91	2 + 37
J 21	150	1	20 + 91	2 + 33
J 25	70	1	20 + 91	2 + 29
Jm 5	70	1	20 + 92	2 + 49
Jm 29	75	1	20 + 92	2 + 25
K 17	145	1	20 + 93	2 + 37
K 31	60	1	20 + 93	2 + 23
K 34	60	1	20 + 93	2 + 20
Km 4	40	1	20 + 94	2 + 50
Kr 13	70	1	20 + 94.5	2 + 41

Hole #	Total Depth (Ft.)	Stage	Coordinates	
			S	W
L 8	100	1	20 + 95	2 + 46
L 10	100	1	20 + 95	2 + 44
L 17	100	1	20 + 95	2 + 37
L 25	25	1	20 + 95	2 + 29
Lm 4A	40	1	20 + 96	2 + 50
Lm 24	135	1	20 + 96	2 + 30
M 14	40	1	20 + 97	2 + 40
M 21A	150	1	20 + 97	2 + 33
M 22	30	1	20 + 97	2 + 32
M 28	170	1	20 + 97	2 + 26
M 30	100	1	20 + 97	2 + 24
Mm 17.3	80	1	20 + 98	2 + 36.9
Mn 27	32	1	20 + 98	2 + 27
N 25	120	1	20 + 99	2 + 29
N 30	160	1	20 + 99	2 + 24
Nm 19	40	1	21 + 00	2 + 35
Nm 21	150	1	21 + 00	2 + 33
O 34	75		21 + 01	2 + 20
Dm 16	90	2	20 + 82	2 + 38
Dm 22	130	2	20 + 82	2 + 32
F 18	80	2	20 + 85	2 + 36
G 26.5	80	2	20 + 87	2 + 27.5
G 32	160	2	20 + 87	2 + 22
Hm 14	120	2	20 + 90	2 + 40
K 9	110	2	20 + 93	2 + 45
K 11	90	2	20 + 93	2 + 43
L 9	130	2	20 + 95	2 + 45
Mm 18.5	90	2	20 + 98	2 + 35.5
Nm 14	160	2	21 + 00	2 + 40
Pm 25	120	2	21 + 04	2 + 29
Pm 29	120	2	21 + 04	2 + 25
Q 34	80	2	21 + 05	2 + 20

Hole #	Total Depth (Ft.)	Stage	Coordinates	
			S	W
Em 6	60	3	20 + 84	2 + 48
G 5	100	3	20 + 87	2 + 49
G 8	80	3	20 + 87	2 + 46
Hm 8	90	3	20 + 90	2 + 46
Jm 15	75	3	20 + 92	2 + 39
K 14	69	3	20 + 93	2 + 40
K 19	150	3	20 + 93	2 + 35
L 31.5	100	3	20 + 95	2 + 22.5
Lm 15	90	3	20 + 96	2 + 39





For explanation of symbols, footnotes (※) and notes see sheet No. 1

UNITS 2 & 3

<b>BECHTEL CORPORATION</b>		
ENGINEERS & CONSTRUCTORS		
LOS ANGELES, CALIF.		
JOB NO.	DATE	APPROVED
10079-003	DEC. 1978	

J.O. NO.	SAN ONOFRE NUCLEAR GENERATING STATION
FILE	EXPLORATION / GROUTING PROGRAM
	WELL No. 6
SHEET	APPENDIX B
No. 9	GRAPHIC LOGS - STAGE I
OF 11	SOUTHERN CALIFORNIA EDISON COMPANY
	SCALE N.T.S. LOS ANGELES, CALIF.

L-10  
N 49° 48' W - 71°

L-10  
(cont.)

L-10  
(cont.)

L 17

L 17  
(cont.)

L 17  
(cont.)

L 25

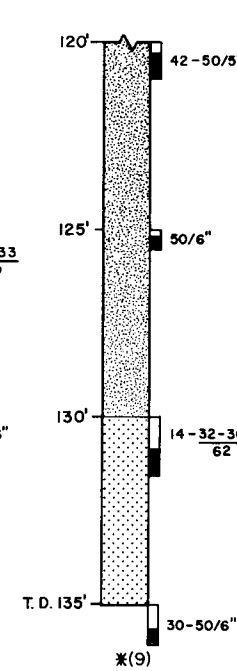
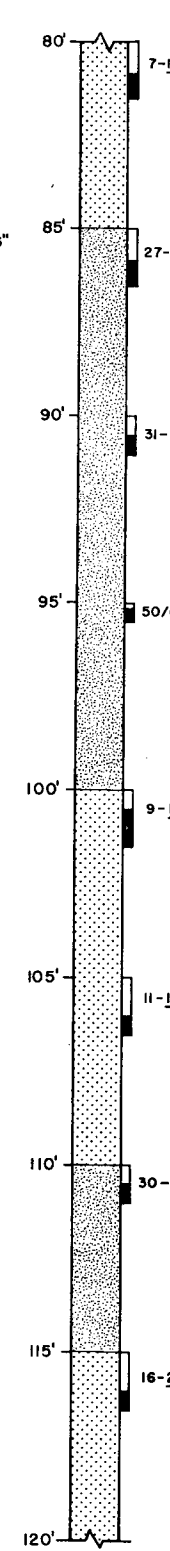
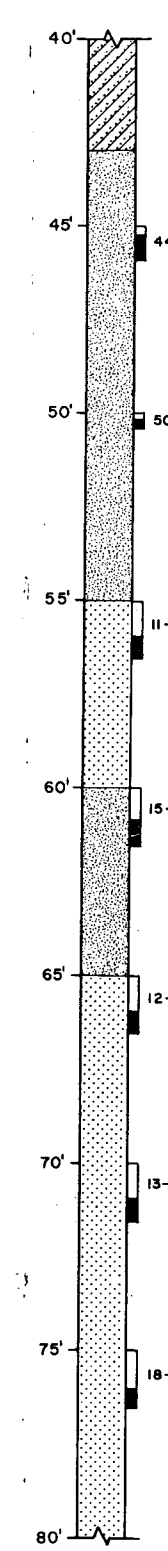
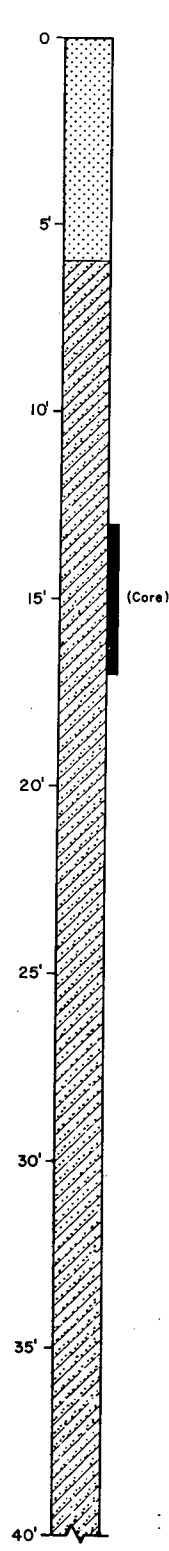
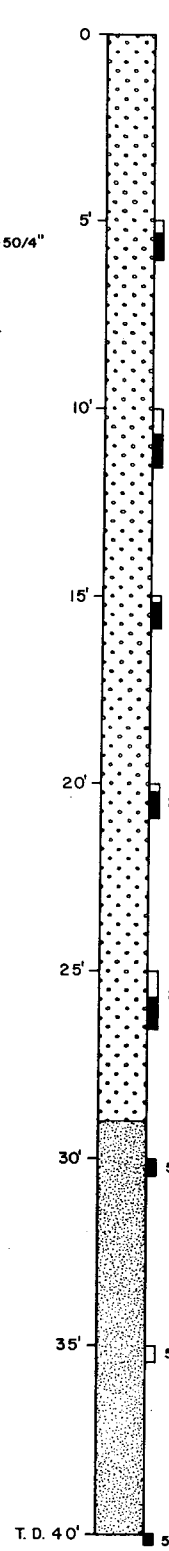
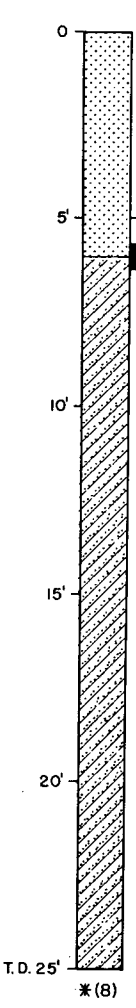
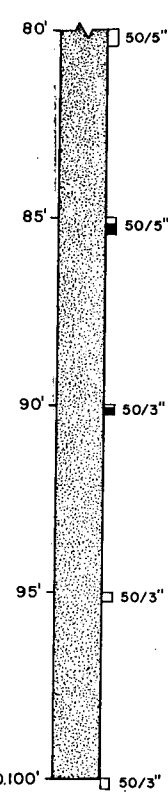
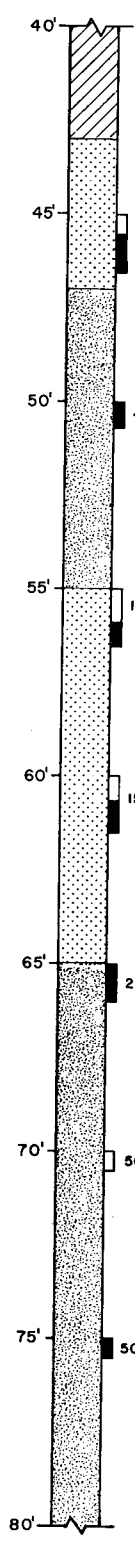
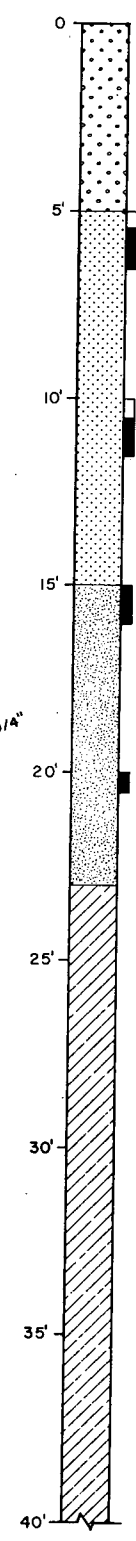
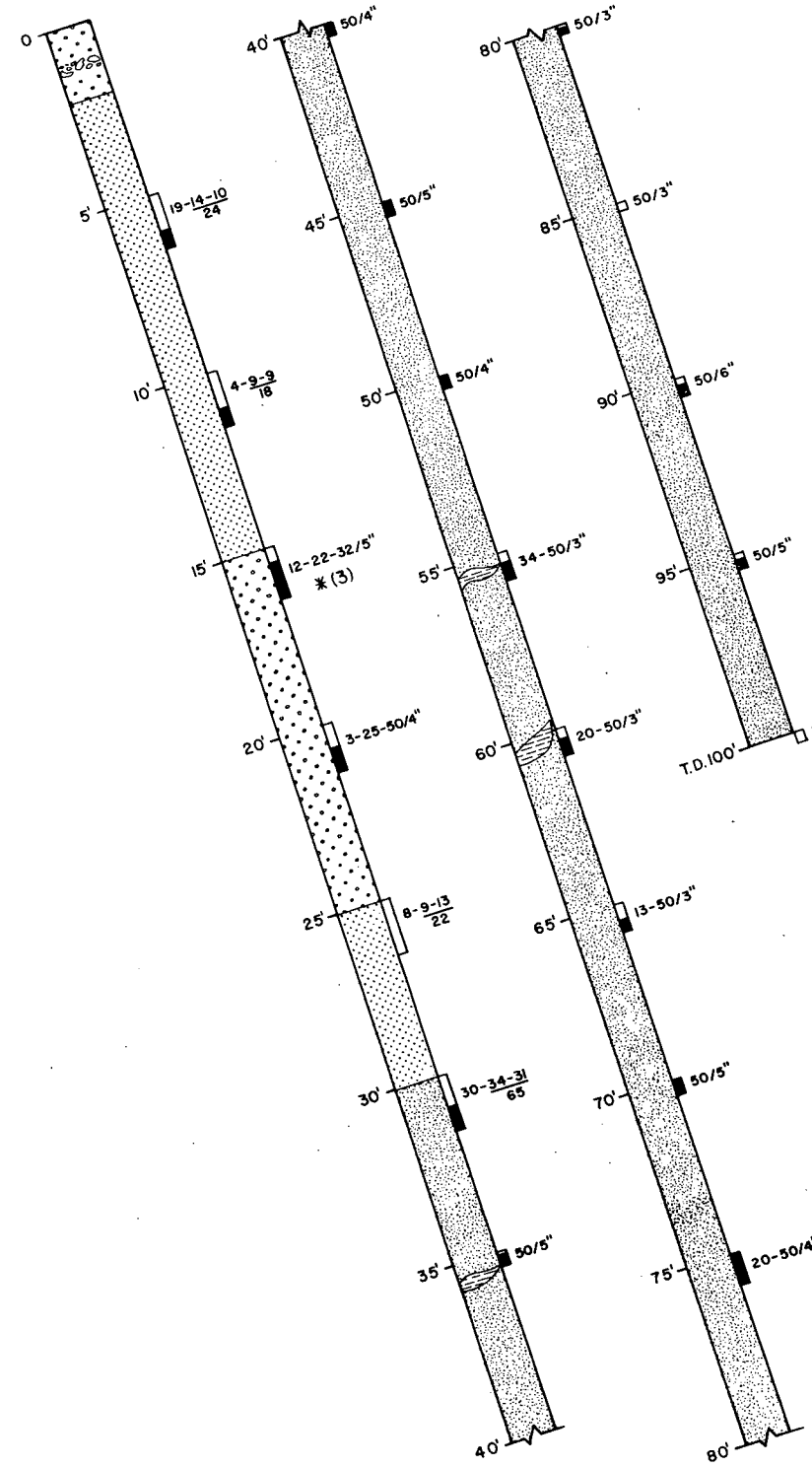
Lm 4A

Lm 24

Lm 24  
(cont.)

Lm 24  
(cont.)

Lm 24  
(cont.)

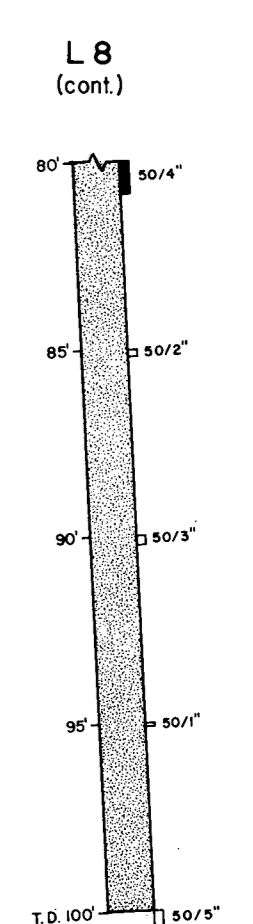
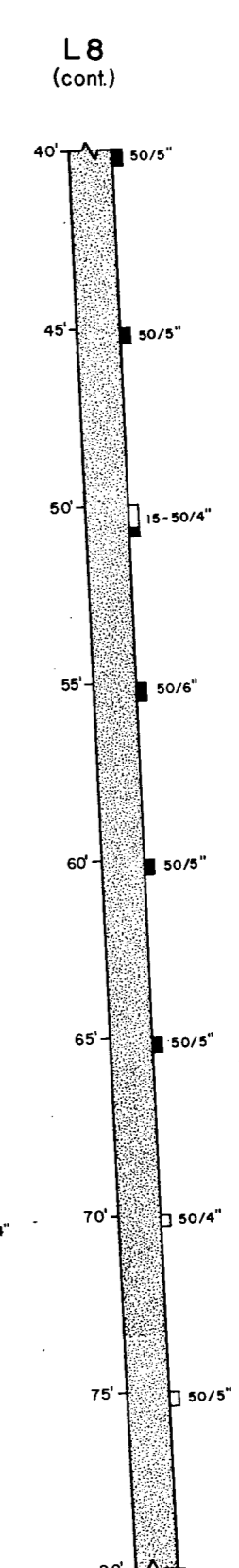
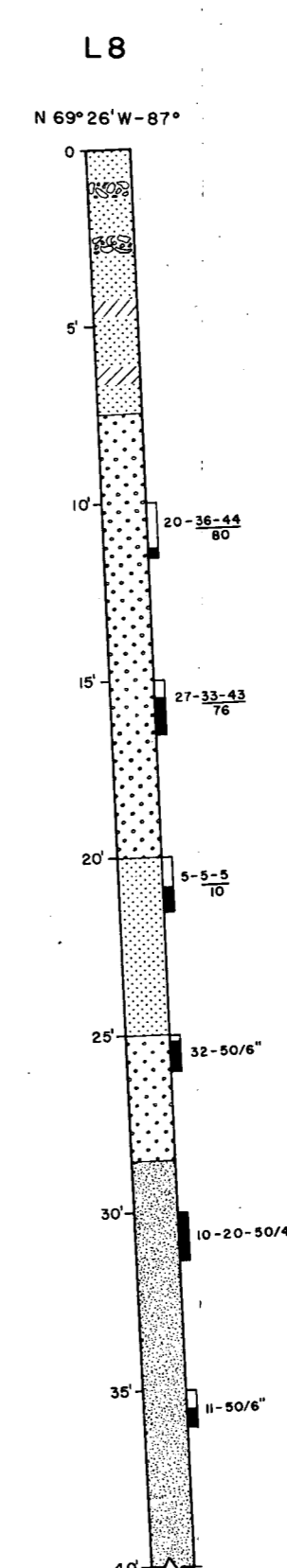
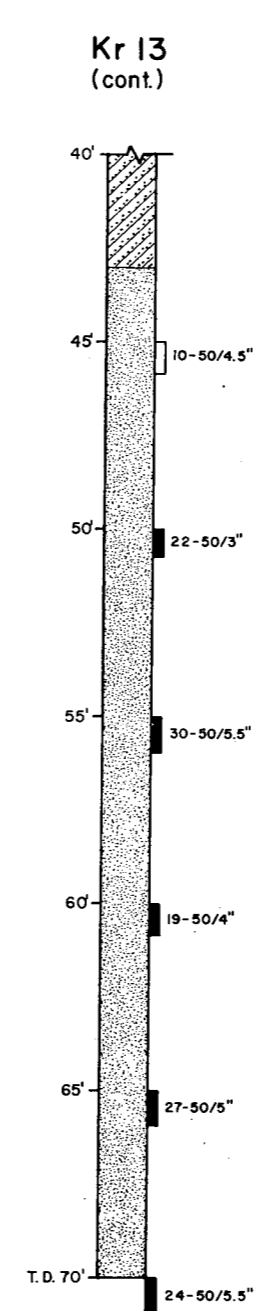
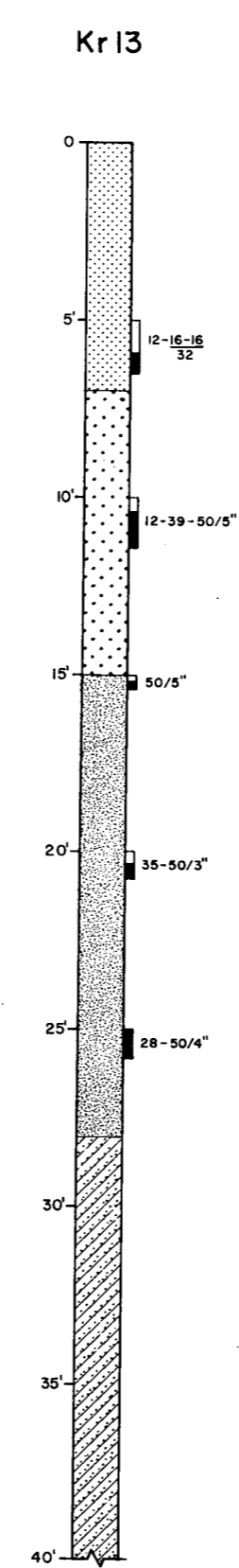
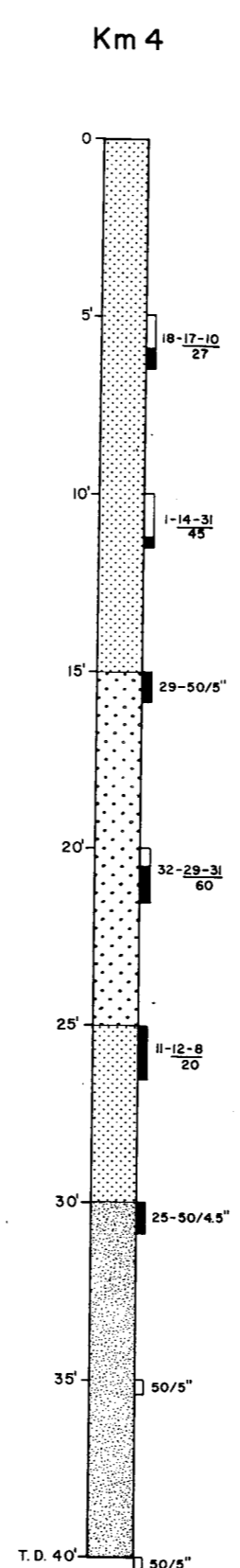
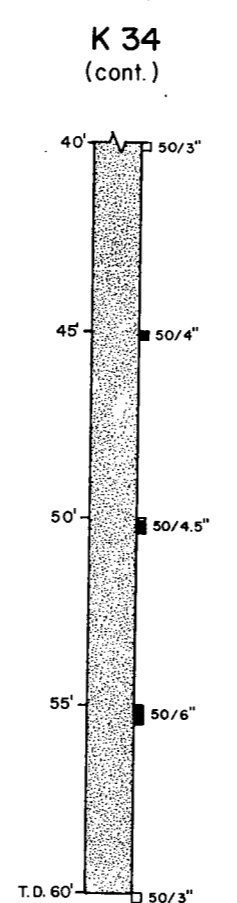
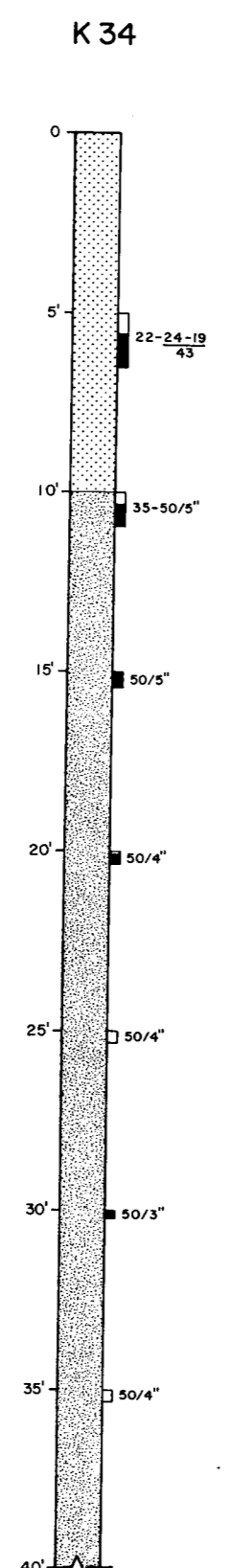
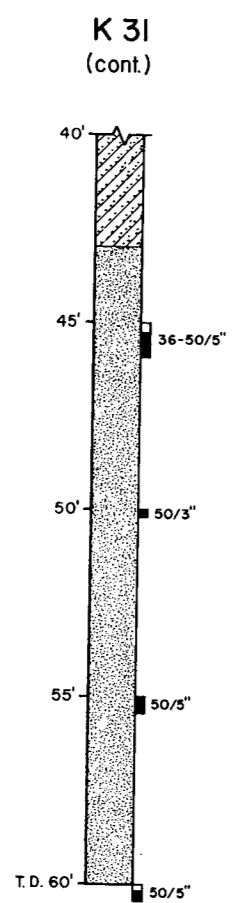
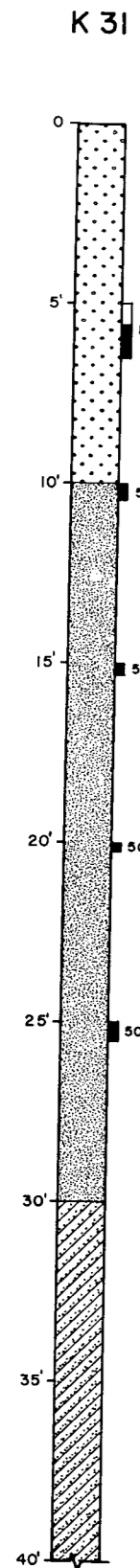


For explanation of symbols, footnotes (\*) and notes, see sheet No. 1

UNITS 2 & 3

BECHTEL CORPORATION ENGINEERS & CONSTRUCTORS LOS ANGELES, CALIF.		
JOB NO.	DATE	APPROVED
10079-003	DEC. 1978	

J.O. NO.	SAN ONOFRE NUCLEAR GENERATING STATION
FILE	EXPLORATION / GROUTING PROGRAM WELL No. 6 APPENDIX B
SHEET No. 8 OF 11	GRAPHIC LOGS - STAGE I SOUTHERN CALIFORNIA EDISON COMPANY SCALE: N.T.S. LOS ANGELES, CALIF.

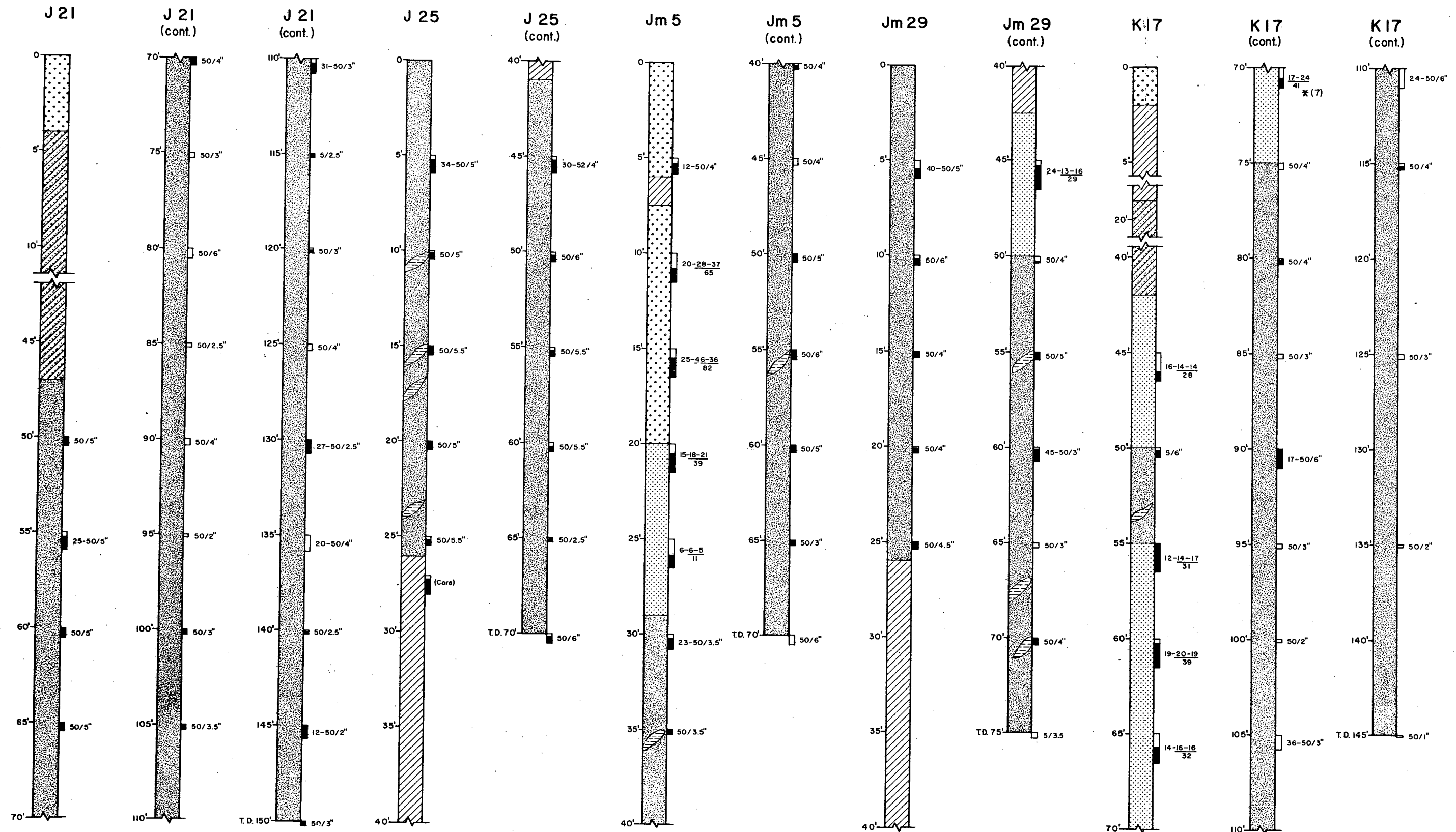


For explanation of symbols, footnotes (※) and notes, see sheet No. 1

UNITS 2 & 3

<b>BECHTEL CORPORATION</b>		
ENGINEERS & CONSTRUCTORS		
LOS ANGELES, CALIF.		
JOB NO.	DATE	APPROVED
0079-003	DEC. 1978	

J.O. NO.	<b>SAN ONOFRE NUCLEAR GENERATING STATION</b>
FILE	EXPLORATION / GROUTING PROGRAM
SHEET No. 7 OF 11	WELL No. 6 APPENDIX B GRAPHIC LOGS - STAGE I
	SOUTHERN CALIFORNIA EDISON COMPANY SCALE N.T.S. LOS ANGELES, CALIF.

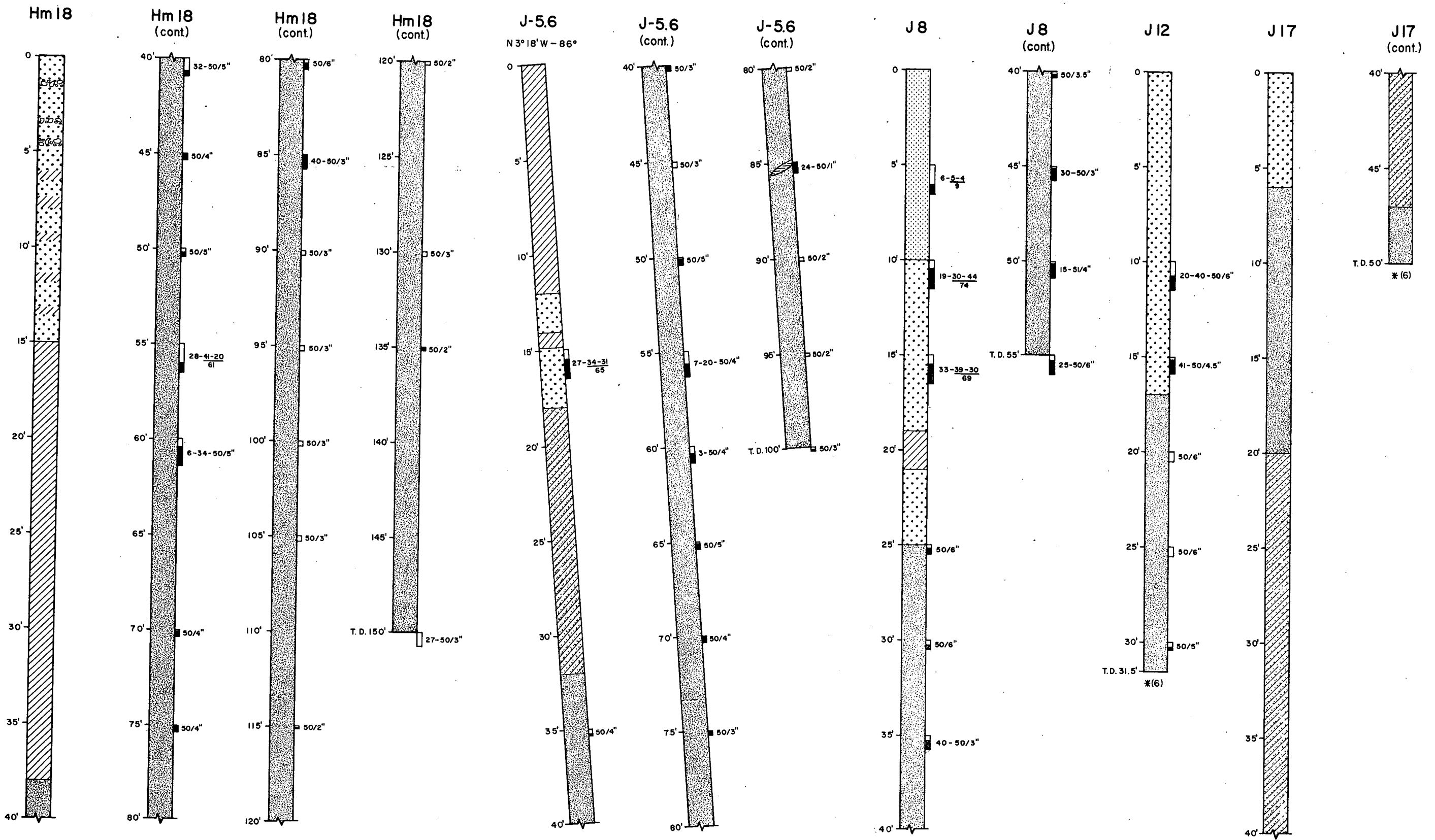


For explanation of symbols, footnotes (\*) and notes, see sheet No. 1

UNITS 2 & 3

BECHTEL CORPORATION ENGINEERS & CONSTRUCTORS LOS ANGELES, CALIF.		
JOB NO. 10079-003	DATE DEC. 1978	APPROVED

J.O. NO.	SAN ONOFRE NUCLEAR GENERATING STATION
FILE	EXPLORATION / GROUTING PROGRAM
SHEET No. 6 OF 11	WELL No. 6 APPENDIX B GRAPHIC LOGS - STAGE I
	SOUTHERN CALIFORNIA EDISON COMPANY SCALE N.T.S. LOS ANGELES, CALIF.

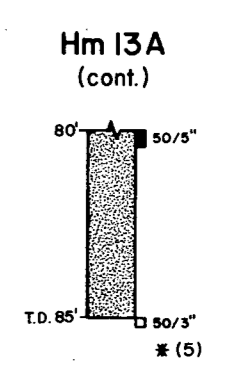
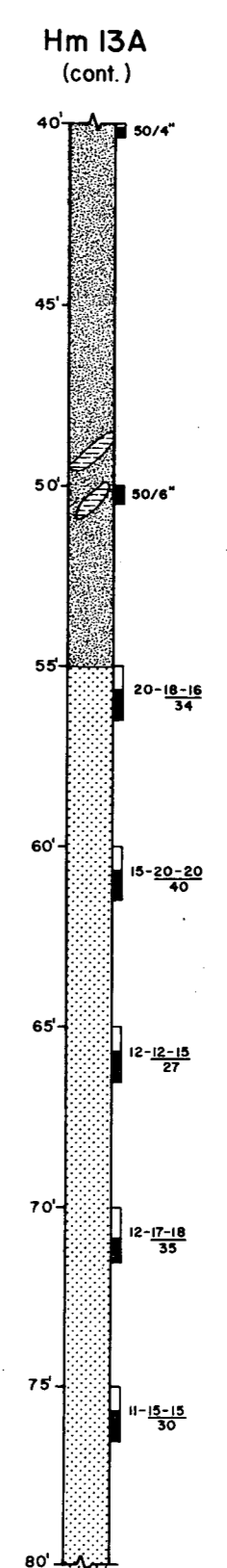
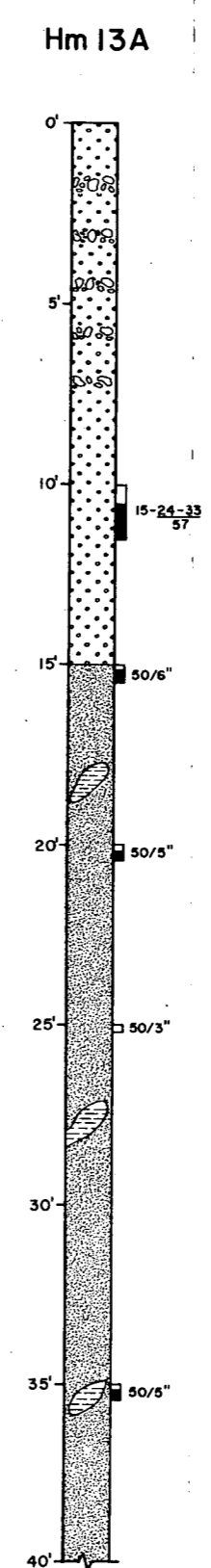
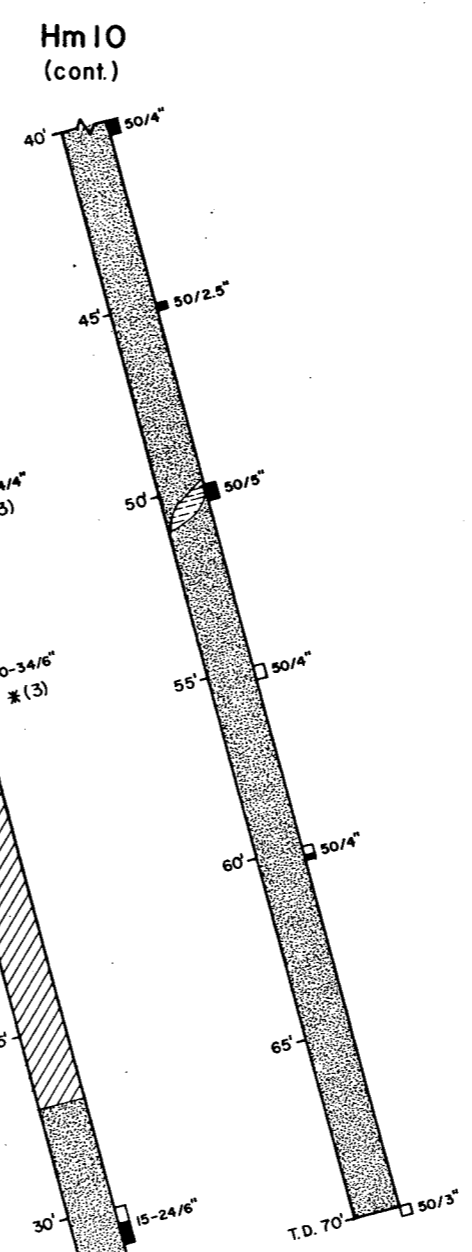
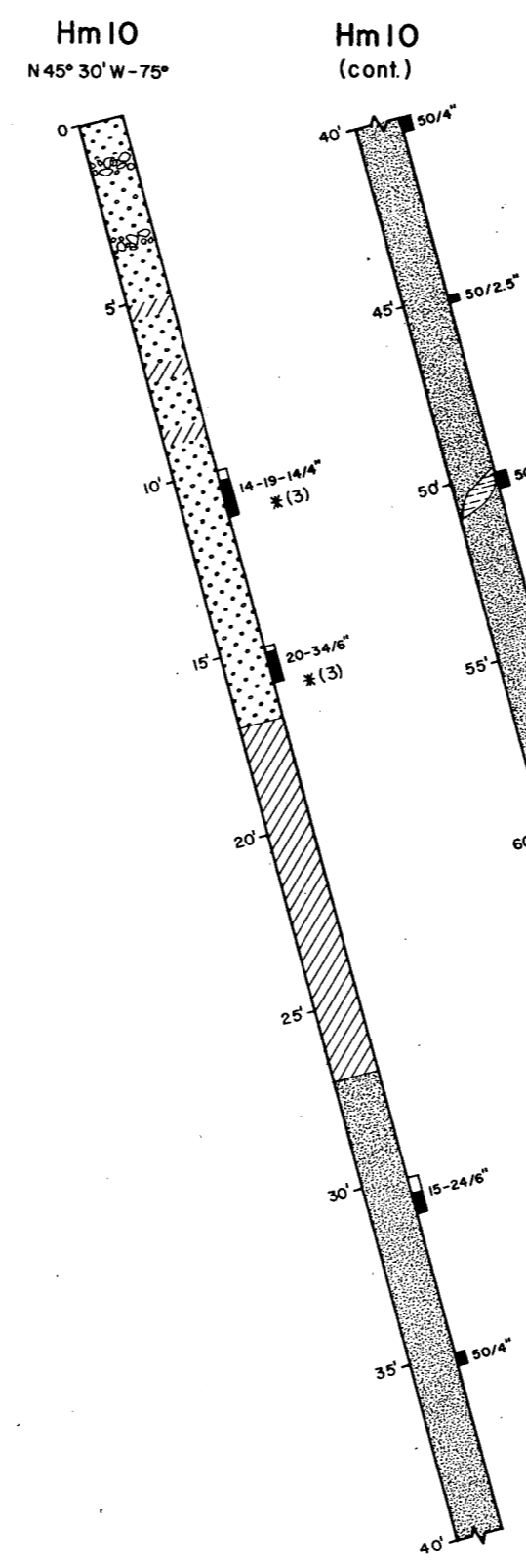
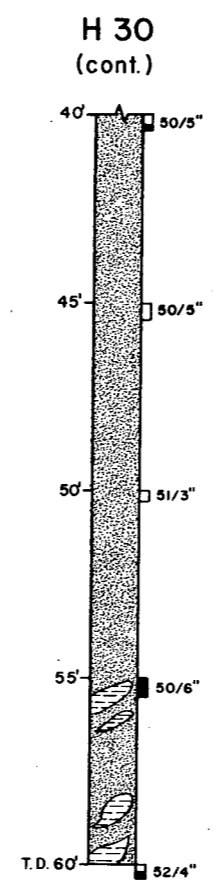
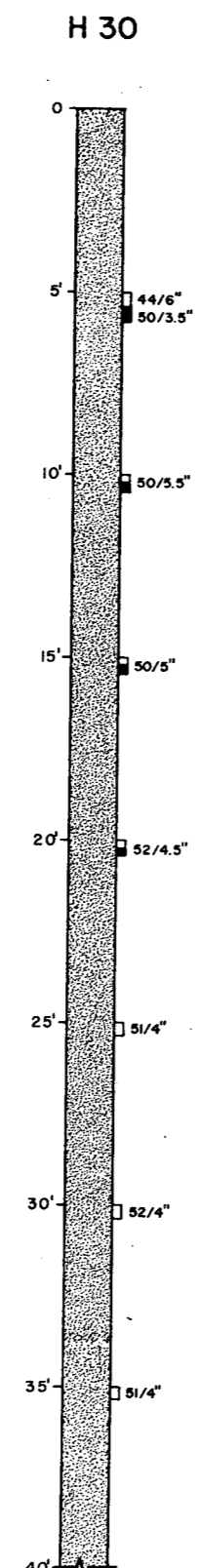
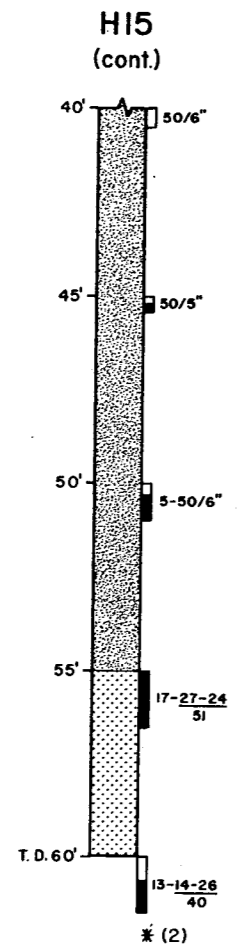
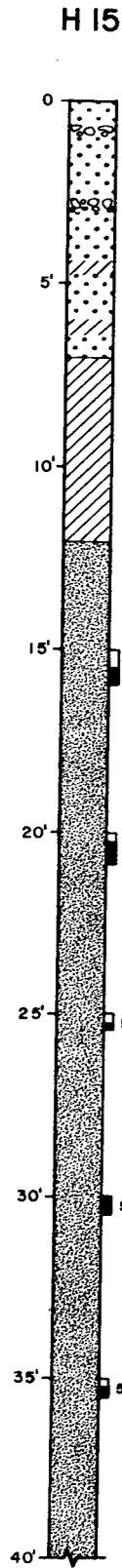


For explanation of symbols, footnotes (\*) and notes, see sheet No. 1

UNITS 2 & 3

<b>BECHTEL CORPORATION</b>		
ENGINEERS & CONSTRUCTORS		
LOS ANGELES, CALIF.		
JOB NO.	DATE	APPROVED
00079-003	DEC. 1978	

J.O. NO.	<b>SAN ONOFRE NUCLEAR GENERATING STATION</b>
FILE	EXPLORATION / GROUTING PROGRAM
	WELL No. 6
	APPENDIX B
	<b>GRAPHIC LOGS - STAGE I</b>
SHEET No. 5 OF 11	SOUTHERN CALIFORNIA EDISON COMPANY
	SCALE N.T.S. LOS ANGELES, CALIF.

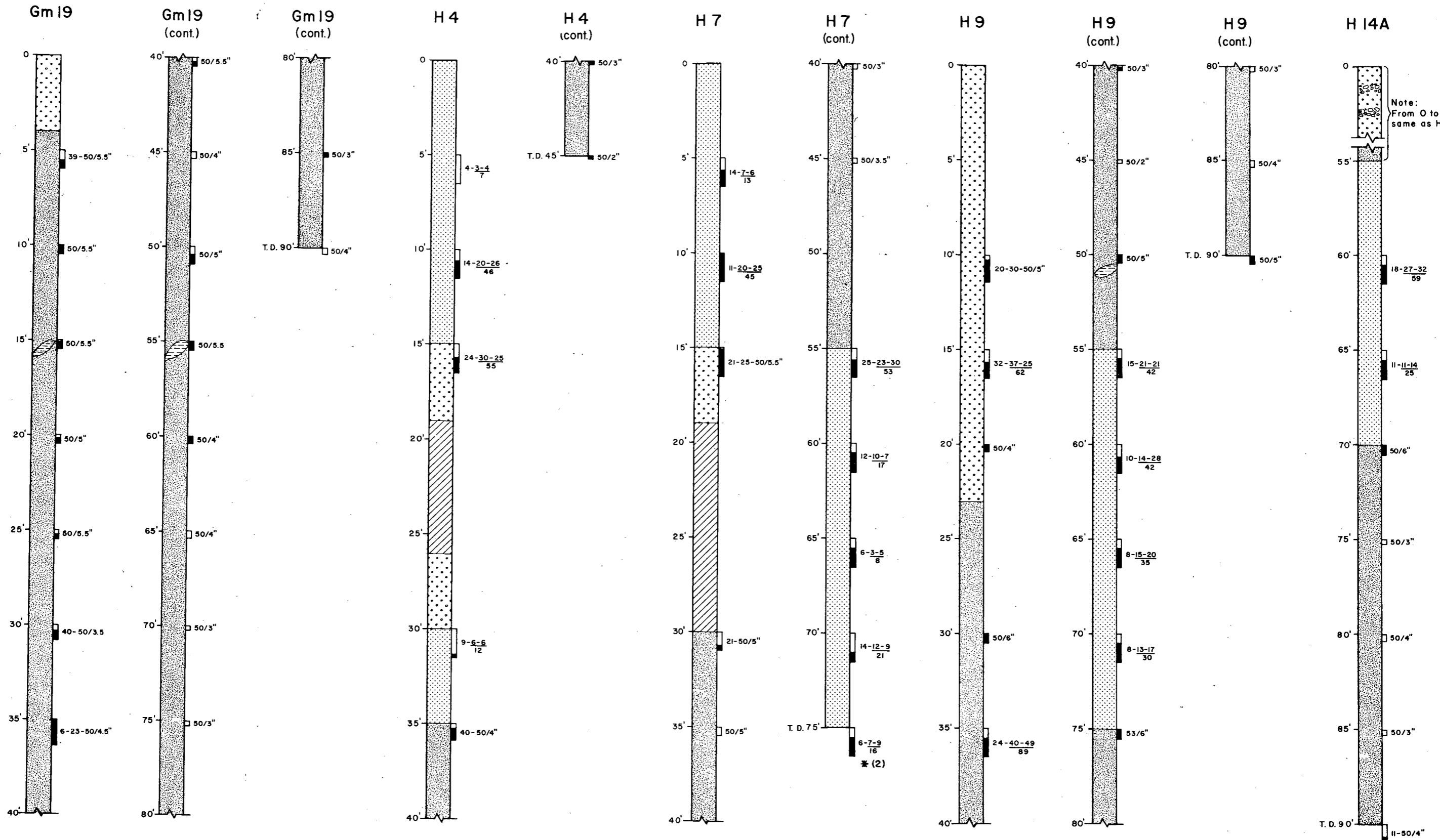


For explanation of symbols, footnotes (\*) and notes, see sheet No. 1

UNITS 2 & 3

<b>BECHTEL CORPORATION</b>		
ENGINEERS & CONSTRUCTORS		
LOS ANGELES, CALIF.		
JOB NO.	DATE	APPROVED
10079-003	DEC. 1978	

J.O. NO.	SAN ONOFRE NUCLEAR GENERATING STATION
FILE	EXPLORATION / GROUTING PROGRAM
	WELL No. 6
	APPENDIX B
SHEET No. 4 OF 11	GRAPHIC LOGS - STAGE I
	SOUTHERN CALIFORNIA EDISON COMPANY
	SCALE N.T.S. LOS ANGELES, CALIF.



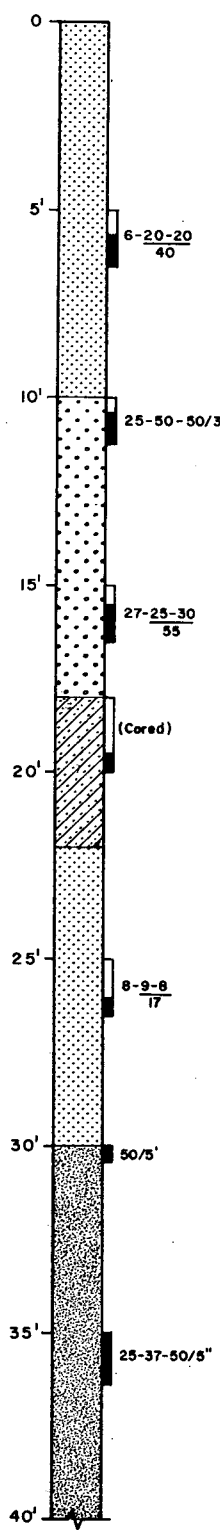
For explanation of symbols, footnotes (\*) and notes, see sheet No. 1

UNITS 2 & 3

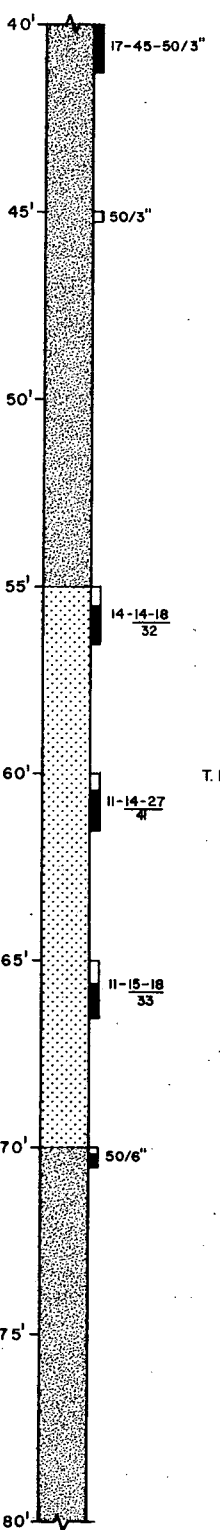
<b>BECHTEL CORPORATION</b>		
ENGINEERS & CONSTRUCTORS		
LOS ANGELES, CALIF.		
JOB NO.	DATE	APPROVED
10079-003	DEC. 1978	

J.O. NO.	<b>SAN ONDRE NUCLEAR GENERATING STATION</b>
FILE	EXPLORATION / GROUTING PROGRAM
	WELL No. 6
	APPENDIX B
	<b>GRAPHIC LOGS-STAGE I</b>
SHEET No. 3 OF 11	SOUTHERN CALIFORNIA EDISON COMPANY
	SCALE N.T.S. LOS ANGELES, CALIF.

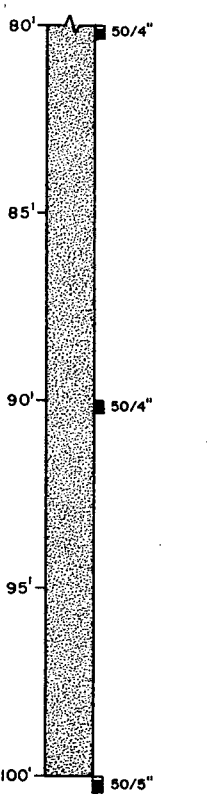
F 7



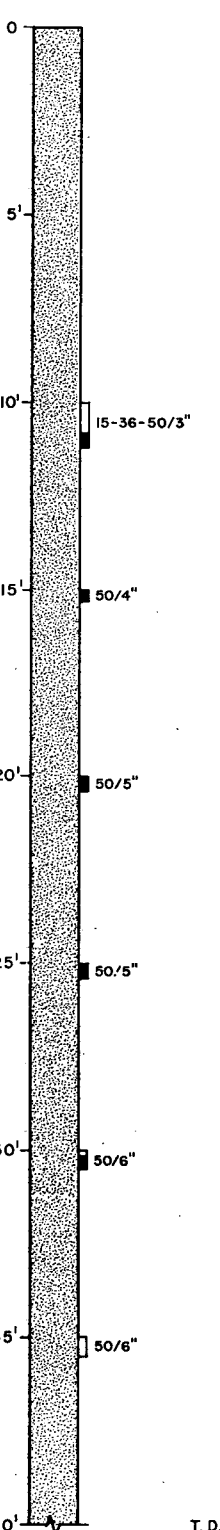
F 7 (cont.)



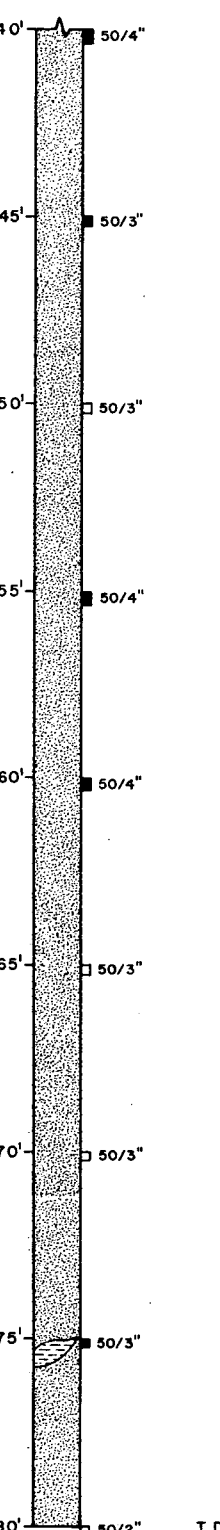
F 7 (cont.)



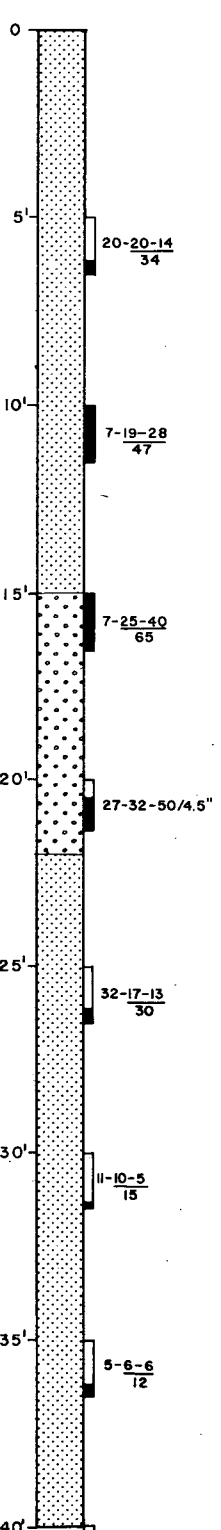
F 30



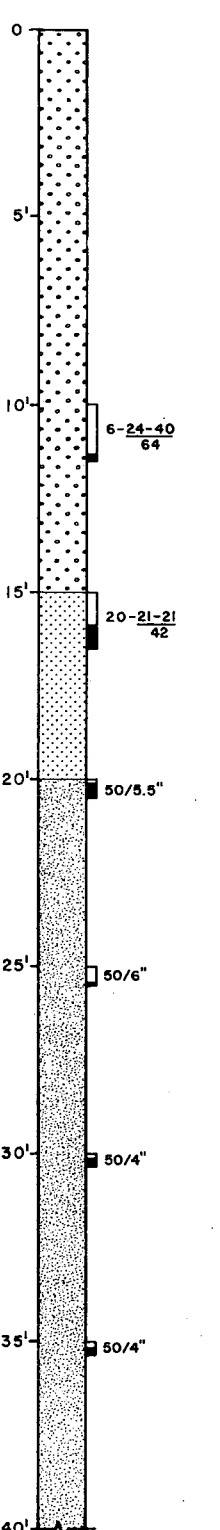
F 30 (cont.)



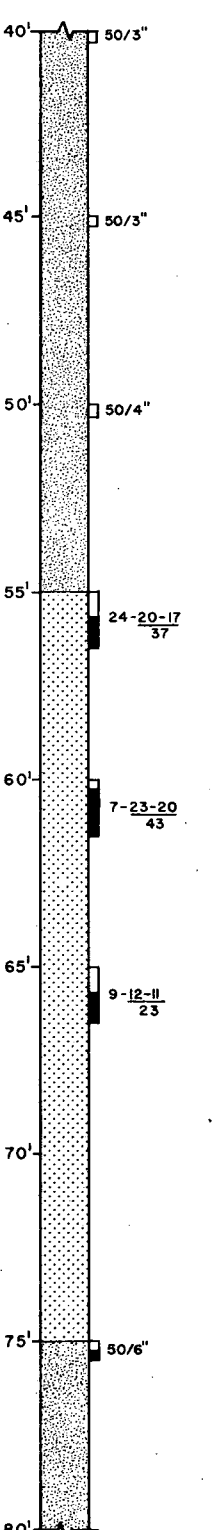
G 9.5



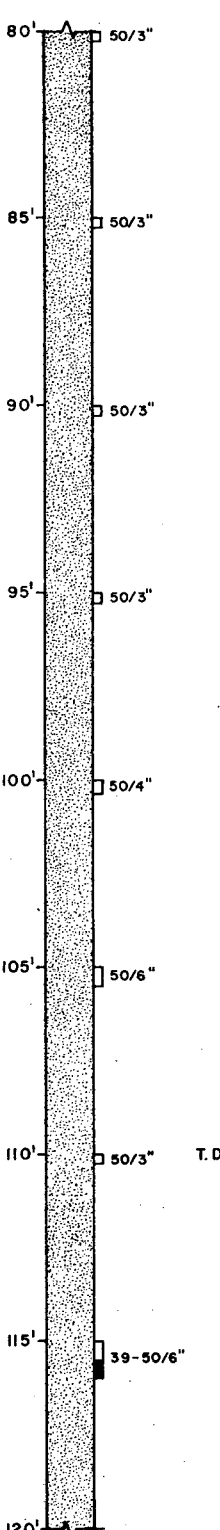
G 11A



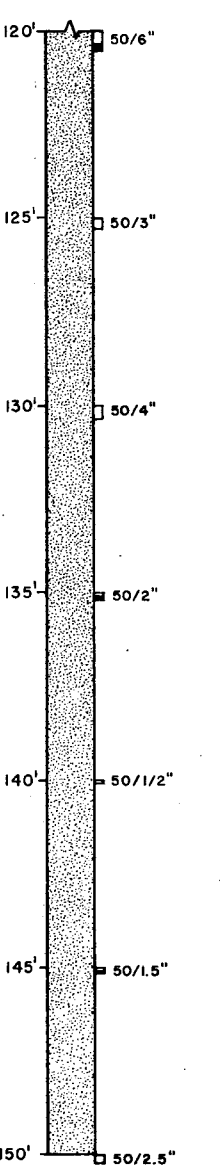
G 11A (cont.)



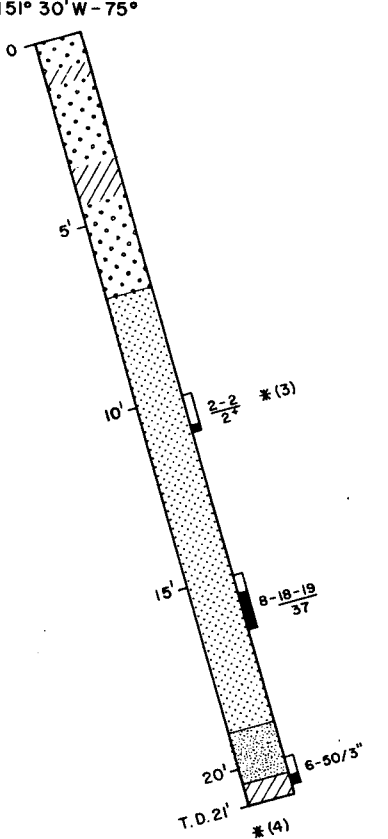
G 11A (cont.)



G 11A (cont.)



Gm II



BECHTEL CORPORATION		
ENGINEERS & CONSTRUCTORS		
LOS ANGELES, CALIF.		
JOB NO.	DATE	APPROVED
10079-003	DEC. 1978	

For explanation of symbols, footnotes (#) and notes, see sheet No. 1

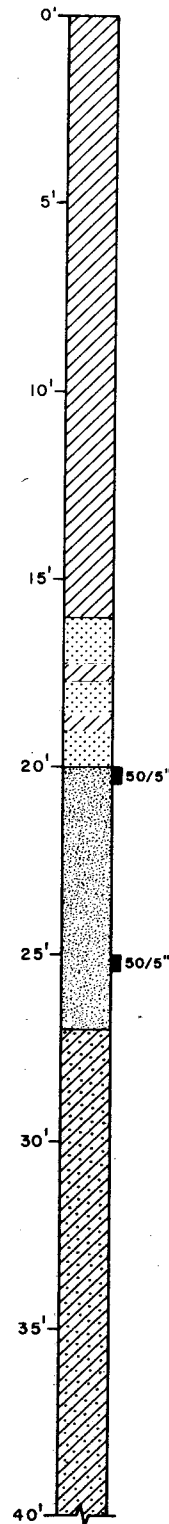
UNITS 2 & 3

J.O. NO.	SAN ONOFRE NUCLEAR GENERATING STATION
FILE	EXPLORATION / GROUTING PROGRAM
SHEET No. 2	WELL No. 6
OF 11	APPENDIX B
	GRAPHIC LOGS - STAGE I
	SOUTHERN CALIFORNIA EDISON COMPANY
	SCALE N.T.S. LOS ANGELES, CALIF.

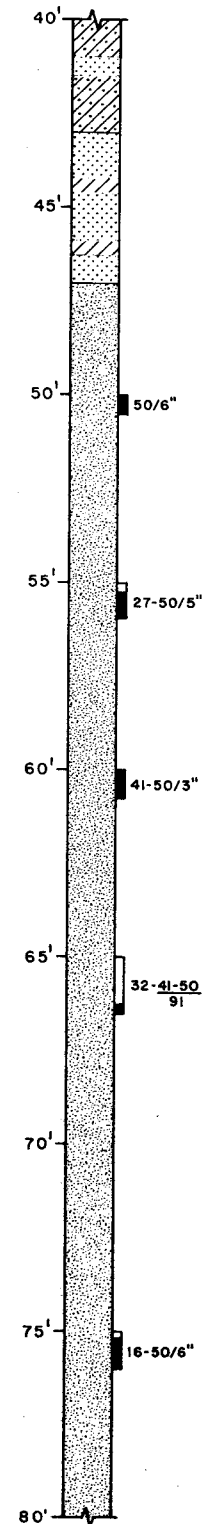




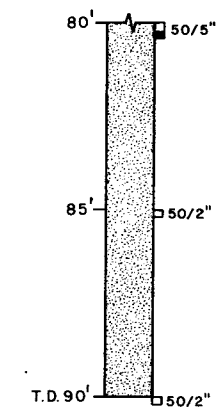
Lm 15



Lm 15  
(cont.)



Lm 15  
(cont.)



**BECHTEL CORPORATION**  
ENGINEERS & CONSTRUCTORS  
LOS ANGELES, CALIF.

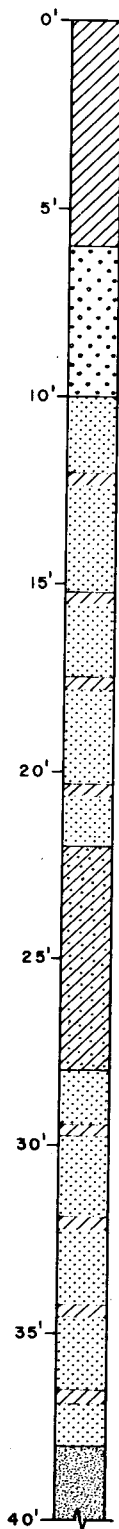
JOB NO.	DATE	APPROVED
10079-003	DEC. 1978	

For explanation of symbols, footnote (※)  
and notes, see sheet No. 1

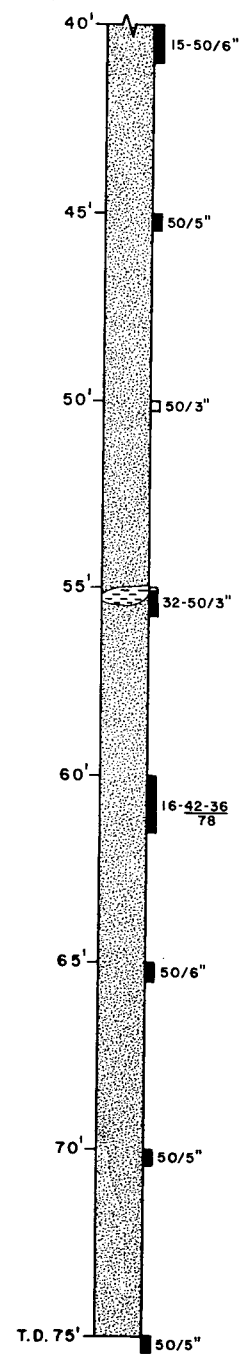
UNITS 2 & 3

J.O. NO.	SAN ONOFRE NUCLEAR GENERATING STATION
FILE	EXPLORATION / GROUTING PROGRAM
SHEET	WELL No. 6
No. 3	APPENDIX B
OF 3	<b>GRAPHIC LOGS - STAGE III</b>
	SOUTHERN CALIFORNIA EDISON COMPANY
	SCALE N.T.S. LOS ANGELES, CALIF.

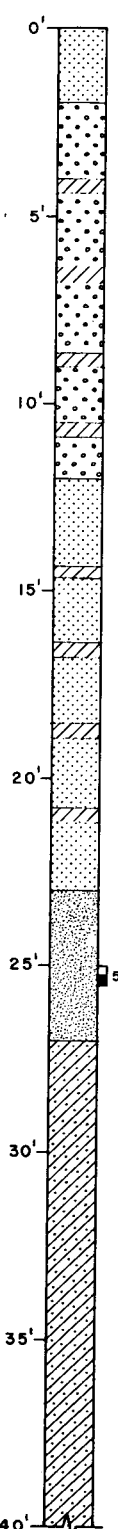
Jm 15



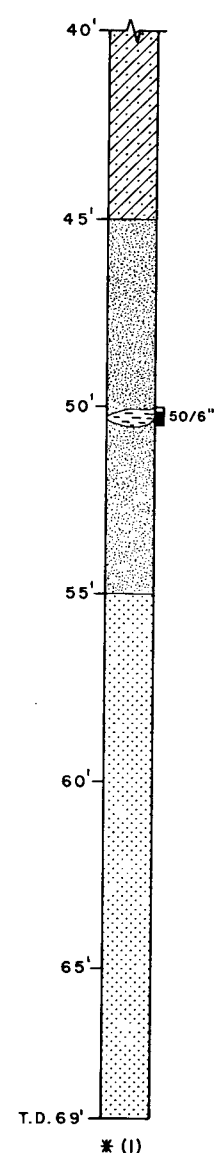
Jm 15 (cont.)



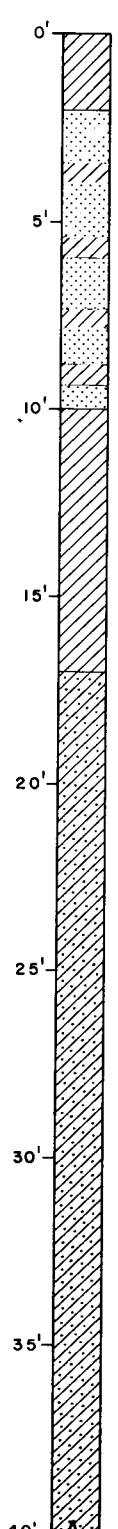
K 14



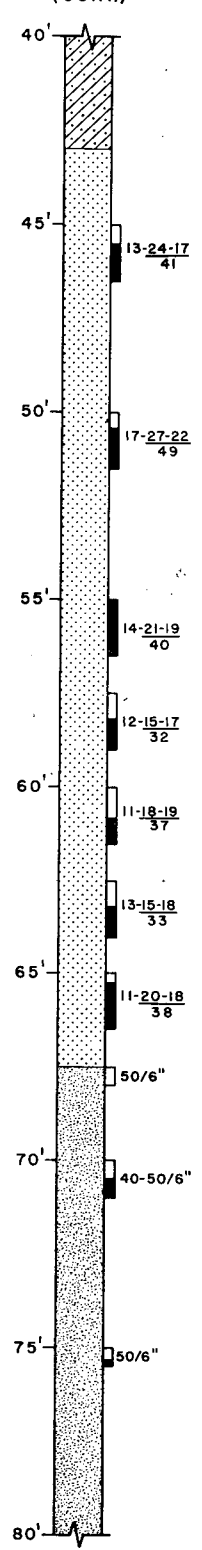
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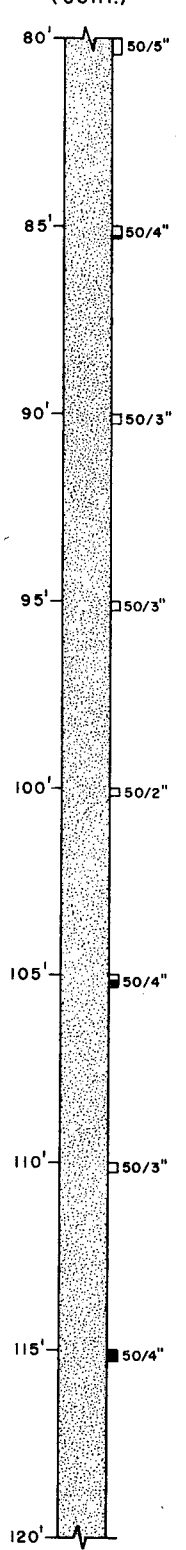
K 19



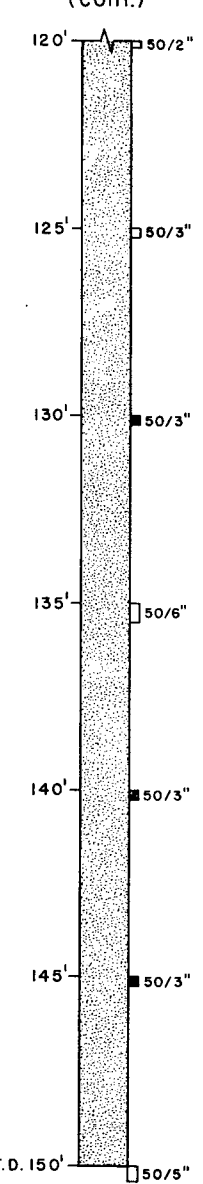
K 19 (cont.)



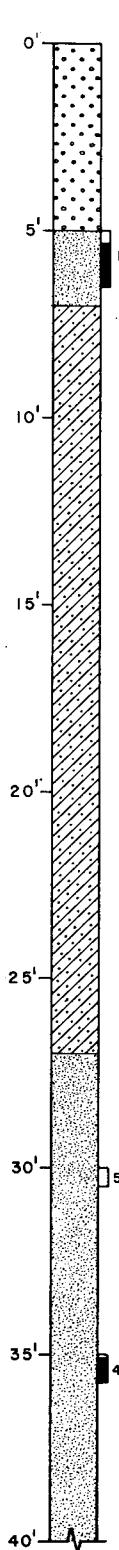
K 19 (cont.)



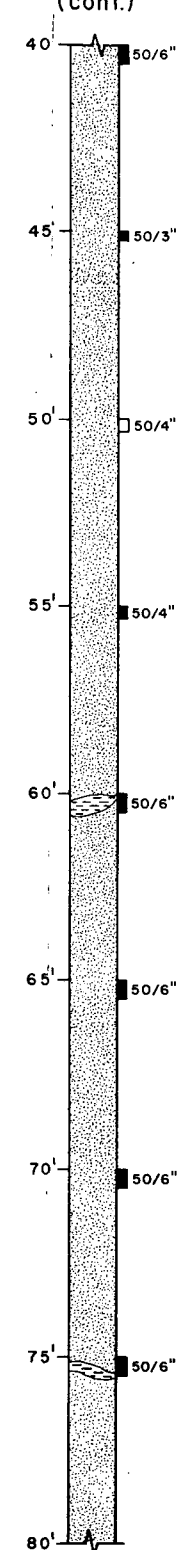
K 19 (cont.)



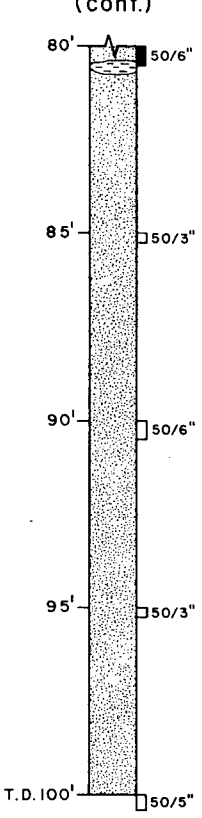
L 31.5



L 31.5 (cont.)



L 31.5 (cont.)



For explanation of symbols, footnote. (\*) and notes, see sheet No. 1

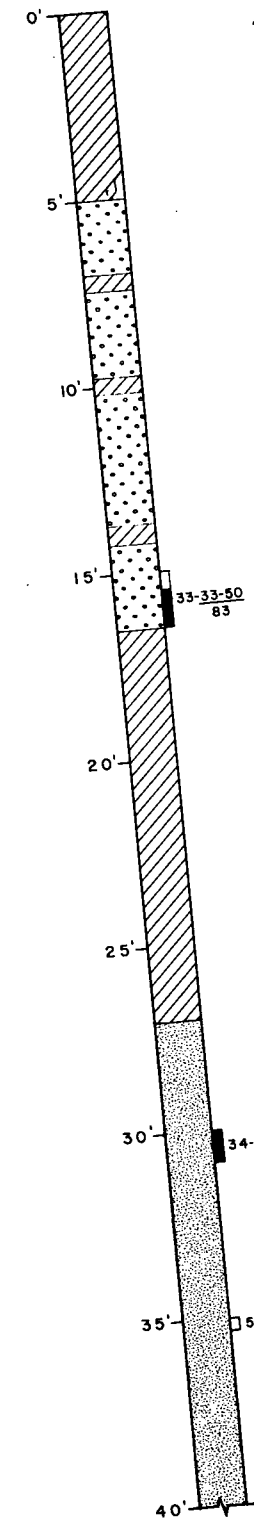
UNITS 2 & 3

BECHTEL CORPORATION ENGINEERS & CONSTRUCTORS LOS ANGELES, CALIF.		
JOB NO. 10079-003	DATE DEC. 1978	APPROVED

I.O. NO.	SAN ONOFRE NUCLEAR GENERATING STATION
FILE	EXPLORATION / GROUTING PROGRAM
SHEET No. 2 OF 3	WELL No. 6 APPENDIX B GRAPHIC LOGS - STAGE III
	SOUTHERN CALIFORNIA EDISON COMPANY SCALE N.T.S. LOS ANGELES, CALIF.

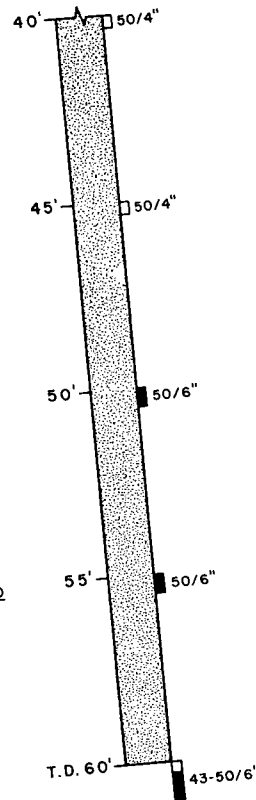
Em 6

N 57° 30' W-84°



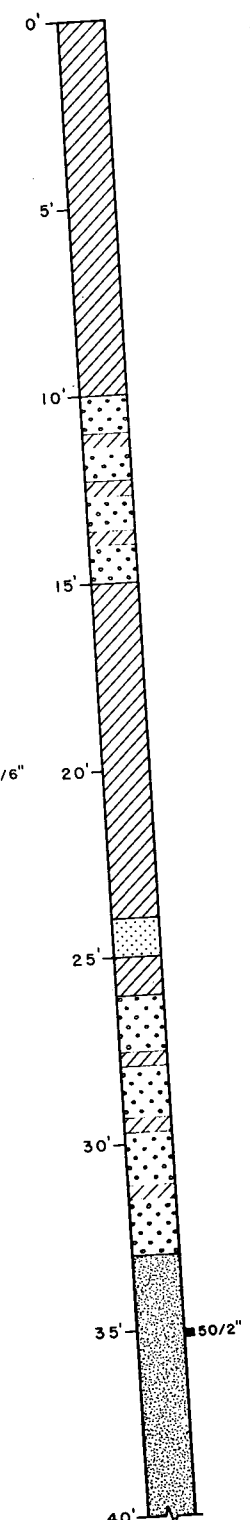
Em 6

(cont.)



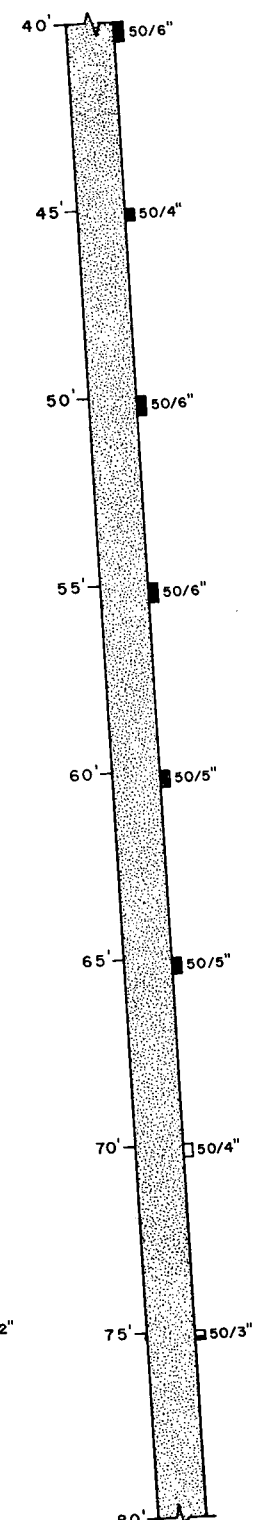
G 5

N 46° 34' W-86°



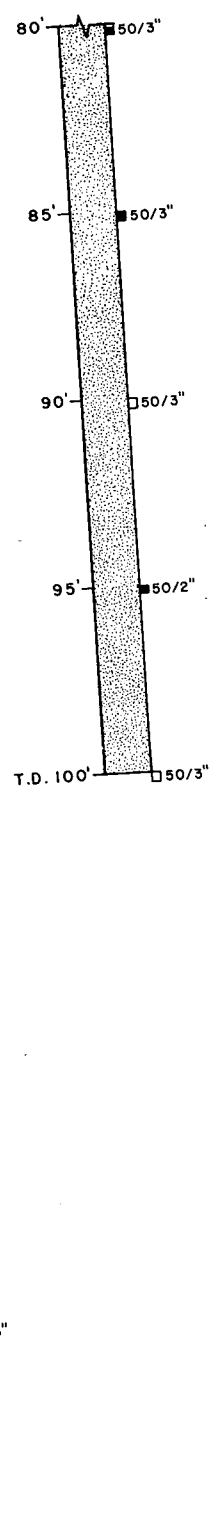
G 5

(cont.)

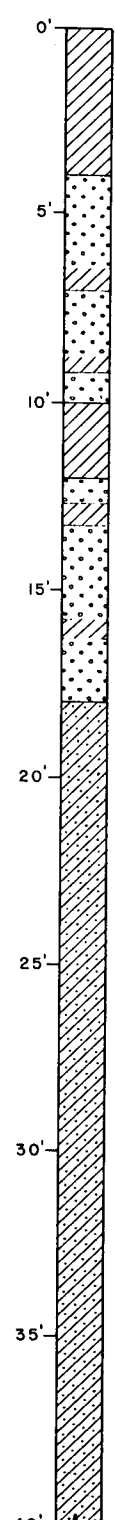


G 5

(cont.)

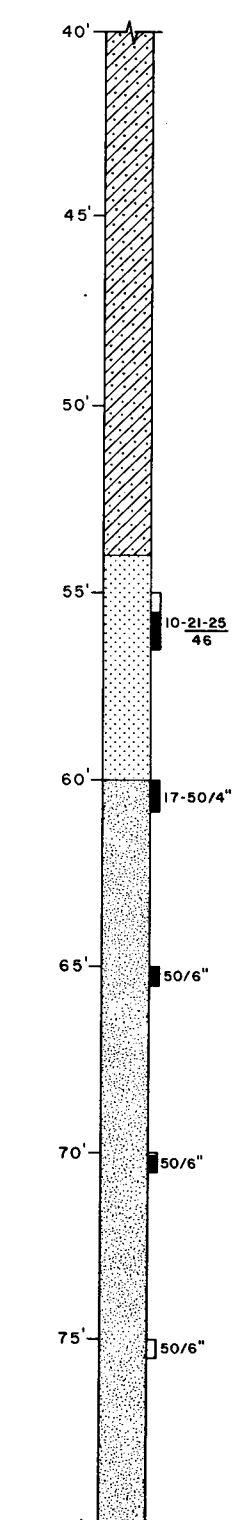


G 8

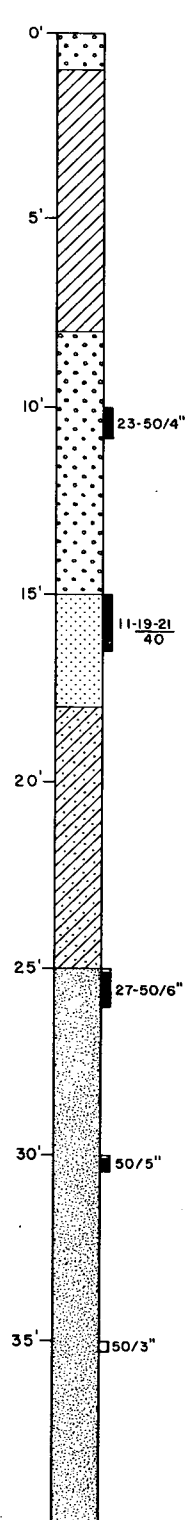


G 8

(cont.)

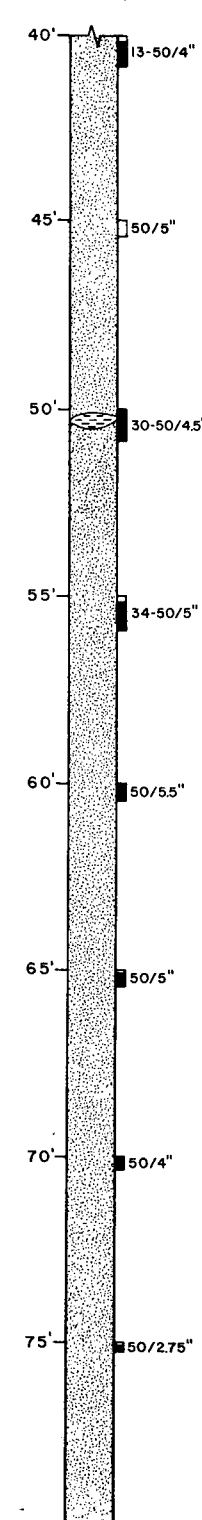


Hm 8



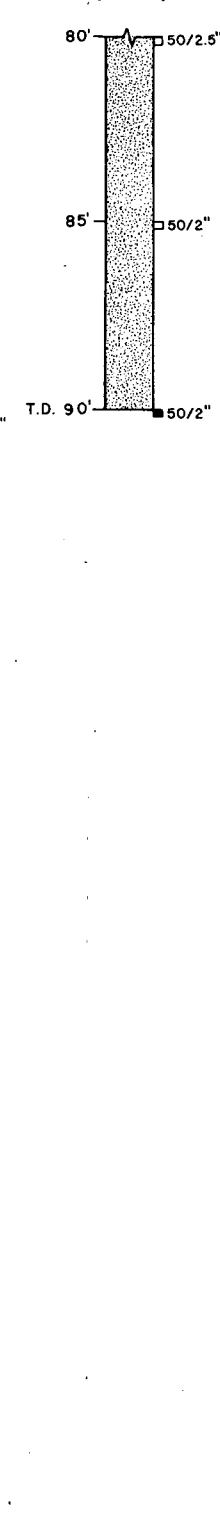
Hm 8

(cont.)



Hm 8

(cont.)



EXPLANATION OF SYMBOLS

- Backfill sand
- Backfill concrete
- Gravel
- Grout (G-3)
- Grout (undiff.)
- Disturbed sand
- San Mateo Formation
- Siltstone (Fragments and lenses within San Mateo Formation)

NOTE:

- G 8** Drill hole number
- N57°30'W-86° Bearing of angle hole - reference to plant north with dip angle from horizontal
- CORED INTERVAL** - darkened interval indicates core recovery
- BLOW COUNTS WITH SPLIT SPOON SAMPLER**
- 8-12-14 blows/6"-blows/6"-blows/6" total blows for last 12"
- 40-50/5" blows/6"-blows/interval noted
- 50/4" blows/interval noted
- darkened interval indicates sample recovery

STAGE III - FOOTNOTE (\*)

1. Hole terminated due to communication with another hole.

UNITS 2 & 3

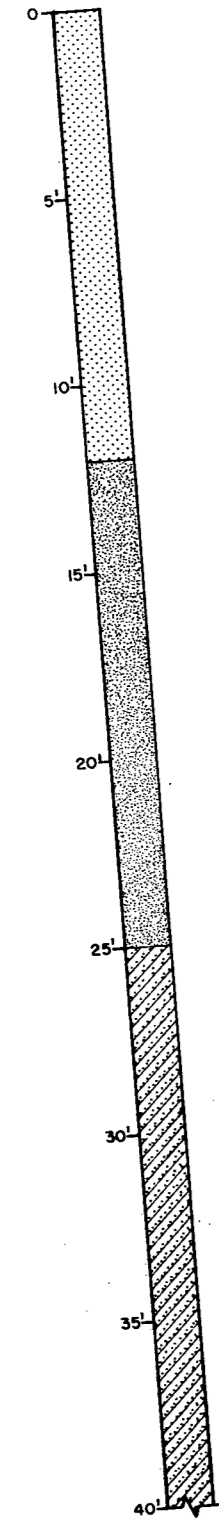
BECHTEL CORPORATION  
ENGINEERS & CONSTRUCTORS  
LOS ANGELES, CALIF.

JOB NO.	DATE	APPROVED
10079-003	DEC. 1978	

J.O. NO.	SAN ONOFRE NUCLEAR GENERATING STATION
FILE	EXPLORATION / GROUTING PROGRAM
SHEET	WELL No. 6
No. 1	APPENDIX B
OF 3	GRAPHIC LOGS - STAGE III
	SOUTHERN CALIFORNIA Edison COMPANY
	SCALE N.T.S. LOS ANGELES, CALIF.

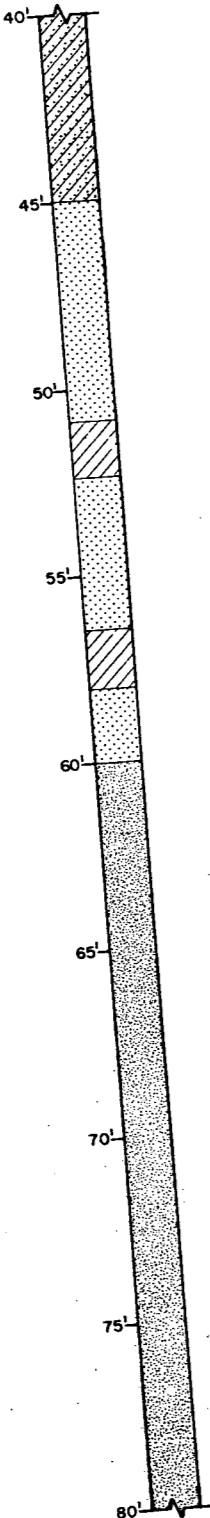
Nm 14

N 0°W - 85°



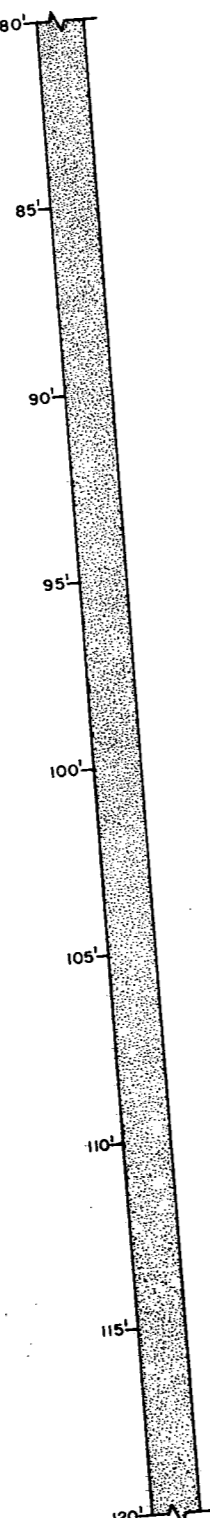
Nm 14

(cont.)



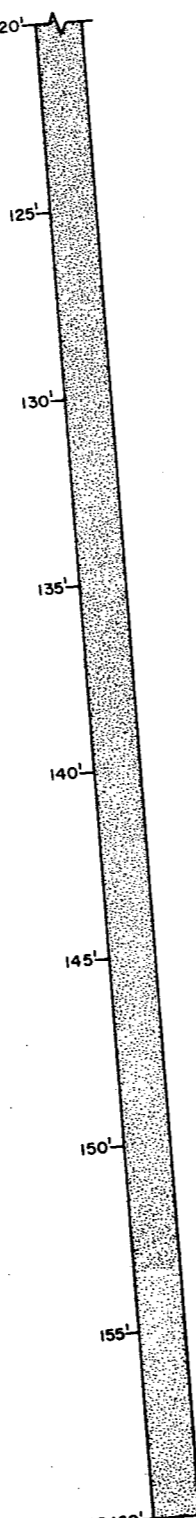
Nm 14

(cont.)



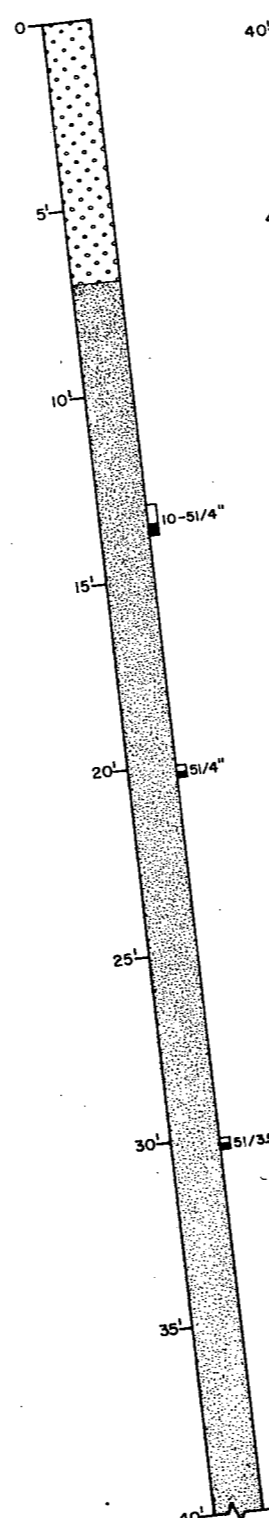
Nm 14

(cont.)



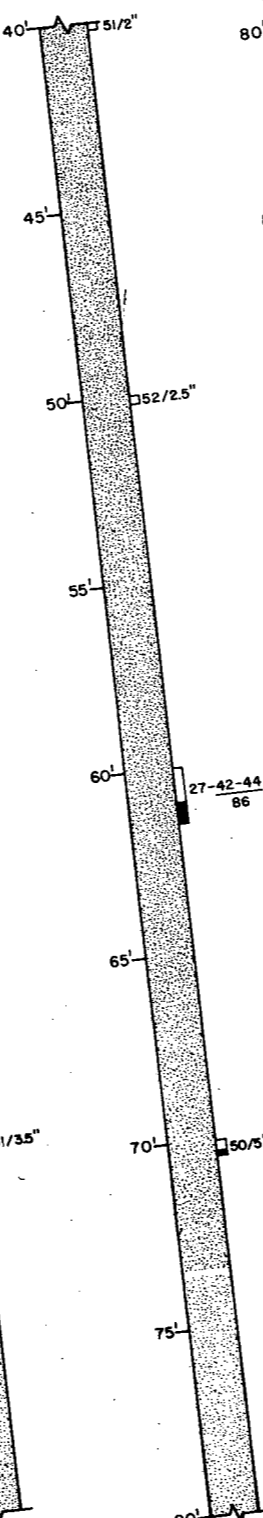
Pm 25

N 1°12'W - 83°



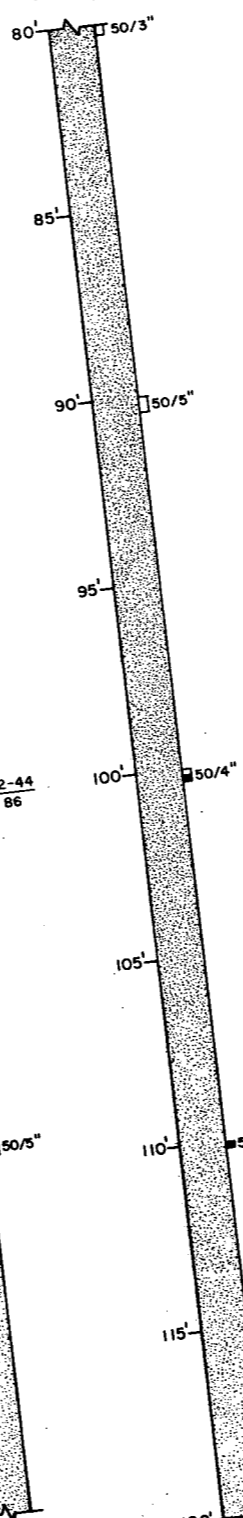
Pm 25

(cont.)



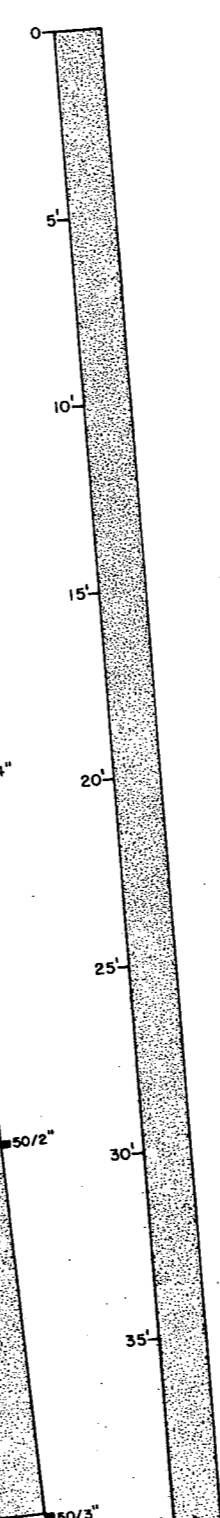
Pm 25

(cont.)



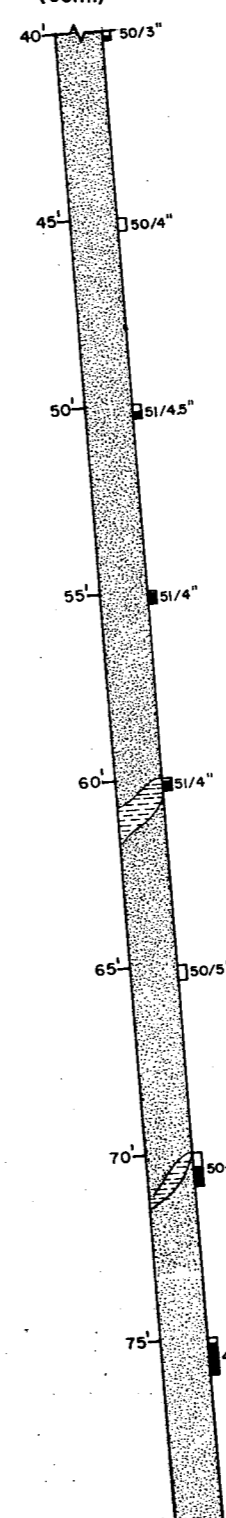
Pm 29

N 5°03'W - 85°



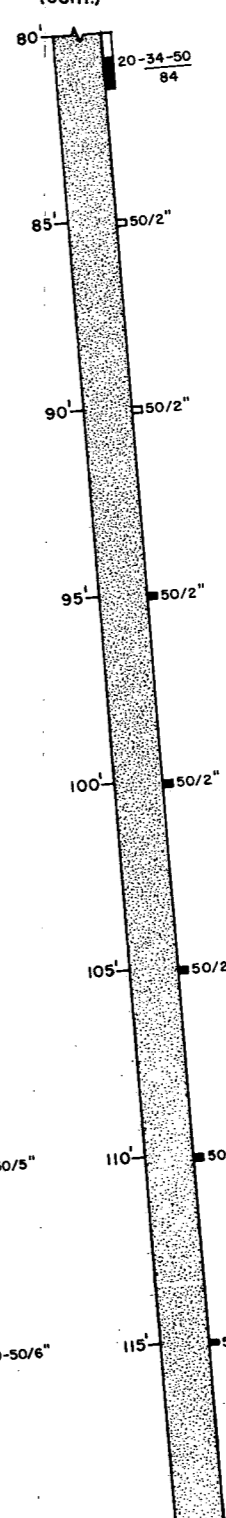
Pm 29

(cont.)



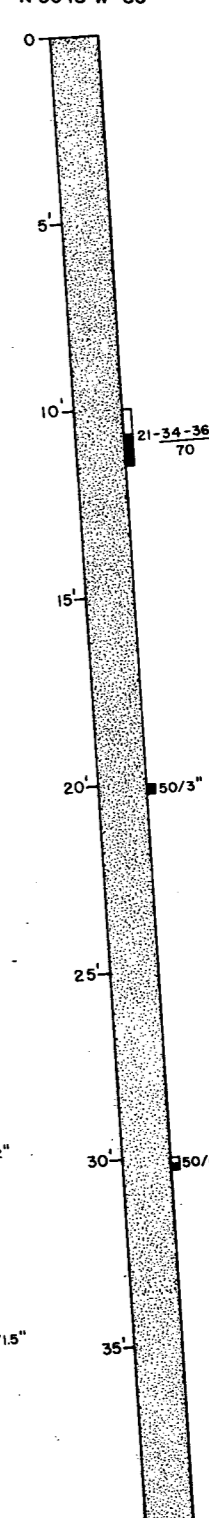
Pm 29

(cont.)



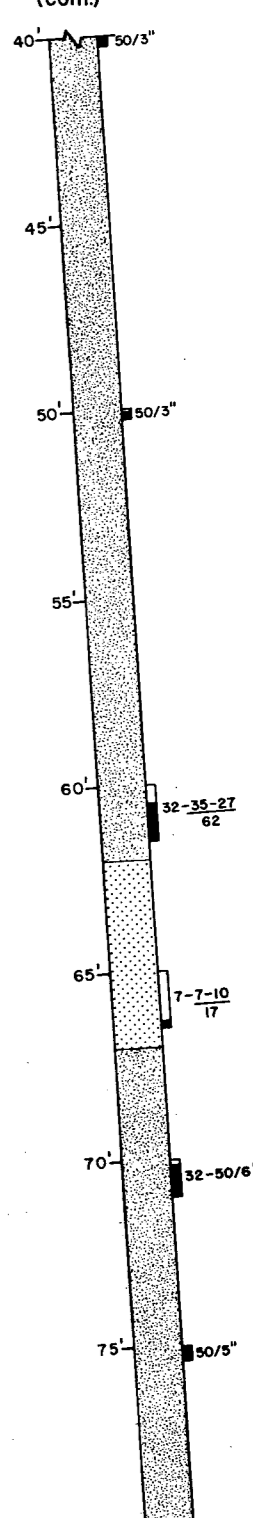
Q 34

N 30°18'W - 86°



Q 34

(cont.)



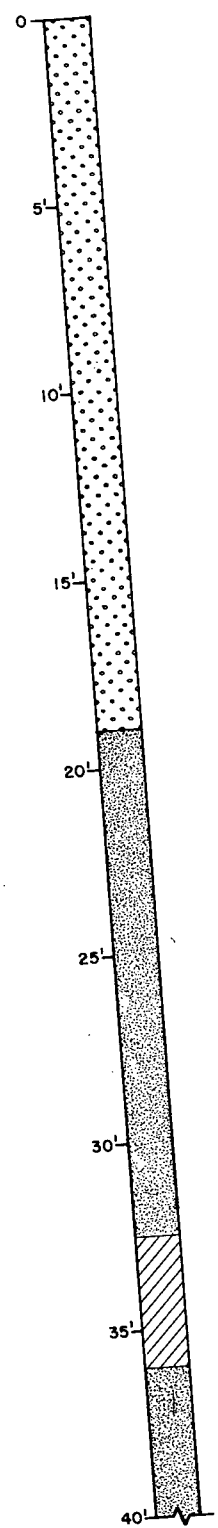
For explanation of symbols, footnotes (\*) and notes, see sheet No. 1

UNITS 2 & 3

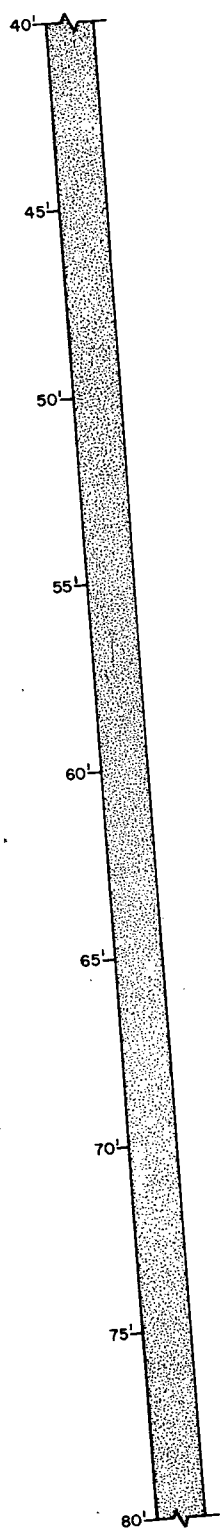
BECHTEL CORPORATION ENGINEERS & CONSTRUCTORS LOS ANGELES, CALIF.		
JOB NO. 10079-003	DATE DEC. 1978	APPROVED

J.O. NO.	SAN ONOFRE NUCLEAR GENERATING STATION
FILE	EXPLORATION / GROUTING PROGRAM WELL No. 6 APPENDIX B
SHEET No. 4 OF 4	GRAPHIC LOGS - STAGE II
	SOUTHERN CALIFORNIA Edison COMPANY SCALE N.T.S. LOS ANGELES, CALIF.

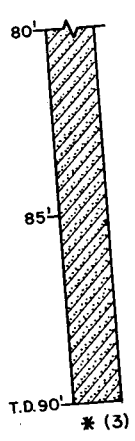
K 11  
N 0°W - 85°



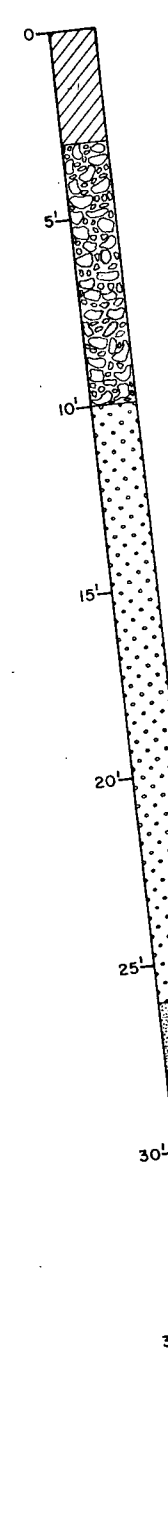
K 11  
(cont.)



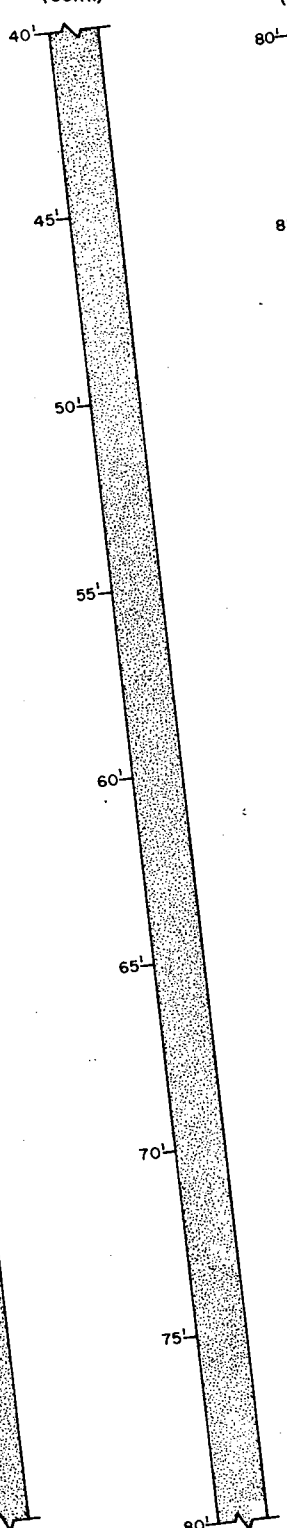
K 11  
(cont.)



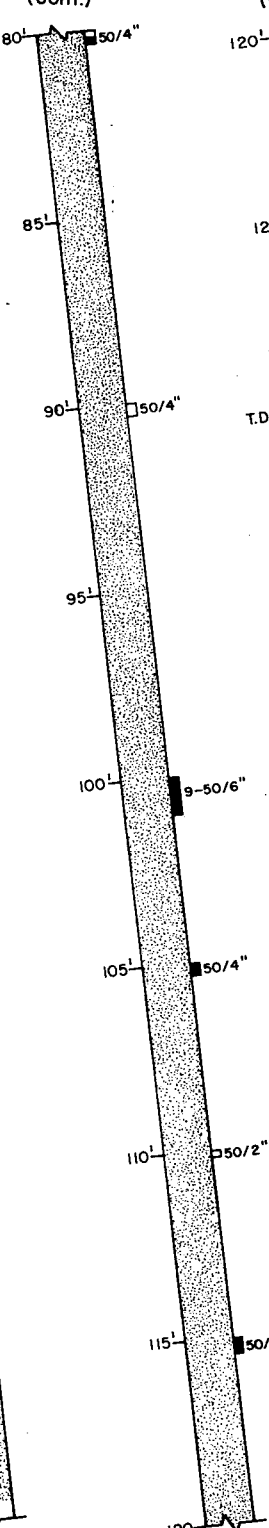
L 9  
N 46°56'W - 83°



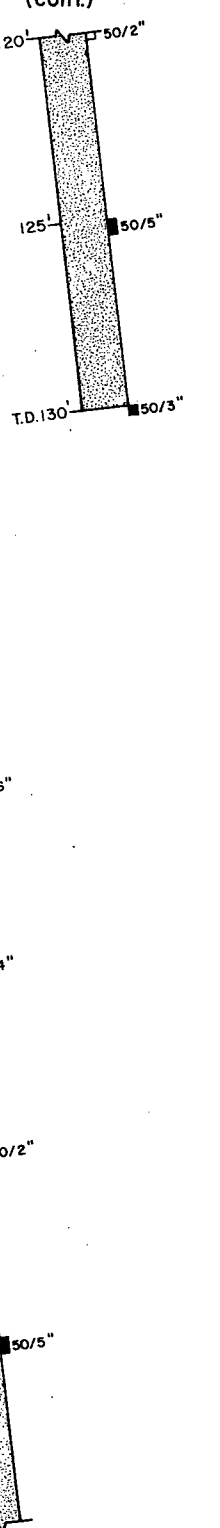
L 9  
(cont.)



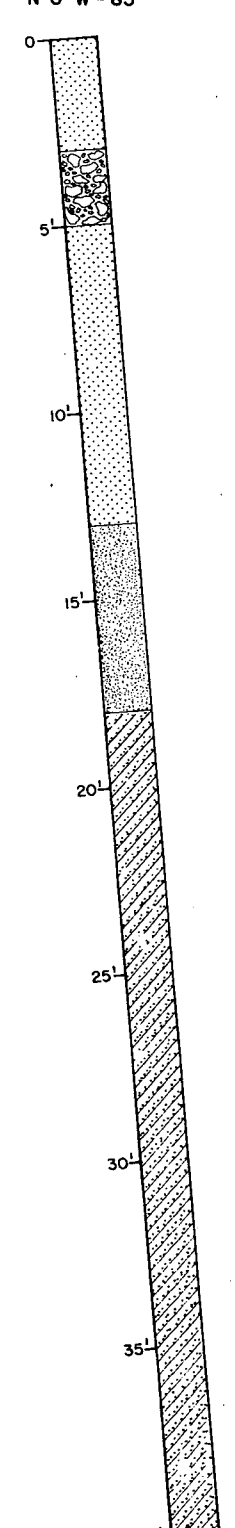
L 9  
(cont.)



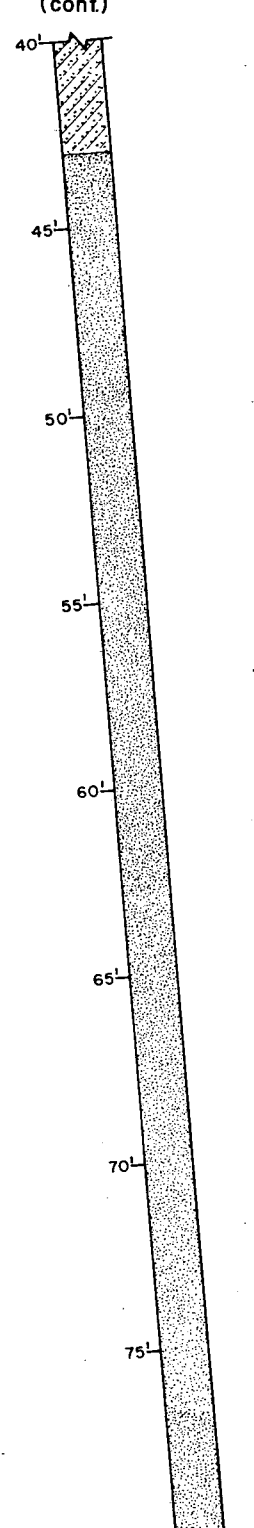
L 9  
(cont.)



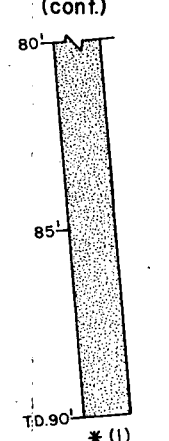
Mm 18.5  
N 0°W - 85°



Mm 18.5  
(cont.)



Mm 18.5  
(cont.)



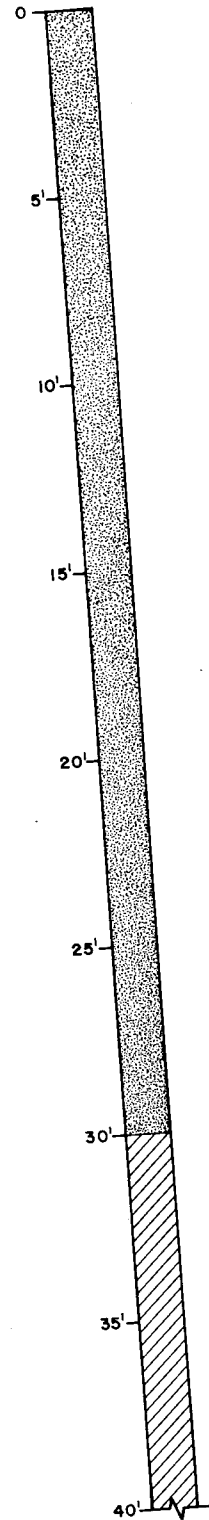
BECHTEL CORPORATION ENGINEERS & CONSTRUCTORS LOS ANGELES, CALIF.		
JOB NO. 10079-003	DATE DEC. 1978	APPROVED

For explanation of symbols, footnotes (\*) and notes, see sheet No. 1

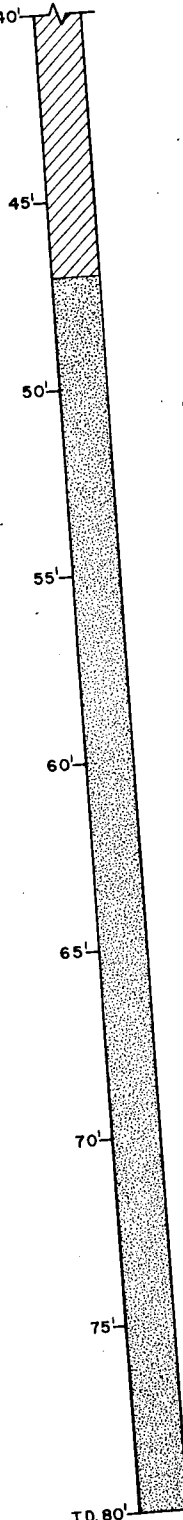
UNITS 2 & 3

J.O. NO.	SAN ONOFRE NUCLEAR GENERATING STATION
FILE	EXPLORATION / GROUTING PROGRAM WELL No. 6
SHEET No. 3 OF 4	APPENDIX B GRAPHIC LOGS - STAGE II
	SOUTHERN CALIFORNIA EDISON COMPANY SCALE N.T.S. LOS ANGELES, CALIF.

G 26.5  
S 0° E - 85°

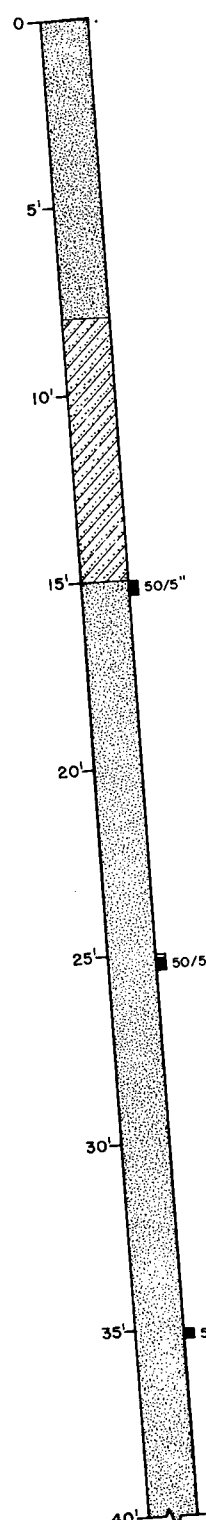


G 26.5  
(cont.)

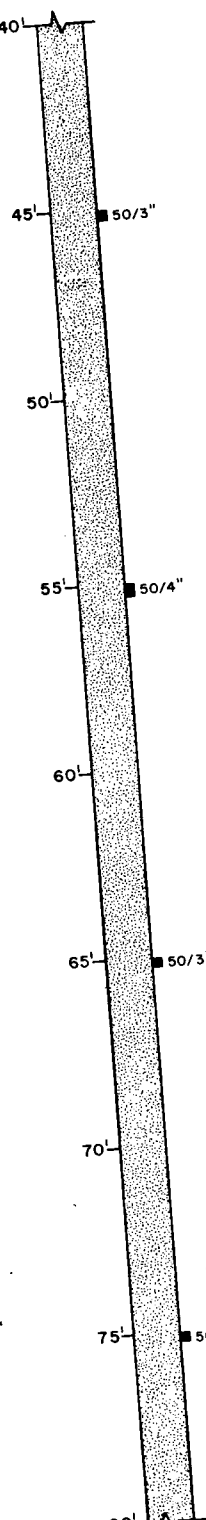


\* (1)

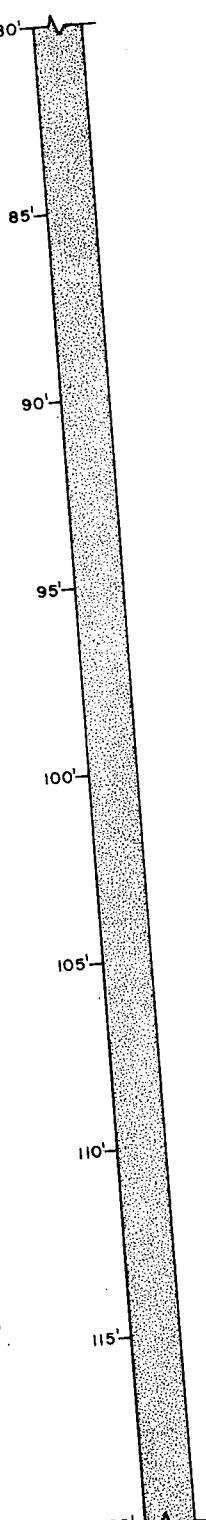
G 32  
S 0° E - 85°



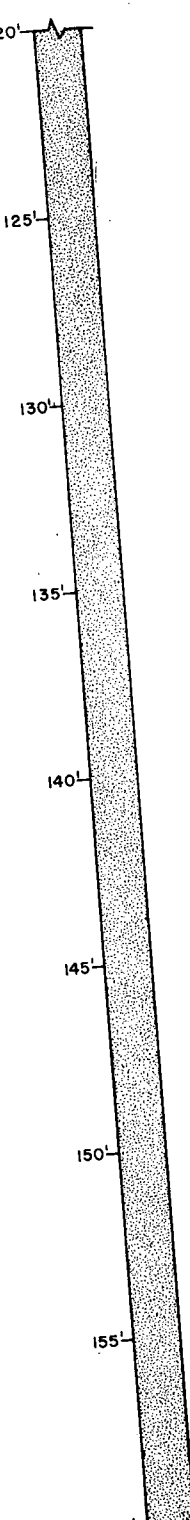
G 32  
(cont.)



G 32  
(cont.)

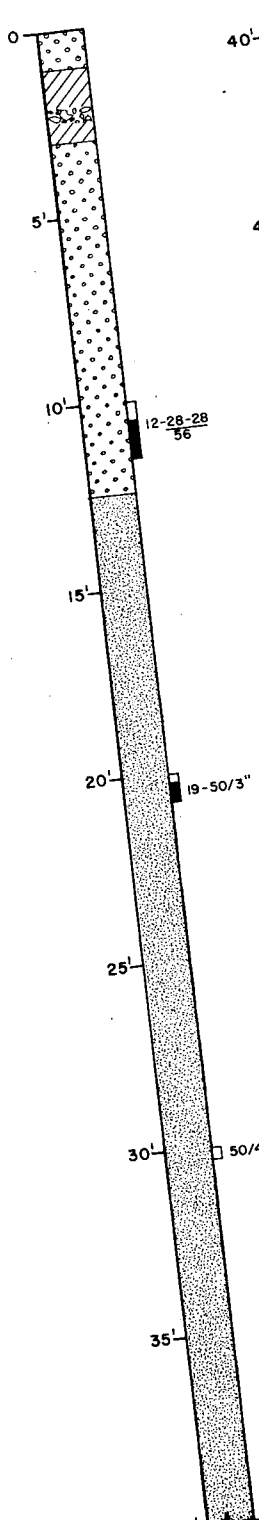


G 32  
(cont.)

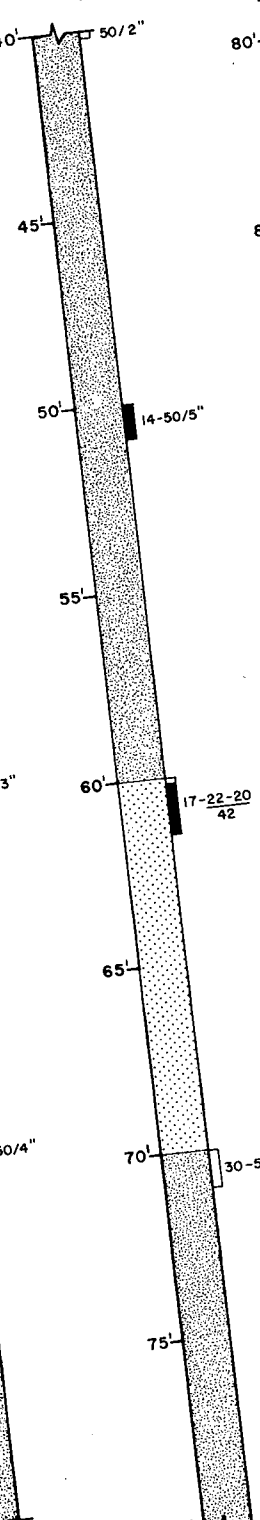


T.D. 160'

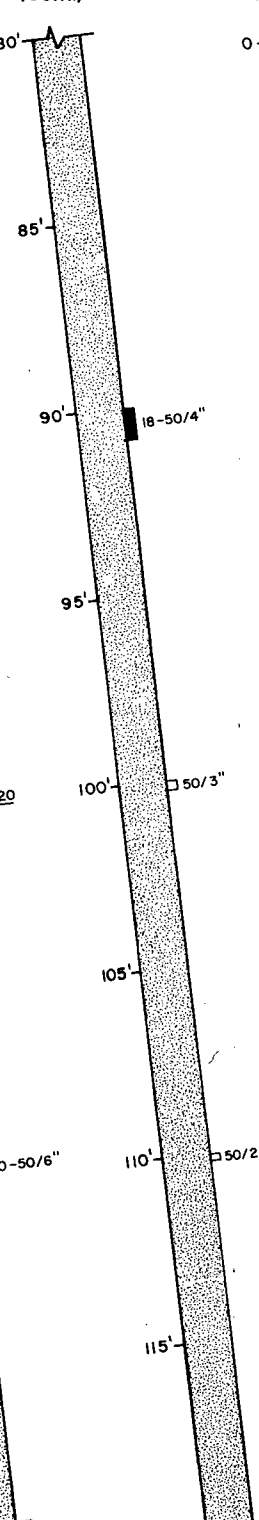
Hm 14  
N 44° 08' W - 83°



Hm 14  
(cont.)

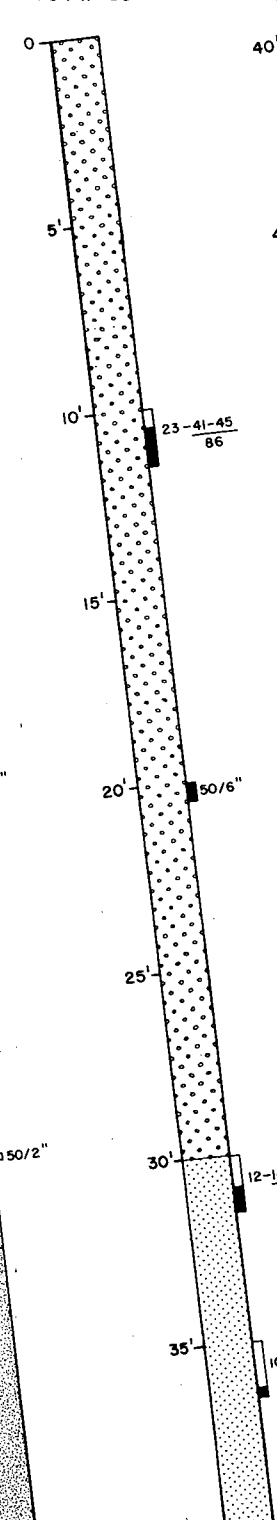


Hm 14  
(cont.)

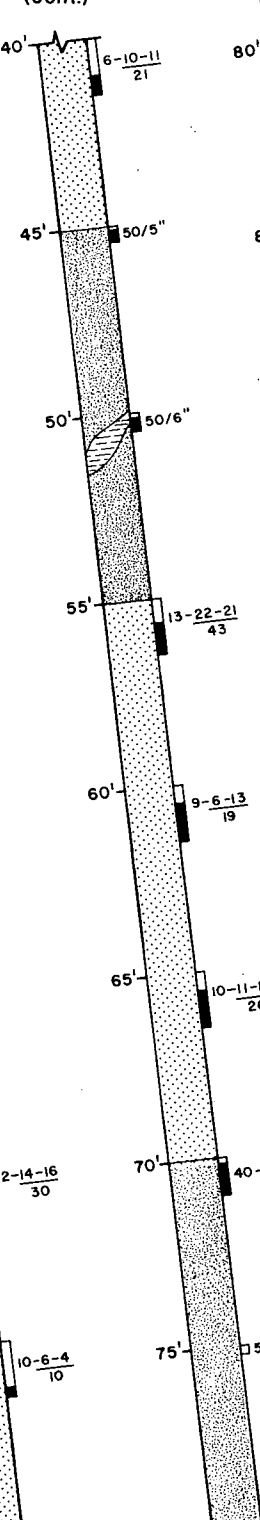


\* (2)

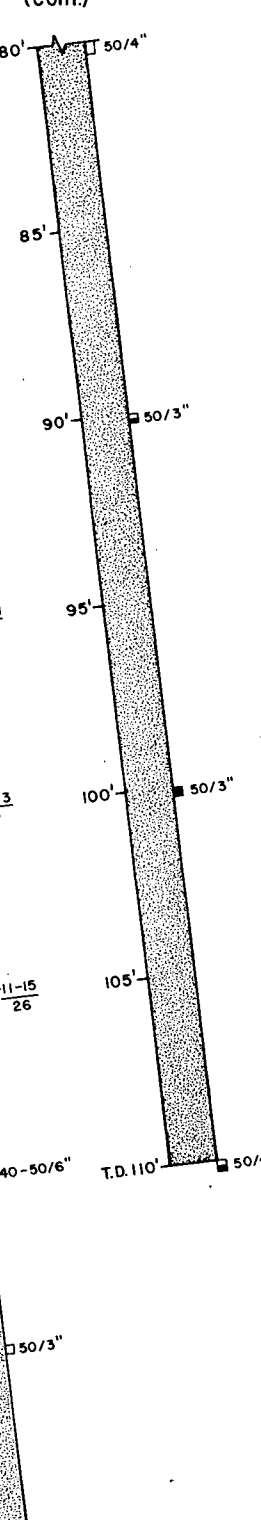
K 9  
N 1° 34' W - 83°



K 9  
(cont.)



K 9  
(cont.)



T.D. 110'

For explanation of symbols, footnotes (\*) and notes, see sheet No. 1

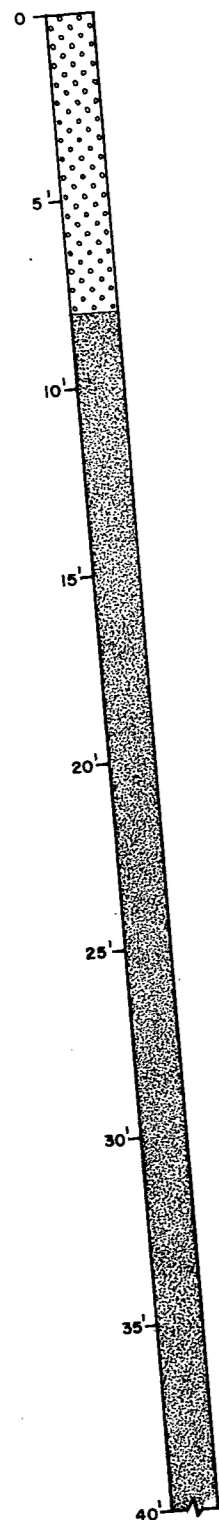
UNITS 2 & 3

BECHTEL CORPORATION		
ENGINEERS & CONSTRUCTORS		
LOS ANGELES, CALIF.		
JOB NO.	DATE	APPROVED
10079-003	DEC. 1978	

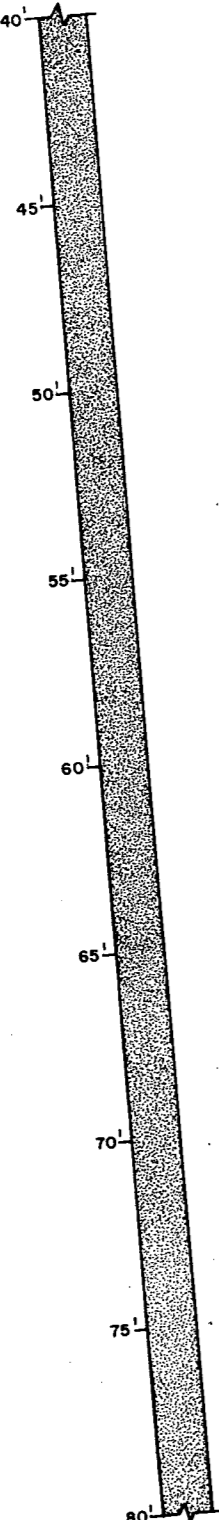
J.O. NO.	SAN ONOFRE NUCLEAR GENERATING STATION
FILE	EXPLORATION / GROUTING PROGRAM
	WELL No. 6
	APPENDIX B
	GRAPHIC LOGS-STAGE II
SHEET No. 2 OF 4	SOUTHERN CALIFORNIA EDISON COMPANY
	SCALE N.T.S. LOS ANGELES, CALIF.

Dm 16

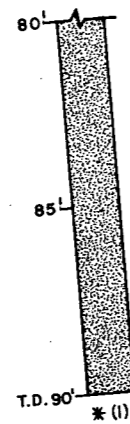
S 0°E-85°



Dm 16 (cont.)

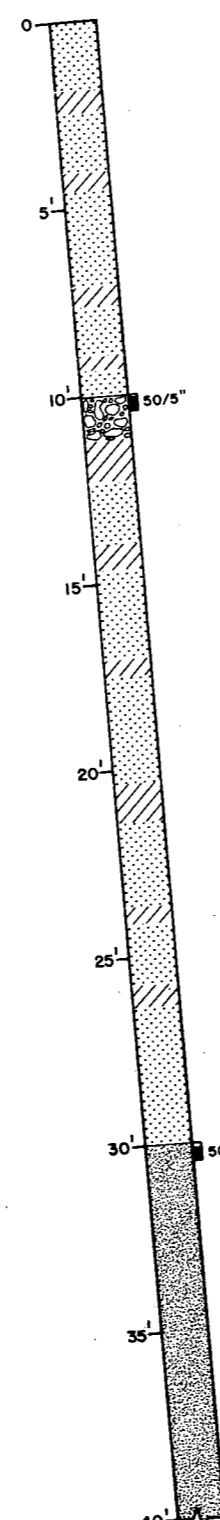


Dm 16 (cont.)

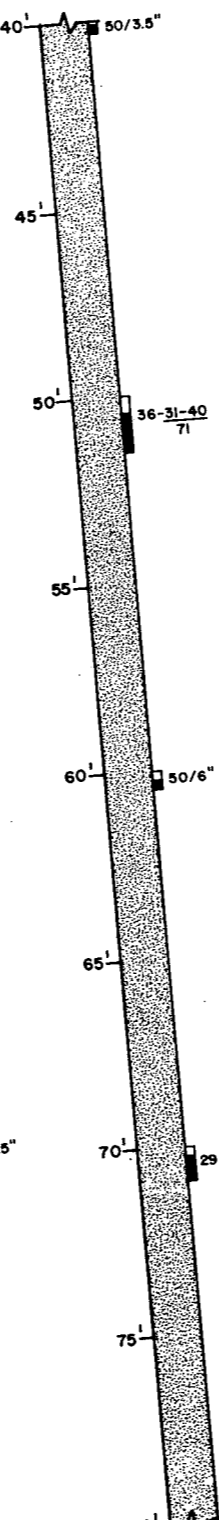


Dm 22

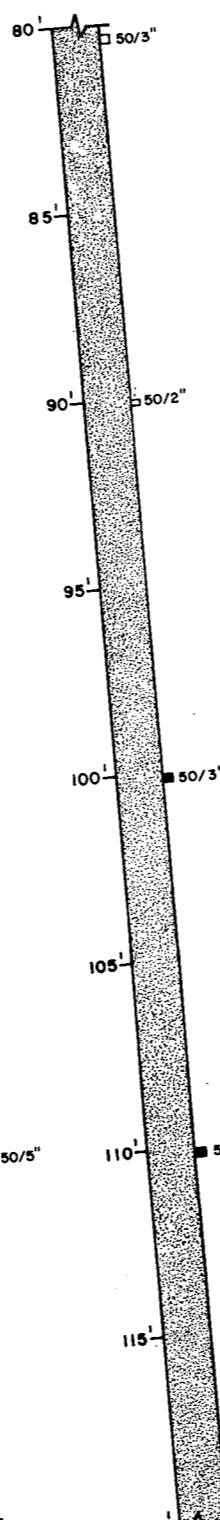
S 29°14'W-85°



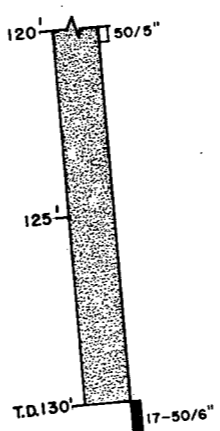
Dm 22 (cont.)



Dm 22 (cont.)



Dm 22 (cont.)

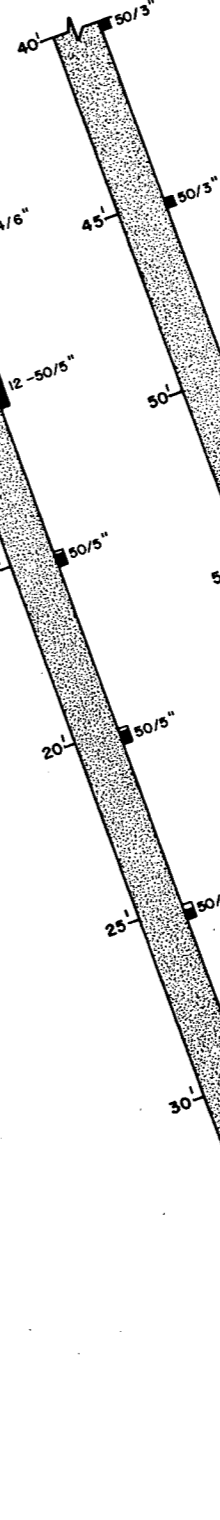


F 18

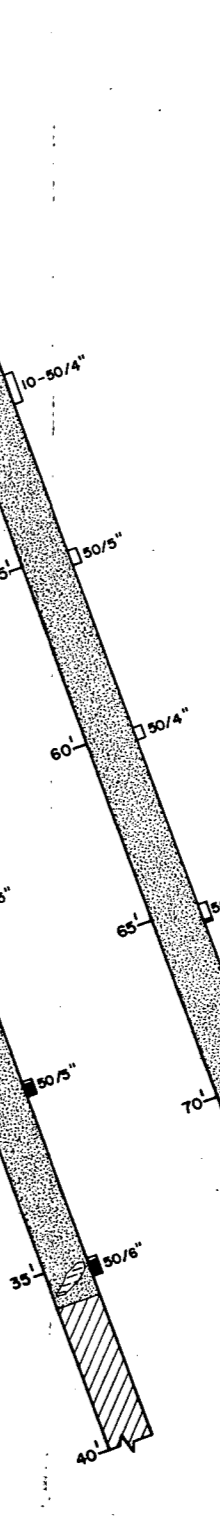
S 44°03'W-70°



F 18 (cont.)



F 18 (cont.)



EXPLANATION OF SYMBOLS

- Backfill sand
- Backfill concrete
- Gravel
- Grout (G-3)
- Grout (undiff.)
- Disturbed sand
- San Mateo Formation
- Siltstone (Fragments and lenses within San Mateo Formation)

NOTE:

**F 18** Drill hole number  
**S 44°03'W-70°** Bearing of angle hole reference to plant north with dip angle from horizontal

- CORED INTERVAL darkened interval indicates core recovery
- BLOW COUNTS WITH SPLIT SPOON SAMPLER  
 8-12-14 blows/6" - blows/6" - blows/6" total blows for last 12"  
 26  
 40-50/5" blows/6" - blows/interval noted  
 50/4" blows/interval noted  
 darkened interval indicates sample recovery

STAGE II - FOOTNOTES (\*)

1. Hole drilled for grouting only; no samples taken.
2. No sample taken at bottom of hole; communication breakdown at shift change.
3. Hole drilled for grouting only; no samples taken. Hole terminated at design depth.

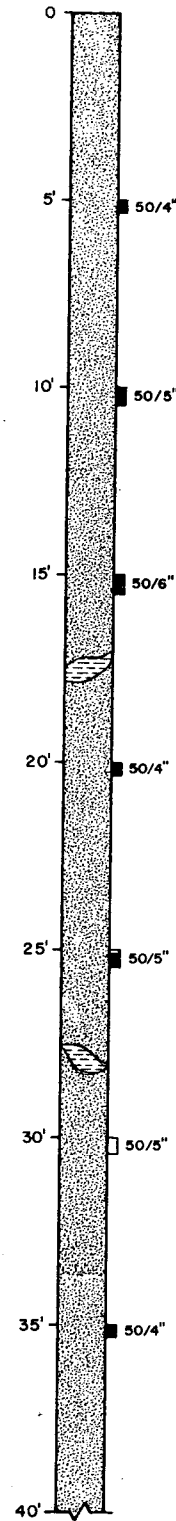
BECHTEL CORPORATION ENGINEERS & CONSTRUCTORS LOS ANGELES, CALIF.		
JOB NO. 10079-003	DATE DEC. 1978	APPROVED

J.O. NO.	SAN ONOFRE NUCLEAR GENERATING STATION
FILE	EXPLORATION / GROUTING PROGRAM
SHEET No. 1 OF 4	WELL No. 6 APPENDIX B GRAPHIC LOGS - STAGE II
	SOUTHERN CALIFORNIA EDISON COMPANY SCALE N.T.S. LOS ANGELES, CALIF.

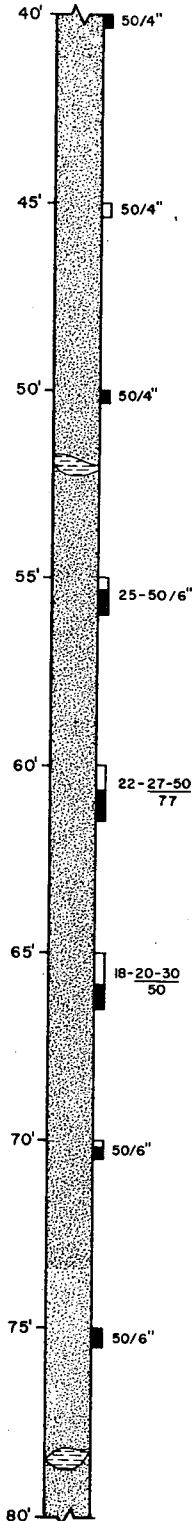
UNITS 2 & 3



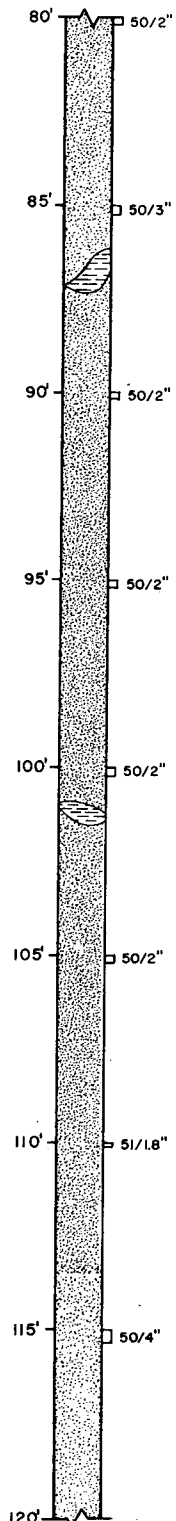
N 30



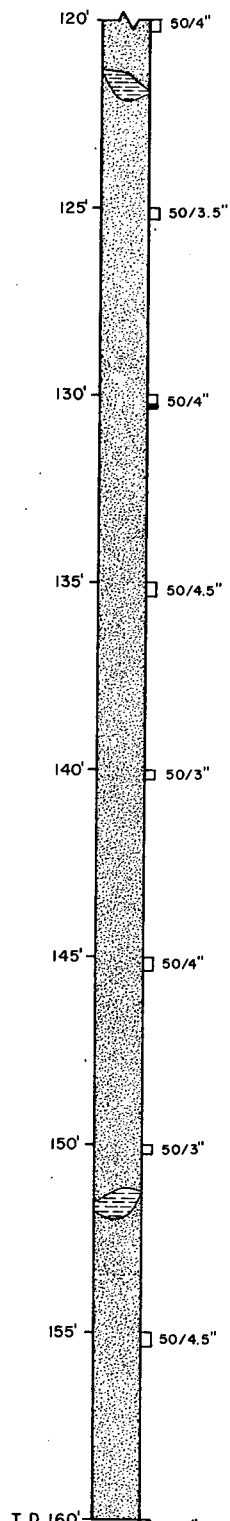
N 30 (cont.)



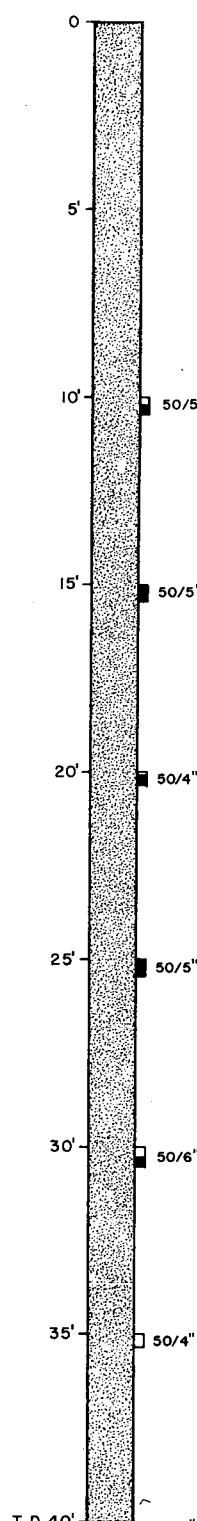
N 30 (cont.)



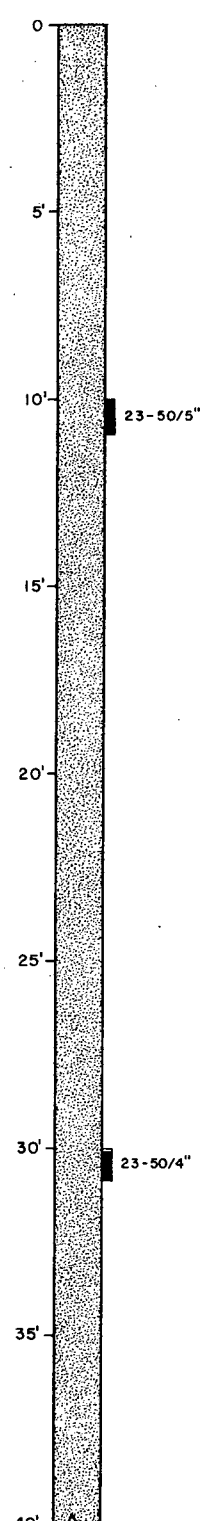
N 30 (cont.)



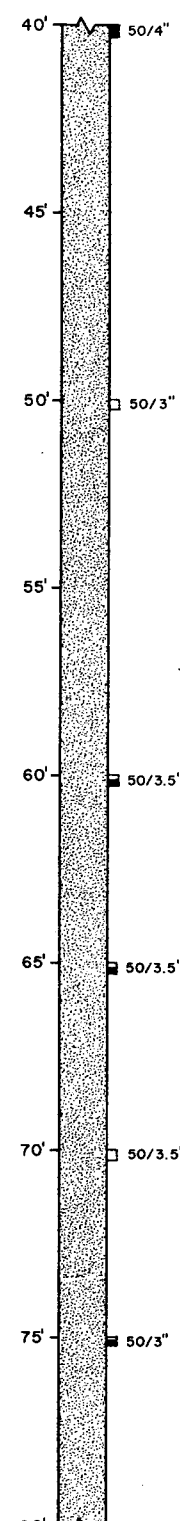
Nm 19



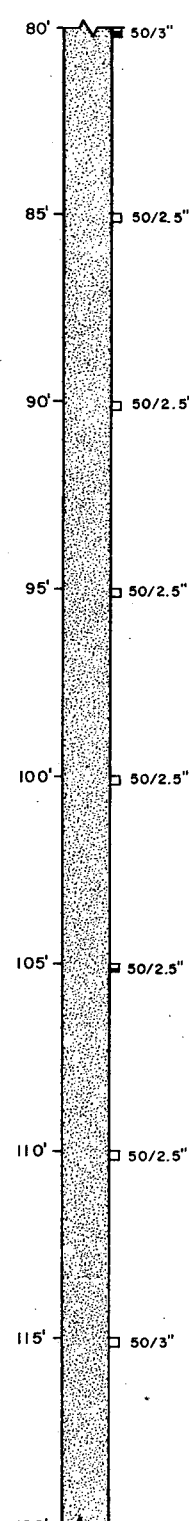
Nm 21



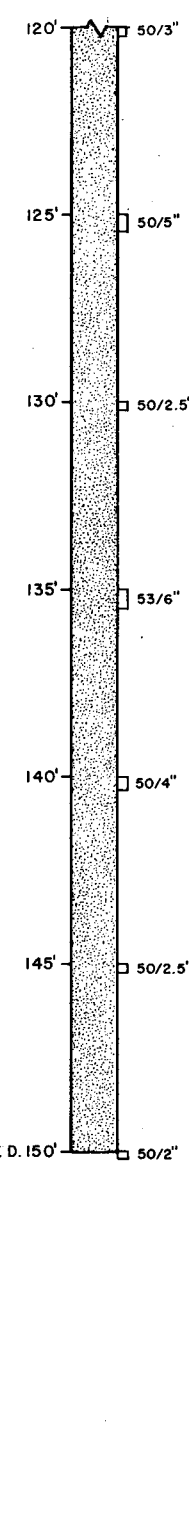
Nm 21 (cont.)



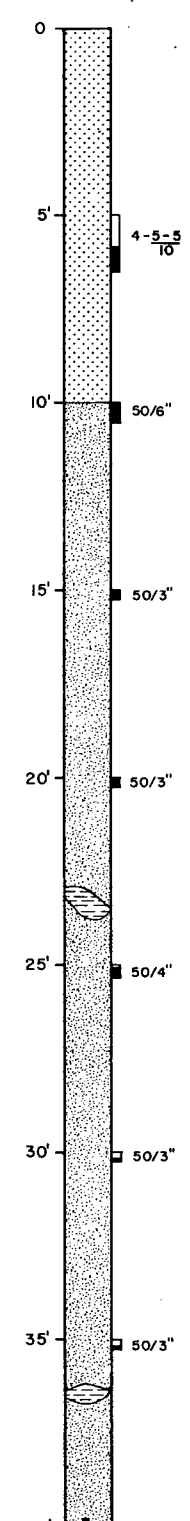
Nm 21 (cont.)



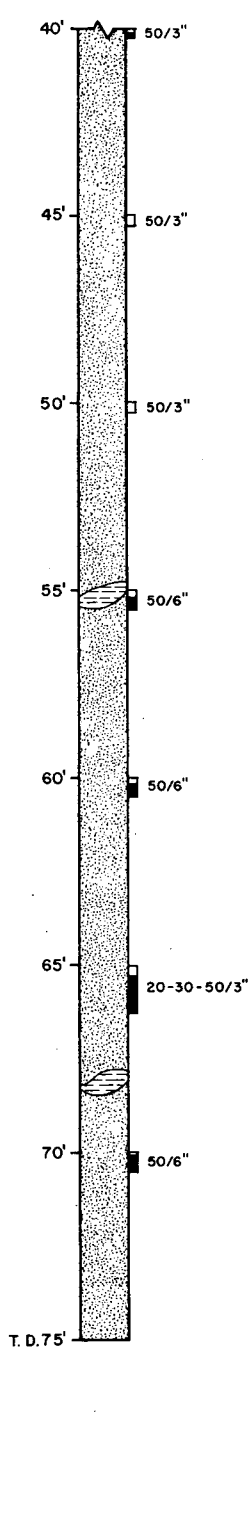
Nm 21 (cont.)



O 34



O 34 (cont.)



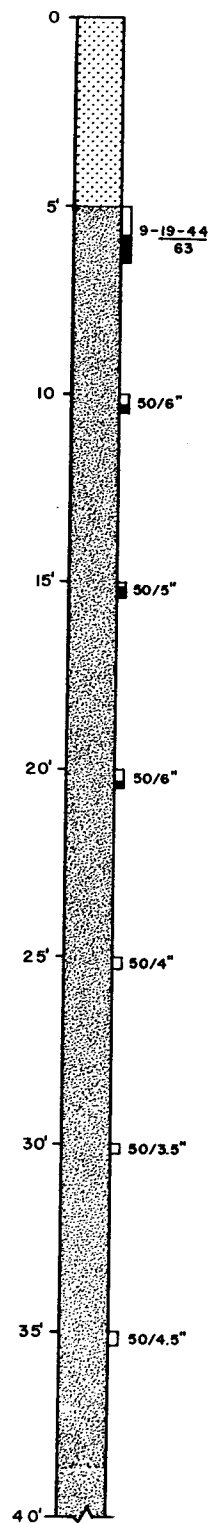
For explanation of symbols, footnotes (#) and notes, see sheet No. 1

UNITS 2 & 3

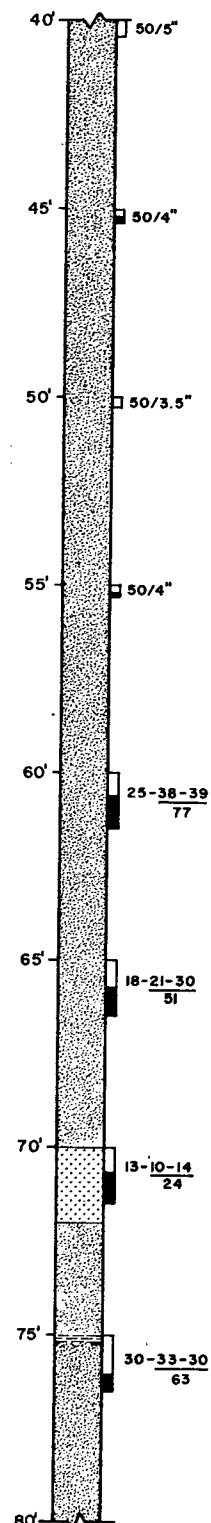
BECHTEL CORPORATION ENGINEERS & CONSTRUCTORS LOS ANGELES, CALIF.		
JOB NO. 10079-003	DATE DEC. 1978	APPROVED

J.O. NO.	SAN ONOFRE NUCLEAR GENERATING STATION
FILE	EXPLORATION / GROUTING PROGRAM WELL No. 6
SHEET No. 11 OF 11	APPENDIX B GRAPHIC LOGS - STAGE I
	SOUTHERN CALIFORNIA EDISON COMPANY SCALE N.T.S. LOS ANGELES, CALIF.

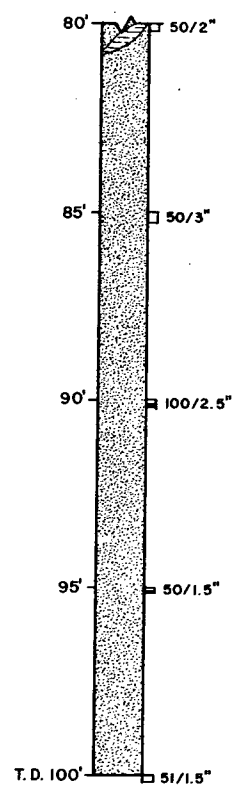
M 30



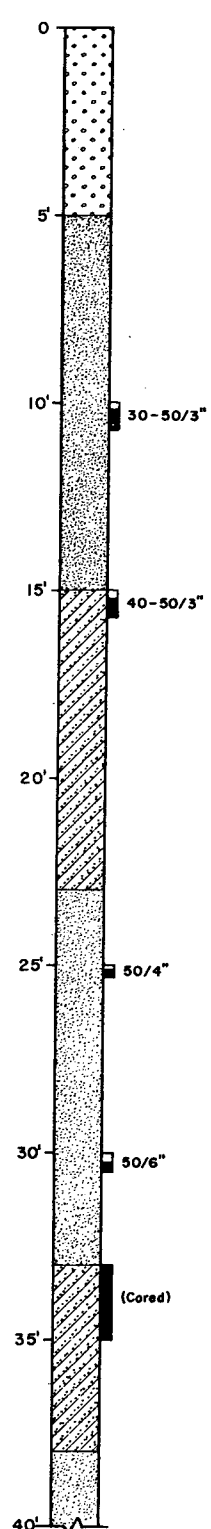
M 30 (cont.)



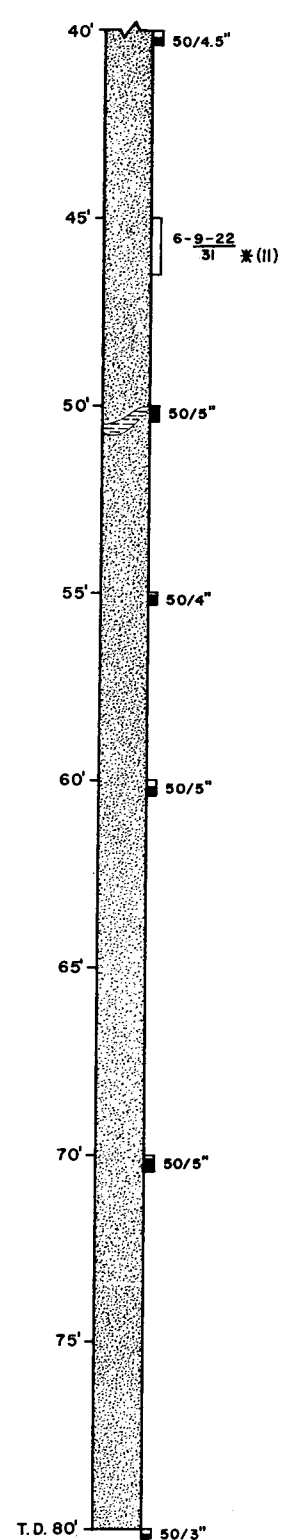
M 30 (cont.)



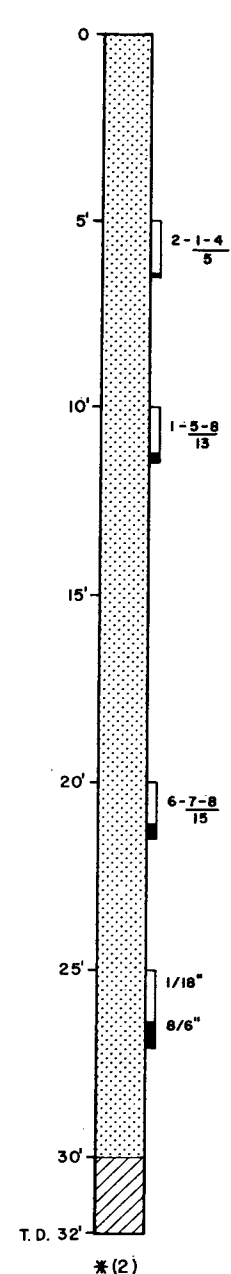
Mm 17.3



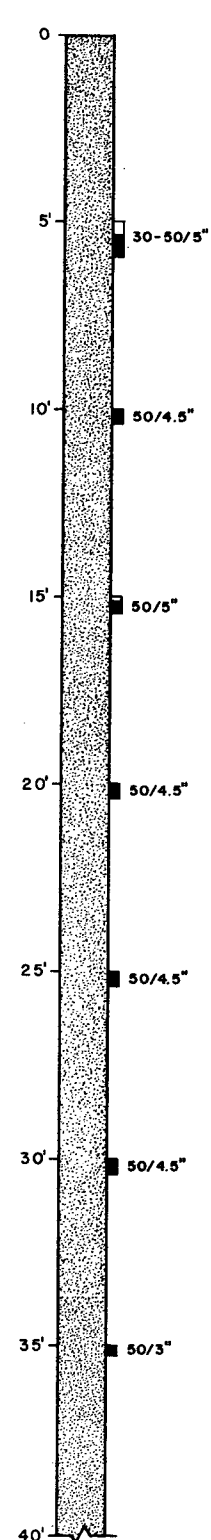
Mm 17.3 (cont.)



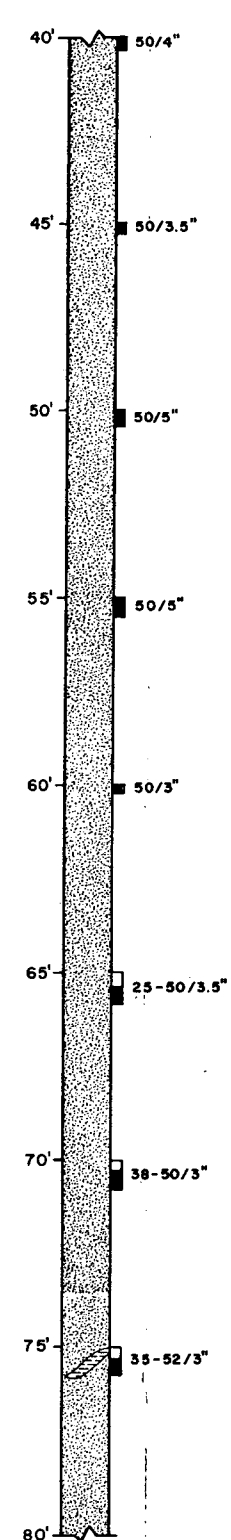
Mn 27



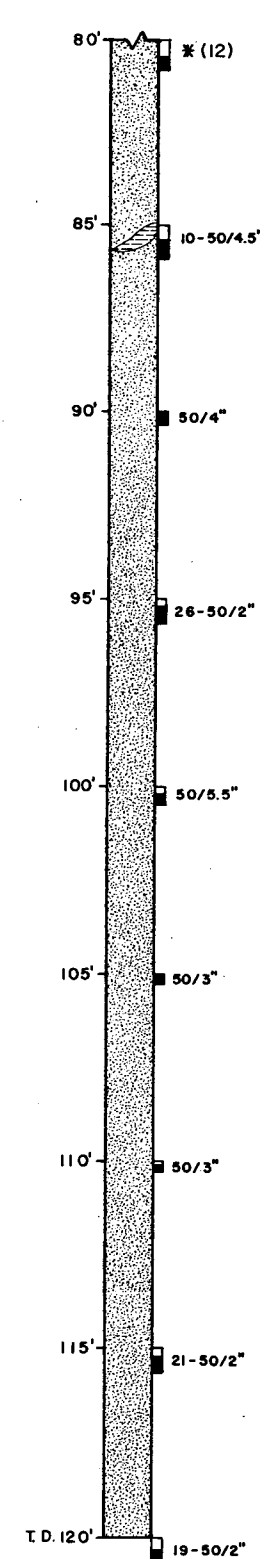
N 25



N 25 (cont.)



N 25 (cont.)



For explanation of symbols, footnotes (\*) and notes, see sheet No. 1

UNITS 2 & 3

BECHTEL CORPORATION ENGINEERS & CONSTRUCTORS LOS ANGELES, CALIF.		
JOB NO. 10079-003	DATE DEC. 1978	APPROVED

J.O. NO.	SAN ONOFRE NUCLEAR GENERATING STATION
FILE	EXPLORATION / GROUTING PROGRAM
SHEET No. 10 OF 11	WELL No. 6 APPENDIX B GRAPHIC LOGS - STAGE I
	SOUTHERN CALIFORNIA EDISON COMPANY SCALE N.T.S. LOS ANGELES, CALIF.

## APPENDIX C

Appendix C consists of the following:

1. Table of Results of Exploration/Grouting Program at Dewatering Well No. 6.
2. Copies of original field grout logs.

Net grout take is the total bags of cement placed in the hole, excluding waste. Waste includes surface leakage and unused grout.

The pressures recorded are gauge pressures measured at the top of the hole.

Grout mixes varied from 5:1 to 3/4:1. Early in the program most holes were started with 5:1 grout mix (water:cement by volume). Surface leakage commonly occurred with the 5:1 mix so the starting mix was changed to a 3:1 or 2:1 mix. If a hole took this mix readily or the desired pressure could not be reached, the mix was thickened. The thickest mix which could be pumped effectively through the perforated PVC pipe was 3/4:1 mix.

APPENDIX C

RESULTS OF EXPLORATION/GROUTING PROGRAM  
DEWATERING WELL NO. 6

<u>Hole #</u>	<u>Stage</u>	<u>Injected Take (Bags)*</u>
E 9	1	2.0
Em 4A	1	1.3
Em 13	1	7.5
F 4	1	6.0
F 6	1	1.2
F 7	1	8.2
F 30	1	2.6
G 9.5	1	5.0
G 11A	1	28.5
Gm 11	1	4.0
Gm 19	1	3.5
H 4	1	9.0
H 7	1	-
H 9	1	6.0
H 14A	1	6.6
H 15	1	0.9
H 30	1	1.1
Hm 10	1	5.0
Hm 13A	1	1.5
Hm 18	1	7.7
J 5.6	1	3.6
J 8	1	2.5
J 12	1	1.0
J 17	1	3.7
J 21	1	0.2
J 25	1	0.5
Jm 5	1	0
Jm 29	1	19.8
K 17	1	7.8
K 31	1	1.6
K 34	1	1.2
Km 4	1	2.5
Kr 13	1	62.0

<u>Hole #</u>	<u>Stage</u>	<u>Injected Take (Bags)*</u>
L 8	1	6.3
L 10	1	3.3
L 17	1	9.2
L 25	1	2.0
Lm 4A	1	2.5
Lm 24	1	0
M 14	1	1.1
M 21A	1	6.6
M 22	1	3.0
M 28	1	89.5
M 30	1	6.8
Mm 17.3	1	43.7
Mn 27	1	3.0
N 25	1	0.3
Nm 19	1	0.5
Nm 21	1	1.1
N 30	1	7.9
O 34	1	4.6
Dm 16	2	7.4
Dm 22	2	5.4
F 18	2	1.4
G 26.5	2	0.2
G 32	2	5.7
Hm 14	2	4.7
K 9	2	4.2
K 11	2	4.6
L 9	2	6.0
Mm 18.5	2	1.9
Nm 14	2	3.5
Pm 25	2	1.6
Pm 29	2	6.3
Q 34	2	2.3

<u>Hole #</u>	<u>Stage</u>	<u>Injected Take (Bags)*</u>
Em 6	3	1.2
G 5	3	4.1
G 8	3	6.0
Hm 8	3	3.9
Jm 15	3	3.3
K 14	3	0.1
K 19	3	14.4
L 31.5	3	6.5
Lm 15	3	<u>0.2</u>
	TOTAL	500.3 bags

\*One bag is 94 pounds dry weight of cement.







Type Casing: 1 1/2" PVC  
 Rep/Contractor: BPC

GROUTING LOG

Location: WELL 6  
 Hole No: EM-13

SONS UNITS 2 & 2

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED**	REMARKS
		MIN	MAX							
8-25-78	0-70			H <sub>2</sub> O	1005					Washed hole with 3/4" pipe Added fast break to wash water Grouted hole from surface to 70'  Leakage from surface at const. joint between unit 2 & F.H. Bldg Stopped grouting. Backfilled with 1:1 mix from surface Mix 3 sacks backfill
				Fast break	1040					
		10	10	5:1	1350			2	2	
		10	30	5:1	1405			2	2	
		20	30	3:1	1413			2	2	
		20	20	3:1	1415			1	2	
		0	0	1:1						
		-	-	1:1	1650			1/2		
				1:1	1710			0	3+(3)	

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 7 1/2 bags  
 WASTE: 6 bags  
 NET TAKE  
 IN HOLE: 7 1/2 bags

INSPECTOR: P. Yin  
 REVIEWED BY: [Signature]

\*\* ( ) carry over from previous hole





Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

Job No: \_\_\_\_\_  
 Location: Well 6  
 Hole No: F-7

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
4-7-78	0-100			Fast break						
	0-100		0	3:1	9:55	8.9	-	-	6	Washed hole - tremie method
		0	10	3:1	10:15	8.8	-	6.0	6	Had to repair leak in line
		25	30	3:1	10:18	5.0		- 1.1		
		30	35	3:1	10:20	8.5				
		35	40	3:1	10:24	8.0				
			40	3:1	10:26	6.5				
			40	3:1	10:30	5.3		0.9		
		40	40	3:1	10:31	8.2				
			40	3:1	10:36	7.9				
		40	40	3:1	10:41	7.5		0.2		
										3.8 Carryover <del>4.2</del> bags to F-18.

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 8.2 bags  
 WASTE: - bags  
 NET TAKE  
 IN HOLE: 8.2 bags

INSPECTOR J. Gallera  
 REVIEWED BY [Signature]

Casing in Hole \_\_\_\_\_ Ft.

Type Casing \_\_\_\_\_

Rep/Contractor Bechtel

BECHTEL POWER CORPORATION

GROUTING LOG

Job No: 10079

Location: Well 6

Hole No: F-30

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
9-19-78	0-80			Fastbreak						
		10	10	3:1	11:36	6.0				Washed hole - tremie method
				3:1	11:38	2.0		1.2		Carryover 5.7 bags from L-17.
			10	3:1	11:40	8.0				
				3:1	11:43	6.0		0.6		
					11:44	8.5				
			20	3:1	11:50	6.0				
			20	3:1	11:54	4.5				
		20	20	3:1	11:57	8.5	-	-	6	
			25	3:1	12:02	6.5				
			30	3:1	12:09	6.0				
			40	3:1	12:16	6.0				
			45	3:1	12:21	5.8		0.8		

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 2.6 bags

WASTE: - bags

NET TAKE

IN HOLE: 2.6 bags

INSPECTOR

*J. Gallarini*

REVIEWED BY

*Robert E. Blodgett*



Type Casing 1 1/2" PVC 10', 3" CASING @ TOP  
 Rep/Contractor BPC

GROUTING LOG

Job No. 10079  
 Location: WELL 6  
 Hole No: G 11-A

SONGS IN: 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS * MIXED*	REMARKS
		MIN	MAX							
8-25-78	0-150'	-	-	H <sub>2</sub> O	0930					Washed hole with 3/4" pipe
		-	-	Fast Break	1040					Injected Fast Break
		10	20	5:1	1436			3	2(+1)	Grouted hole 0-150'
		20	30	3:1	1450			2	2	
		30	40	3:1	1510			4	4	
		40	50	3:1	1520			4	4	Communication from HM-13 @ 1520
		50	50	3:1	1540			2	2	Capped communication & cont. to grout
		50	50	1:1	1547			5	5	
		50	50	1:1	1552			5	5	
		50	50	1:1	1605			3	5	Refused
		-	-	1:1	1636			1/2	-	Backfill from 1:1 in tub.

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 28 1/2 bags  
 WASTE: 0 bags  
 NET TAKE  
 IN HOLE: 28 1/2 bags

INSPECTOR [Signature]  
 REVIEWED BY [Signature]

\*\* ( ) bags carried over from previous hole







Casing in Hole 40 Ft.  
 Type Casing 1 1/2" PVC  
 Rep/Contractor BECHTEL

BECHTEL POWER CORPORATION  
 GROUTING LOG

Job No: 10017  
 Location: WELL 6  
 Hole No: H 4

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
8-16-78				FAST BREAK	1000					
"	0-40	10	10	5:1	1055	8.5			2	(2 bags left from F-4)
"	"	10	10	5:1	1105	?		3		
"	"	10	10	5:1					2	Communication with J-8 @ 1105
"	"	10	10	5:1	1110					Capped J-8
"	"	10	10	5:1	1111					Developed surface leakage 2' N of J-8
"	"		10	1:1	1325			5		Moved to grout J-8
"	"	0	10	1:1	1345			1	CARRY OVER	GROUTED HOLE MOVED TO J-8
									8	(SURFACE LEAKAGE HALFWAY BETWEEN J-8 & H-4 MOVE TO J-8)
										COMMUNICATION WITH J-8

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 10 bags  
 WASTE: 1 bags  
 NET TAKE  
 IN HOLE: 9 bags

INSPECTOR P. Young  
 REVIEWED BY Robert S. Blodgett

Casing in Hole 90' Ft. 80' perforated  
 Type Casing 1 1/2" PVC 10' solid  
 Rep/Contractor Bunker

BECHTEL POWER CORPORATION  
 GROUTING LOG

Job No: 10079  
 Location: well 6  
 Hole No: H-9

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
8-31-78	0-90			Fast break						
9-1-78	0-90				<del>9:12</del>	<del>8.0</del>	-	-	0	Washed hole - tremie method
			20	3:1	9:12	8.0	-	-		
				3:1	9:21	4.0		1.1		Carryover 2.4 bags from L-10.
			20	3:1	9:25	6.5			6	Water comm. to H-15 noted @ 9:18 Grout @ 9:25
			20	3:1	9:30	3.5		0.9		Capped hole off
										Surface leakage developed near H-15. Had to stop temporarily
		20	30	1:1	11:17	8.3	-	-		
		30	30	1:1	11:21	5.0				Carryover 9.7 bags from H-15
			35	1:1	11:26	4.4				
		35	50	1:1	11:31	3.2		3.5		
			50	1:1	11:34	7.7				
			50	1:1	11:40	7.4				
			50	1:1	11:45	7.0		0.5		
										Carryover 5.7 bags to L-10
										Back filled hole 1:1 mix

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 6.0 bags  
 WASTE: - bags  
 NET TAKE  
 IN HOLE: 6.0 bags

INSPECTOR J. Hallgren  
 REVIEWED BY [Signature]

Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

Job No: 100,111  
 Location: Well 6  
 Hole No: H-14A

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
9-12-78	0-90'			Fastbreak						
9-12-78	0-90		10	3:1	10:28	7.0	-	-		washed hole - tremie method
				3:1	10:31	7.0	-	-		Carryover 5-7 bags from L-8.
		10	10	3:1	10:36	8.2				C Immediate grout comm. to F-18. Capped off
			20	3:1	10:42	6.5				
			20	3:1	10:48	8.5				
			20	3:1	10:55	6.0				
		30	30	3:1	11:00	4.6				
			30	3:1	11:03	4.0				
			30	3:1	11:07	2.8		4.8		
			30	3:1	11:11	8.0	-	-	6	
		40	40	3:1	11:14	7.5				
			45	3:1	11:18	7.5				
		50	50	3:1	11:23	5.8				
			50	3:1	11:29	3.8		1.2		
			50	3:1	11:31	8.5				
			50	3:1	11:37	7.0				
			50	3:1	11:42	6.7				
		50	50	3:1	11:51	6.5		0.6		
										Carryover 5.1 bags to bank fill. mixed 3 more bags cement.
										Tremie break filled with 1:1 mix. Pipe to 80'

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 6.6 bags  
 WASTE: - bags  
 NET TAKE  
 IN HOLE: 6.6 bags

INSPECTOR J. J. Jellison  
 REVIEWED BY [Signature]

Casing in Hole 60' ft.  
 Type Casing 50' 1 1/2" PVC perforated (10' section)  
 Rep/Contractor Bechtel

BECHTEL CORPORATION  
 GROUTING LOG

Job No: 10079  
 Location: Well 6  
 Hole No: H-15

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
9-1-78	0-60									Washed hole - tremie method
	0-60		10	3:1	10:40	0.2	-	-		Carryover 4.6 bags
		5	10	1:1	10:53	9.6	-	-	6	Surface leakage immediately
			20	1:1	11:02	8.7				leaking through railroad
			20	1:1	11:07	8.5				ballast. No way to
		30	30	1:1	11:12	8.3		0.9		prevent the leakage. Thickened
			30							mix to 1:1. Pumped
										in hole.
										No further leakage using
										1:1 mix.
										Carryover 9.7 bags to
										H-9.
										Backfilled hole 1:1 mix
										tremie

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 0.9 bags  
 WASTE: - bags  
 NET TAKE  
 IN HOLE: 0.9 bags

INSPECTOR J. Zallerani  
 REVIEWED BY Robert E. Hockley

Casing in Hole 60' Ft.  
 Type Casing 1 1/2" PVC 60' perforated  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

Job No: 10074  
 Location: Well 6  
 Hole No: H-30

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
8-30-78	0-60	20		Fast break 3:1	11:30	8.5			6	washed hole - tremic method.
		0	0	3:1	1:01			-	-	Swit grout pad around hole. started grouting again @ 1 PM. Used low pressure initially. surface leakage again. Had to stop again and build new grout pad. Moved to 0-34
	0-60	0	10	12:1	3:03	9.5		-	-	Carryover 7.8 bags from N-30.
		0	0	13:1	3:07	8.5		0.3	-	Surface leakage reoccurring even at low pump speed. Stopped grouting. ↑
								0.2 ← WASTE on surface		Backfilled 1:1 mix mixed 2 more bags

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 1.3 bags  
 WASTE: 0.2 bags  
 NET TAKE  
 IN HOLE: 1.1 bags

INSPECTOR J. Gallorini  
 REVIEWED BY Robert Blodwin

Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

Job No: \_\_\_\_\_  
 Location: Well 6  
 Hole No: Hm-10  
Angle

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
	0-70'			Fast break						Washed hole - tremie method
9-12-78	0-70			3:1	10:01	8.0	-	-		Conveyer 5.7 bags from
			0	3:1	10:07	3.5		4.7		Pm-29. Surface readings noted @ 10:06 3' from hole. Unable to stop. Stopped grouting. Will return later with 1:1 mix.
										Conveyer 1.0 bags to 6-8.
	0-70	0	10	2:1	2:54	8.5	-	-	-	Conveyer 7 bags from 6-8.
		5	10	2:1	2:58	8.0				
			20	2:1	3:03	7.8				
		30	40	2:1	3:11	7.8		0.3		No leakage.
										Backfilled 1:1 mix tremie method mixed 2 more bags
										WASTE 4 bags

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 9.0 bags  
 WASTE: 4.0 bags  
 NET TAKE  
 IN HOLE: 5.0 bags

INSPECTOR J. J. Allen  
 REVIEWED BY Robert R. ...





Casing in Hole 147.5' t. 7.5' Solid  
 Type Casing 140' perforated  
 Rep/Contractor Bechtel

BECHTEL CORPORATION  
 LOGGING LOG

Job No: \_\_\_\_\_  
 Location: Well 2  
 Hole No: H-18

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
			20	3:1	11:42	4.3	-			
				3:1	11:50	-		5.2		Carryover 5.2 bags from H-30
				3:1	11:50	7.0	-		6	
			10	3:1	11:54	5.5				
			10	3:7	11:58	4.0		0.8		
			25		12:04	9.0				
			30	3:1	12:10	8.4				
		30	30	3:1	12:16	7.5				
			40	3:1	12:22	6.0				
			40	3:1	12:28	4.0		1.4		
			40	3:1	12:33	6.9				
			50	3:1	12:38	6.9				
			50	3:1	12:46	6.1				
			50	3:1	12:52	5.9		0.3		
										Carryover <del>1.7</del> bags to H-30
										Waste: 1.7 bags due to foam.
										Back Filled with 1:1 mix

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 9.4 bags  
 WASTE: 1.7 bags  
 NET TAKE  
 IN HOLE: 7.7 bags

INSPECTOR J. J. Tallen  
 REVIEWED BY Robert L. ...

Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

Job No: 10011  
 Location: well 6  
 Hole No: J-5.6  
85° angle


SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
9-19-78	0-100			Fastbreak						Washed hole - tremie method
	0-100	0	10	3:1	10:45	7.6	-	-	6	
		10	10	3:1	10:48	7.2		(4.0)		← washed out
										Surface leakage massive 4' from hole. Grouting stopped when first noted.
										Carryover 2 bags to exposed 3" PVC and found it improperly sealed. Had to wash out hole and reseed with 5 star grout.
9-20-78	0-100	10		3:1	1:15	10.0	-	-	6	
			10	3:1	1:17	3.0		2.8		
			10	3:1	1:19	8.7				
		15	15	3:1	1:22	8.2				
		30	30	3:1	1:29	6.5				
		40	40	3:1	1:36	6.0				
			45	3:1	1:41	6.0				
					1:42	8.5				
										Carryover 2.4 bags to Lm-11.

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 7.6 bags  
 WASTE: 4.0 bags  
 NET TAKE  
 IN HOLE: 3.6 bags

INSPECTOR

 J. J. Gallorini

REVIEWED BY

[Signature]





Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

Job No: 10079  
 Location: well 6  
 Hole No: V-17

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
8-15-78	0-50			Fast Bores Water						Unable to jet wash pipe past 15'. Stuck on PVC. PVC possibly bent.
	0-50		15	1:1	10:44	5.5			3	
			18		11:50	7.7				
			20	1:1	12:00	4.5				
		10	25	1:1	12:03	4.5				Pressure dropped to 10 psi. Surface leakage 5' west of hole coming up through railroad ballast.
					12:07	1.5		2.7		
										used 1.3 bags to backfill around J-25
8-16-78	0-50	10	10	5:1	1130			1/2	CARRY OVER	GROUTED HOLE
					1135					SURFACE LEAKAGE 1' S. OF HOLE AT EDGE OF GROUT CAP
		0	10	1:1	1140-1200			1/2	4	COMPLETED GROUTING MOVE TO F-4

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 3.7 bags  
 WASTE: \_\_\_\_\_ bags  
 NET TAKE  
 IN HOLE: 3.7 bags

INSPECTOR <sup>BPC</sup> <sup>SL</sup> <sup>JCE</sup> 8-15-78 J.G. P. Jr.  
 REVIEWED BY [Signature]











Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

Job No: 10077  
 Location: Well 6  
 Hole No: K-17

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
9-13-78	0-145			Fastbreak						washed hole - tremie method
9-14-78	0-145	0		2:1	10:53	7.3	-	-	-	Carryover 10.2 bags from M-21A
		20	20	2:1	10:54	3.5				20 psi @ 10:54
		20	20	2:1	10:59	10.5				
		30	30	2:1	11:02	9.5				
		30	30	2:1	11:08	8.0				
		30	30	2:1	11:14	8.0				Checked lines. OK.
		40	40	2:1	11:16	7.4				
		50	50	2:1	11:22	6.3				
		50	50	2:1	11:27	6.0		7.8		
										Carryover 2.4 bags to M-21A.

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 7.8 bags  
 WASTE: - bags  
 NET TAKE  
 IN HOLE: 7.8 bags

INSPECTOR J. Galligan  
 REVIEWED BY [Signature]

Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

Location: well 6  
 Hole No: K-31

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
9-19-78	0-60			Fastbreak	10					Washed hole - Tremie method
	0-60	10	10	3:1	12:27	5.8	-	-	-	Carryover 9.1 bags from F-30.
			10	3:1	12:37	3.0		0.8		Waste: 0.9 bags - Foaming.
			20	3:1	12:37	8.0				
		20	20	3:1	12:41	7.5				
			40	3:1	12:44	6.8				
		40	40	3:1	12:47	6.0				
			50	3:1	12:53	5.5				
			50	3:1	12:57	5.0		0.8		
		50	50	3:1	12:57	8.0				
			50	3:1	1:02	8.0				

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 9.1 bags  
 WASTE: 7.5 bags  
 NET TAKE  
 IN HOLE: 1.6 bags

INSPECTOR

J. Gallarini

REVIEWED BY

Robert H. Block



Casing in Hole 40 Ft.  
 Type Casing 1 1/2" PVC  
 Rep/Contractor BECHTEL

BECHTEL POWER CORPORATION  
 GROUTING LOG  
 SONGS UNITS 2 & 3

Job No: 1001  
 Location: Well 6  
 Hole No: Km-4

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
8-16-78	0-40	-	-	FAST BREAK	1000					Washed hole
8-16-78	"	10	10	5:1	11:20					Carry over Grouted hole
"	"	10	10	5:1	11:25			1		Communication with J-8, H-4
"	"	10	10	5:1	11:30			-		& surface leakage near J-8.
"	"	10	20	1:1	1500-1600			1		Capped J-8 & H-4
"	"	0	0	1:1	1625			1/2		Moved to grout J-25
										REFUSED
										BACKFILL

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 2 1/2 bags  
 WASTE: - bags  
 NET TAKE  
 IN HOLE: 2 1/2 bags

INSPECTOR P. J. [Signature]  
 REVIEWED BY [Signature]

Casing in Hole 60' 1/2" PVC (per)  
 Type Casing 10' 1 1/2" PVC Ft.  
 Rep/Contractor Bentel

BECHTEL POWER CORPORATION  
 GROUTING LOG  
 SONGS UNITS 2 & 3

Job No: 10079  
 Location: Well 6  
 Hole No: KF-13

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
8-10-78	0-70			Kast Break water						Washed hole with 3/4" pipe. Return around 1 1/2" PVC.
	0-70	5	10	3:1	12:54	8.0	-	-	3	
		10	10	3:1	1:03	2.5				only 10 on gage. Bypass closed changed valves. No difference
			5	3:1	1:15	8.1			3	
			5	3:1	1:21	-			6	
			0	3:1	1:26	9.5			6	Unable to get pressure.
			0	3:1	1:33	-			6	
				2:1	1:39	7.5			10	
			0	2:1	1:40	1.0			10	
			0	2:1	1:48	10.0			10	
				2:1	1:53	-			10	Checked gauge ok
			0	1:1	1:59	7.5			10	
				1:1	2:15				5	
				1:1	2:30				5	
			5	1:1	2:35				15	Comm. to Nm-21 noted @ 2:15. Stopper grouting
				1:1	2:47				15	Had to move drill. Cap hole
				1:1	2:50				10	Thick grout coming out @ 2:37.
					3:00				4	Capped hole.
			5	1:1	3:01					
										Comm. to 6A-18! @ 2:45.
										1:1 Grout coming out @ 3:00
										Had to stop grouting hole!
										Back pressure on hole after stopping. Let set. for 10 min. Valve closed.
										Carryover 5 bags to Nm-17.3
					4:45				1	Used 1 more bag to top off Hole Full.

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 62 bags  
 WASTE: 0 bags  
 NET TAKE  
 IN HOLE: 62 bags

INSPECTOR John Gelberan  
 REVIEWED BY [Signature]

Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

Job No: 10077  
 Location: Well 6  
 Hole No: ~~\_\_\_\_\_~~  
L-8 35° angle

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
9-12-78	0-100'			Fast break			-	-		washed hole - tremic method
9-12-78	0-100			3:1	10:46	8.5	-	-	6	Carryover 1 bag from Hm-10
			0	3:1	10:22	4.0		1.3		Surface leakage around PVC. Have to dig out PVC & Seal and repair. Moved to H-14A.
	0-100	0	10	2:1	2:08	7.5	-	-	6	
		10	10	2:1	2:11	5.5	-	-	-	
		10	25	2:1	2:15	3.7	-	1.6		
			25	2:1	2:16	7.5	-	-		
		30	30	2:1	2:21	6.5	-	-		
			30	2:1	2:26	5.5	-	-		
		50	50	2:1	2:31	4.5	-	-		No leakage.
			50	2:1	2:36	4.0	-	-		
			50	2:1	2:41	3.0	-	3.2		
		50	50	2:1	2:45	8.8	-	-	6	1.2
		50	50	2:1	2:50	8.5	-	0.2		
										Carryover 7 bags to Hm-10
										Backfilled with 1:1 mix tremic method.

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 6.3 bags  
 WASTE: - bags  
 NET TAKE  
 IN HOLE: 6.3 bags

INSPECTOR J. J. Galligan  
 REVIEWED BY [Signature]

Casing in Hole 100' Ft. 10' sand PVC  
 Type Casing 90' 1 1/2" PVC perforated  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

Job No: 10079  
 Location: Well 6  
 Hole No: L-10  
70° angle

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
9-1-78	0-100			Fast break						Washed hole - tremie method 40' pipe stuck in hole.
			20	3:1	9:01	9.0	-	-	6	
					9:03	3.0				
					9:05	7.0				
		20	20	3:1	9:08	0.6		2.3		
			30	3:1	9:10					
					9:10	11.0		1.3		Large surface leakage at edge of Aux. building @ 30psi. Had to stop grouting
					9:11	8.0				
										Surface leakage (waste)
		20	20	1:1	11:51	7.0		2.5		Carryover 5-7 bags from H-9.
										Surface leakage at edge of Aux. building. Became very large. Unable to seal off.
										approx. 1 bag in hole - 6-5 bags on surface as waste
										Drill filled with 1:1 mix tremie
										Used remaining 1:1 mix for backfill plus 7 bags more mixed

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 6.1 bags  
 WASTE: 2.8 bags  
 NET TAKE  
 IN HOLE: 3.3 bags

INSPECTOR J. J. Galliani  
 REVIEWED BY Robert Blackledge



Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

Location: well 6  
 Hole No: L-17

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
9-19-78	0-100			Fast break						Washed hole - Xreme method
	0-100	10	10	3:1	11:15	6.5	-	-		Carryover 6.7 bags from
			10	3:1	11:19	4.0				from N-11 RRB
			10	3:1	11:20	7.0				
		15	15			6.0		(1.0)	washed out	Surface leakage along R.R. track north of hole about 5'. Stopped grouting
										Carryover 5.7 bags to F-30
										Exposed 3" PVC nipple. Not properly sealed. Had to wash out hole and reseat with 5 star grout.
9-20-78	0-100		10	3:1	2:17	8.6	-	-	-	Carryover 5.2 bags from N-11
			10	3:1	2:19	3.0				
				3:1	2:23	5.5				Communication to N-14
				3:1	2:28	1.0		4.9		@ 2:19. Revert coming out
				3:1	2:30				6	hole. Grout @ 2:37.
				3:1	2:37	7.0				Capped hole off
		15	20	3:1	2:39	9.5				
			20	3:1	2:45	7.8				
			25	3:1	2:49	7.0		4.3		Surface leakage noted at approx. 0-20. Unable to stop. Pumped 1:1 mix after grouting N-14.
										Carryover 2 bags to N-14.
	0-100	10	25	1:1	4:31	7.0				Carryover 8.1 bags from N-14
				1:1	4:32	6.5		(0.4)	on surface waste	large surface leakage.
										Comm. to N-14. Stopped grouting. Waste: 7.7 bags

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 18.3 bags  
 WASTE: 9.1 bags  
 NET TAKE  
 IN HOLE: 9.2 bags

INSPECTOR J. Gallenow  
 REVIEWED BY Robert H. [Signature]



In. n le 40'  
 Type Casing PVC 1 1/2" 0-40'  
 Rep/Contractor BECKTEL POWER CORP.

CROWLING LOG

Job No: 10077  
 Location: WELL 6  
 Hole No: LM-4A

SONS U' FS 2 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
8-25-78	0-40'			H <sub>2</sub> O	0845					Washed hole to 40'
"	"			Fast break	0900					Injected Fast Break additive
8-25-78	"	10	10	5:1	1315	8.0		1/2	2	Grouted hole from surface to 40'
	"	20	20		1320	7.0		-		
	"	30	30		1325	7.0		-		
	"	40	40		1330	7.0		-		
	"	50	50		1345	6.2		1 1/2		
	"	-	-	1:1	1640			1/2		Backfill from 1:1 in tub

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 2 1/2 bags  
 WASTE: 0 bags  
 NET TAKE  
 IN HOLE: 2 1/2 bags

INSPECTOR  
 REVIEWED BY

*[Signature]*  
*[Signature]*





Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

Job No: 10077  
 Location: Well 6  
 Hole No: M-21A

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
4-13-78	0-150'			Fastbreak						Washed hole - tremie method
9-14-78	0-150'	10	10	3:1	10:00	8.0	-	-	6	
			20	3:1	10:10	3.5				
			20	3:1	10:11	9.0				
		30	30	3:1	10:14	7.0				
			30	3:1	10:18	10.0				
		40	40							
			45	3:1		3.5		5.0		Some surface leakage at 45 psi
			20	3:1					9	Reduced to 20 psi. Still
		15	20	2:1	10:37	9.6	-	-	10	Small leakage. Thickened
			20	2:1	10:42	7.7				mix to 2:1. No more
		15	20	2:1	10:47	7.3		0.8		leakage. Slight bubbling
										at surface noted @ 10:45
										Sealed with sand
										Surface leakage developed
										after increasing pressure
										Slightly.
		20	20	2:1	11:31	6.0	-	-		Carryover 2-4 bags from K-17
			30	2:1	11:34	4.0		0.8		Surface leakage @ 30 psi.
										Stopped grouting.

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 6.6 bags  
 WASTE: - bags  
 NET TAKE  
 IN HOLE: 6.6 bags

INSPECTOR J. Gallen  
 REVIEWED BY Robert H. [Signature]



Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor \_\_\_\_\_

BECHTEL POWER CORPORATION  
 GROUTING LOG

Job No: 10077  
 Location: Well 6  
 Hole No: M-28

SONGS UNITS 2 & 3

Page 1 of 2

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
8-22-78	0-100			Fast break						Had to wash from 50-100'
			0	3:1	12:54	10.0	-	-	6	Unable to get past 100'
					12:57	8.5		4.9		Carryover 1.3 bags from M-17-3
			30	3:1	12:58	8.5		-		Comm. to Lm-24 @ 12:58
					1:00					Grout @ 12:56. Capped hole off.
			35		1:05			2.4		Able to get 30 psi max
			35	3:1	1:08				6	@ 1:00
			40	3:1	1:13	8.0				Comm. to Jm-29 @ 1:12
				3:1	1:18	-		6	6	Capped hole @ 1:13
		40	48	3:1	1:23					
					1:28			6		
				2:1	1:35			-	10	Bypass closed. Pump at full capacity.
		20	40	2:1	1:42				10	
		30		2:1	1:52				10	
			30	2:1	1:59				10	Took caps off communicating holes. Bled water off.
		20	35	1 1/2:1	2:13				10	
			35	1 1/2:1	2:20				10	Comm. to J-21 @ 1:57
			30	1 1/2:1	2:25				10	Grout @ 1:58
			35	1 1/2:1	2:30				10	
				1 1/2:1	2:35				10	Comm. to N-25 @ 2:37. Grout
			30	1 1/2:1	2:39				10	out @ 2:36. Capped all holes.
			30	1 1/2:1	2:45				10	
			30	1:1	2:50				10	Grout coming out of Jm-5
			25	1:1	3:00				10	@ 2:55. Had to put in 3" PIC nipple @ Jm-5.

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: \_\_\_\_\_ bags  
 WASTE: \_\_\_\_\_ bags  
 NET TAKE  
 IN HOLE: \_\_\_\_\_ bags

INSPECTOR J. Gallen  
 REVIEWED BY Robert H. Schuchman







Casing in Hole 80 1/2" PVC Ft.  
 Type Casing PVC  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

Job No: 10079  
 Location: \_\_\_\_\_  
 Hole No: M-17.3

SONGS UNITS 2 & 3

original hole depth = 80'

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
8-22-78	0-40			Water						
	0-40	0	18	5:1	11:38	7.8			2	Could only wash to 40'. Hit very hard material. Probably grout from K-13.
			18	5:1	11:40			2		
			18	5:1	11:44	8.5			2	Unable to get more than 18 psi with bypass closed.
			16	5:1	11:46			2		
			15	2:1	11:50				6	
				2:1	11:53				6	
			10	2:1	11:57				6	
			10	2:1	12:03			6		Bypass closed. pump Full capacity.
			12	2:1	12:07				10	
				2:1	12:14			10		
			10	2:1	12:18				6	Grout leakage @ P-12 noted @ 12:20. Appears to be coming from Railroad ballast. more grout being pumped into hole than leaking out surface.
					12:20			6		
			10	1:1	12:28				8	
			10	1:1	12:33			8		
					12:35				5	Leakage in numerous areas along R.R. @ 12:36. 1:1 mix coming out. Stopped pumping.
		10	12	1:1	12:37	2.0		3.7		
										Carryover 1.3 bags to m-28

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 43.7 bags  
 WASTE: — bags  
 NET TAKE  
 IN HOLE: 43.7 bags

INSPECTOR J. Gallen  
 REVIEWED BY Robert H. Stokich







Casing in Hole 120 Perforated  
10' solid Ft.  
 Type Casing 1 1/2" PVC  
 Rep/Contractor \_\_\_\_\_

BECHTEL POWER CORPORATION  
 GROUTING LOG

Job No: 10079  
 Location: Well 6  
 Hole No: Ann-21

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
8-10-78	0-150		70	1:1	2:00	6.0				Comm. when grouting K <sub>p</sub> -13
			70		2:15	7.0				1:1 out of hole.
		70	70		3:26	7.0				
			60	1:1	3:34	7.0		0.7		Took up off K <sub>p</sub> -13. No
			60	1:1	4:07	7.0				grout coming out. Check
			60	1:1	4:24	6.5				hole to be sure it wasn't
		60	60	1:1	4:15	6.7		0.4		plugged. Plugged. Unable
										to wash below 40'.
										Regrouted
										concrete 4.7 bags to
										back fill

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 1.1 bags  
 WASTE: \_\_\_\_\_ bags  
 NET TAKE  
 IN HOLE: 1.1 bags

INSPECTOR John E. Galliani  
 REVIEWED BY Robert B. Blackwell

Casing in Hole 160' ft. 10' solid  
 Type Casing 1 1/2" PVC - 150' perforated  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATIC  
 MOUNTING LOG

Job No: 10011  
 Location: Well 6  
 Hole No: N-30

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
8-30-78	0-140			Fast break						Unable to wash past 110'
	0-110	0		3:1	11:21	8.7	-	-	6	Now to get only 10 psi on gage
			10	3:1	11:27	1.0		5.7		@ 11:23. By pass closed
										Surface leakage 2' west of hole @ 11:24 made great pad and let set up til 2 pm. waste 0.3 on surface
	0-110		0	3:1	2:00	9.0	-	-	6	Carryover 1.4 bags from 0-34.
			5	3:1	2:04	7.0		0.5		Sm. leakage at surface. Threecleaned mix.
	0-110			1 1/2:1	2:18	6.2	-	-	4	
				1 1/2:1	2:22	5.4				Still surface leakage. Pumped
		0		1 1/2:1	2:32	4.0		1.2		at slower speed. No leakage noted.
		0	2	1 1/2:1	2:33	8.3		*		
				1 1/2:1	2:45	7.3		0.5		
				1 1/2:1	2:55	7.2		-		Surface leakage in numerous areas around hole. Slowed pump.
										Tried to raise pressure. Recurrent surface leakage. Abandoned hole.
										Carryover 7.8 bags to H-30.
										Back-filled 1:1 mix

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 7.9 bags  
 WASTE: - bags  
 NET TAKE  
 IN HOLE: 7.9 bags

INSPECTOR J. Galliani  
 REVIEWED BY Robert J. Block





Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

Job No: 10011  
 Location: Well 6  
 Hole No: Dm-16  
 Stage 2  
 85"

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
9-20-78	0-90'									washed hole - tremic method
9-22-78	0-90'	10		3:1	3:07	6.7	-	-	3	
			10	3:1	3:11	7.5				Carryover 1.9 bags from
		20	20	3:1	3:18	5.5				<del>15-34</del>
			20	3:1	3:22	2.5		4.2		
			20	3:1	3:25	6.5	-	-	3	
					3:30	4.5				
			20	3:1	3:31	8.7	-			
		35	35	3:1	3:36	7.5				
		40	45	3:1	3:40	5.3				
			45	3:1	3:47	2.5		3.0		
		40	45	3:1	3:52	7.3			6	
			45	3:1	3:56	6.8				
		40	40	3:1	4:01	6.5		0.2		
										Carryover 6.5 bags to backfill. Mixed 6 more bags cement. Waste: 1.7 bags
										Backfilled with 1:1 mix tremic method

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 9.1 bags  
 WASTE: 1.7 bags  
 NET TAKE  
 IN HOLE: 7.4 bags

INSPECTOR J. Galliani  
 REVIEWED BY [Signature]

Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

Job No: 10011  
 Location: Well 6  
 Hole No: D<sub>a</sub>-22  
 Stage 2 85°

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
10-2-78	0-110			Fast break						Washed hole - tremie method
	0-110	10		2:1	10:39	7.5	-	-	6	Unable to wash past 110' GROUT in washings.
			20	2:1	10:43	5.0				
		20	20	2:1	10:44	8.8				
			20	2:1	10:48	6.5				
			25	2:1	10:49	8.5				
		25	30	2:1	10:52	8.0				
		30	30	2:1	10:56	6.3				
		40	40	2:1	11:00	5.0		4.0		
			40	2:1	11:00	8.5	-	-	6	2
			40	2:1	11:04	7.8	-	-		
			40	2:1	11:09	6.3				
		40	40	2:1	11:12	5.9				
			50	2:1	11:15	5.5		1.2		
		50	50	2:1	11:16	9.0				
			50	2:1	11:21	8.6		0.2		
										Carryover 6.6 bags to F-6.
										Backfilled with 1:1 mix using tremie method.

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 5.4 bags  
 WASTE: - bags  
 NET TAKE  
 IN HOLE: 5.4 bags

INSPECTOR J. Gallarini  
 REVIEWED BY Robert H. Block

Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG  
 SONGS UNITS 2 & 3

Job No: 10079  
 Location: Well 6  
 Hole No: F-18  
 Angle hole  
 Stage 2

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
9-7-78	0-80			Fast break			—			washed hole - tremie method
	0-80	10	10	3:1	10:47	7.0	—	—		
			20	3:1	10:53	5.0		1.4		Carryover 3.8 bags from F-7. Surface leakage 3' from hole in sand. Decided to go to another hole and come back later with 1:1 mix.
	0-80	0	0	1:1	11:41	6.0	—	—	2	Carryover 1.6 bags from M-30
			0	1:1	11:45	2.0		2.6		Surface leakage in railroad ballast.
								↑ on surface waste.		

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 5.0 bags  
 WASTE: 3.6 bags  
 NET TAKE  
 IN HOLE: 1.4 bags

INSPECTOR J. Gallen  
 REVIEWED BY Robert H. Blodgett



Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

Location: well 6  
 Hole No: G-32  
 Stage 2 85-

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
9-22-78	0-160			Fast break						Washed hole - tremie method
	0-160	10		3:1	2:07	9.0	-	-	-	Carryover 5.8 bags $16.6 - 26.5$
			10	3:1	2:09	5.0				
			10	3:1	2:10	6.5				
			20	3:1	2:16	3.0		5.0		
		20	20	3:1	2:18	8.5	-	-	3	not
			20		2:23	7.0				
		30	30	3:1	2:28	6.5				
			30	3:1	2:33	4.3		0.7		
			40	3:1	2:34	6.3				
										Tried 40 psi. large surface leakage 2' from nipple. Had to stop grouting
										Carryover 3.1 bags to K-32
										Back filled with 1:1 mix tremie method.

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 5.7 bags  
 WASTE: - bags  
 NET TAKE  
 IN HOLE: 5.7 bags

INSPECTOR J. J. Galliani  
 REVIEWED BY Robert H. Schuker

Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

Job No: 10011  
 Location: Well 6  
 Hole No: Ann-Hm-14  
 Stage 2

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
9-28-78	0-120			Fast break						Washed hole - tremie method
		10		3:1	2:41	6.5	-	-	-	Carryover 5.7 bags from 6-9.
			10	3:1	2:44	1.0		1.5		
			10	3:1	2:46	8.5				
			10	3:1	2:50	8.2				
		25	30	3:1	2:55	5.5				
		30	30	3:1	3:01	5.0		1.0		
		40	40	3:1	3:04	9.2				
			50	3:1	3:09	8.0				
			50	3:1	3:14	6.5				
			50	3:1	3:22	3.0				
			50	3:1	3:23	6.0				
			50	3:1	3:28	5.2				
			50	3:1	3:38	4.0				
			50	3:1	3:43	3.6				
		50	50	3:1	3:48	3.4		2.2		
										Carryover 1 bag to 6-9.
										Backfilled with 1:1 mix tremie method.

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 4.7 bags  
 WASTE: - bags  
 NET TAKE  
 IN HOLE: 4.7 bags



INSPECTOR

J. Haller  
 REVIEWED BY [Signature]

Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

Job No: 10011  
 Location: well 6  
 Hole No: K-9  
 Stage 2 810

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
10-6-78	0-110			Fast break				-	-	Washed hole - tremic method
	0-110	10		3:1	8 1:56	7.2				Carryover 4.9 bags from K-19.
			20	3:1	1:58	2.0		1.4		Surface leakage @ 1:58 around PVC nipple. Had to stop grouting & repair seal
								WASTE		Carryover 3.5 bags to km-15
										Washed hole out. Will regrout 10-9-78.
10-9-78	0-110	10		2:1	1:56	8.3	-	-	5	
			10	2:1	1:59	4.0				
			10	2:1	2:00	8.0				
			10	2:1	2:04	6.5				
		10	10	2:1	2:10	5.8				
		10	15	2:1	2:17	4.5		3.2		
		15	20	2:1	2:15	8.5	-	-	5	1.8
		20	20	2:1	2:20	8.0				
		30	30	2:1	2:25	8.0				Checked lines OK. Not plugged
			30	2:1	2:30	7.4				
			30	2:1	2:34	6.4				
			30	2:1	2:38	6.2				
		40	40	2:1	2:39	6.2				
			40	2:1	2:44	6.1				
			45	2:1	2:53	6.0		1.0		
										Carryover 5.8 bags to backfill
									2	Backfilled using 1:1 mix tremic method mixed 2 bags cement additional

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 5.6 bags  
 WASTE: 1.4 bags  
 NET TAKE  
 IN HOLE: 4.2 bags

INSPECTOR J. Alkharani  
 REVIEWED BY [Signature]



Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

SONGS UNITS 2 & 3

JOB NO: \_\_\_\_\_  
 Location: Well 6  
 Hole No: Unit K-11  
Stage 2 PUC  
85°  
 page 1 of 2

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
9-19-78	0-90			Fast break						Washed hole tremie method
		10		3:1	11:02	7.2	-	-		Carryover 2 bags from
					11:07	4.0		1.0		√-5.6.
		10		3:1	11:08	7.3	-	-	6	
		20		3:1	11:10	6.5		0.3		Surface leakage around surface
										grout seal. Stopped grouting immediately!
										washed out.
										Carryover 6.7 bags to L-17
										Exposed 3" PVC and found it not properly sealed. Had to wash out hole and re-seal PVC with 5 stars.
9-20-78	0-90	10	20	3:1	1:49	8.5	-	-	-	Carryover 2.4 bags from
			20	3:1	1:51	2.5		1.7		√-5.6.
			20	3:1	1:53	7.0		-	6	
					1:56	5.0				
			20	3:1	1:57	8.5				
			30	3:1	2:05	5.2		1.5		PVC nipple cracked 1' below surface. Had to replace. Made new seal.
										Carryover 5.2 bags to L-17.
	0-90		10	3:1	3:19	9.0	-	-	6	Carryover 1 bag from Nm-14
			10	3:1	3:23	7.5				Slight leakage around PVC.
			20	3:1	3:28	7.5				
			20	3:1	3:32	7.0				
		20	25	3:1	3:37	6.6				large leakage past
			25	3:1	3:41	5.5				thicken mix
		20	25	3:1	3:45	4.6		1.2		
			25	3:1	3:46	8.5				
			25	3:1	3:51	8.4				

\*NOTE: All mix contains 1% Interplast per weight of cement

TOTAL USED: \_\_\_\_\_ bags  
 WASTE: \_\_\_\_\_ bags  
 NET TAKE  
 IN HOLE: \_\_\_\_\_ bags

INSPECTOR J. Williams  
 REVIEWED BY [Signature]



Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

Job No: 10011  
 Location: well 6  
 Hole No: 6-9  
 Stage 2

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
9-27-78	0-130'			Fast break						Washed hole - tremie method
	0-130'	10	10	3:1	2:10	10.0	-	-	6	
				3:1	2:19	2.5		5.3		
			10	3:1	2:20	8.3		-	6	
			10	3:1	2:26	7.0		-		
		12	15	3:1	2:31	6.8		0.4		
										Surface leakage around nipple when pressure raised to 20 psi.
										Moved to Hm-8.
										Carryover 6.3 bags to Hm-8
	0-130'	80	40	3:1	3:04	8.5				No leakage for 1 minute then
			0	3:1	3:05	8.0		0.2 waste		more leakage Carryover 2.4 bags from Hm-8.
										Built new surface seal with 5 star grout.
9-28-78	0-130	10		3:1	2:33	7.8			6	
			20	3:1	2:40	6.5			0.3	Surface leakage again on edge of surface grout seal. Unable to stop. 20 psi.
										Carryover 5.7 bags to Hm-14.
			20	1:1	3:56	9.5			10	Carryover 1 bag from Hm-14 immediate surface leakage
										Back filled with 1:1 mix tremie method

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 6.2 bags  
 WASTE: 0.2 bags  
 NET TAKE  
 IN HOLE: 6.0 bags

INSPECTOR J. J. Galliani  
 REVIEWED BY Robert B. Blodgett



Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

JOB NO: \_\_\_\_\_  
 Location: well 6  
 Hole No: Nm-14  
Stage 2  
85°

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
9-20-78	0-160	15		3:1	2:54	7.0	-	-	-	Had comm. when grouting
			20		2:57	6.2				L-17. Unable to wash.
			25	3:1	3:01	5.5				Carryover 2 bags from
			35	3:1	3:05	4.5				L-17.
		30	30	3:1	3:08	4.5	-	-		Comm. to L-17 @ 3:05.
						3.5		1.0		Capped hole.
										Surface leakage at approx
										Q-20. F
										Returned to hole Lm-11.
										Carryover 1 bag to Lm-11
	0-160			1:1	4:22	8.1	-	-	5	Carryover 5.6 bags from
		20	30	1:1	4:24	6.0				Lm-11.
			30	1:1	4:25	8.5				Comm. to L-17. 1:1 mix
				1:1	4:30	7.0		2.5		coming out @ 4:24.
										Capped hole.
										Massive surface leakage
										at Q-20 and
										near L-17. Stopped
										grouting when 1:1 mix
										started coming out
										surface.
										Carryover 8.1 bags
										to L-17.

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 3.5 bags  
 WASTE: - bags  
 NET TAKE  
 IN HOLE: 3.5 bags

INSPECTOR J. Gallen  
 REVIEWED BY Robert Woodruff

Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG  
 SONGS UNITS 2 & 3

Job No: 10011  
 Location: well 6  
 Hole No: Pm-25  
 Stage 2

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
10-10-78	0-120			Fast break						Washed hole - tremie method
	0-120									No return at surface.
	0-120	40	40	1:1	4:57	8.3				80' wash hose remained stuck in hole
		40	60	1:1	5:01	6.5				Carryover 7.7 bags from 6B-20. Communication
		60	60	1:1	5:05	6.0				when grouting 6B-20.
					5:10	6.0		1-6		with 1:1 mix.
										Hole full of grout
										Carryover 6.1 bags to 6B-19.
										Topped hole off from top with 1:1 mix.

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 1.6 bags  
 WASTE: - bags  
 NET TAKE  
 IN HOLE: 1.6 bags

INSPECTOR J. Tallergui  
 REVIEWED BY [Signature]

Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

Job No: \_\_\_\_\_  
 Location: Well 6  
 Hole No: Pm-29  
 Stage 2

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
	<del>0-120</del>									
9-12-78	0-120			10 Fast break						Washed hole - tremie method
9-12-78	0-120			3:1	9:08	9.0	-	-	6	
			0		9:09	4.0				
			15	3:1	9:12	5.8				
		10	20	3:1	9:15	3.6				
		20	20	3:1	9:17	2.8		5.2		
			30	3:1	9:19	1.6		-	6	
			30	3:1	9:30	6.5				
		50	50	3:1	9:38	5.6				
			50	3:1	9:43	4.9				
		50	50	3:1	9:48	4.4				
			50	3:1	9:53	4.0		1.1		
										Carryover 5.7 bags to
										Backfilled with 1:1 mix.
										ited to from top of hole
										because 3" wash pipe
										stuck in hole. Unable
										to tremie backfill.

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 6.3 bags  
 WASTE: - bags  
 NET TAKE  
 IN HOLE: 6.3 bags

INSPECTOR J. J. Gallen  
 REVIEWED BY [Signature]

Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

Job No: \_\_\_\_\_  
 Location: Well 6  
 Hole No: Q-34

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
9-13-78	0-80			Fast break						Washed hole - tremie method
9-14-78	0-80	20		3:1	11:45	8.0	-	-	6	Carryover 1.6 bags from M=21A.
			40	3:1	11:50	2.8		1.5		Surface leakage around grout seal. noted @ 11:50. No take @ 20 psi. Had increased to 40 psi prior to leakage. All cement in hole. Moved off hole after spotting leakage. Required seal with 5 star grout.
	0-80	15		2:1	1:03	5.3	-	-	1	Carryover 5 bags from M=14.
			15	2:1	1:09	4.5				
			15	2:1	1:13	4.5				
		30	30	2:1	1:18	4.2				
		40	40	2:1						
		50	50	2:1	1:23	3.8				
			50	2:1	1:28	3.6		0.8		Carryover 5.3 bags to backfill. Mixed 5 additional bags.

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 2.3 bags  
 WASTE: - bags  
 NET TAKE  
 IN HOLE: 2.3 bags

INSPECTOR J. Zeller  
 REVIEWED BY Robert P. Blodgett





Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG  
 SONGS UNITS 2 & 3

Job No: 100  
 Location: Well 6  
 Hole No: G-5  
 Stage 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
10-5-78	0-100			Fast break						washed hole - tremie method
	0-100			3:1	1:54	8.0	-	-	6	
		10	10	3:1	1:57	6.5				
			20	3:1	2:01	4.0	4	1.1		
			20	3:1	2:02	4.0				
		20	20	3:1	2:11	8.0				
		30	30	3:1	2:15	7.0				
			35	3:1	2:21	6.0				
		40	40	3:1	2:27	5.5				
		50	55	3:1	2:37	2.0		2.0		
			50	3:1	2:38	8.0				
			50	3:1	2:44	7.5				
			50	3:1	2:50	7.0				
			50	3:1	2:58	6.8		1.0		
										Carryover 1-9 bags to backfill mixed 3 additional bags cement for 1:1 mix.
										Backfilled with 1:1 mix - tremie method.

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 4.1 bags  
 WASTE: - bags  
 NET TAKE  
 IN HOLE: 4.1 bags

INSPECTOR J. J. Jolliffe  
 REVIEWED BY Robert B. ...

Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

Job No: 10079  
 Location: well 6  
 Hole No: G-8  
Stage 3

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
10-12-78	C-80'			Fast break						Washed hole-tremie method
		10		3:1	10:50	9.5	-	-	-	Carryover 4.8 bags from E-6.
			10	3:1	10:54	7.0				
		20	20	3:1	10:59	6.0				
		25	30	3:1	11:03	5.5				
		40	40	3:1	11:07	1.0		4.5		
		20	40	3:1	11:15	7.5	-	-	6	Started taking grout at increase pace @ 11:06.
		40	40	3:1	11:18	5.0				
			40	3:1	11:25	4.5				
		50	50	3:1	11:33	3.5		1.1		
			50	3:1	11:34	9.0				
			50	3:1	11:40	8.0				
				3:1	11:45	7.8				
			50	3:1	11:50	7.7		0.7		
										Carryover 4.8 bags to K-14
										Backfilled hole with 1:1 mix tremie method.

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 6.0 bags  
 WASTE: - bags  
 NET TAKE  
 IN HOLE: 6.0 bags

INSPECTOR J. Gallucci  
 REVIEWED BY [Signature]

Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

Job No: 10011  
 Location: Well 6  
 Hole No: Hm-8  
 Stage 3

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
9-27-78	0-90			Fast break						Washed hole - tremie method
	0-90	10		3:1	2:33	6.8	-	-	-	Carryover 6.3 bags from L-9.
			10	3:1	2:40	4.0				
			20	3:1	2:41	8.5				
			20	3:1	2:48	8.0				
		30	30	3:1	2:51	5.0				Pressure dropped to 20 then
			30	3:1	2:53	8.5				Came back up. Increase
			30	3:1	2:57	7.5				in grout take.
					2:59	8.0		3.6		
					3:00	6.0		(0.3) waste		Surface leakage developed
					3:03	8.5				2-4' east of hole. Crack
										developed in sand. 30 psi
										@ 2:59. Stopped
										grouting. Will return
										with thicker mix
										carryover 2.4 bags to L-9.
		20	25	2:1	4:06	3.8				
				2:1	4:07	3.0		(0.3) waste		Carryover 1.3 bags from
										Hm-8.
										leakage at 25 psi.
		20	20	1:1	4:10	9.5			11	Thickened mix to 1:1
				1:1	4:15	9.2				pumped in hole.
		35	35	1:1	4:20	9.0				No leakage @ 20 psi with 1:1 mix
			40	1:1	4:21	9.0		0.3		or 35 psi.
										leakage at 40 psi
										Stopped grouting.
										Carryover 12 bags to backfill.
										Backfilled 1:1 mix - tremie
										method

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 4.5 bags  
 WASTE: 0.6 bags  
 NET TAKE  
 IN HOLE: 3.9 bags

INSPECTOR J. Tallarini  
 REVIEWED BY [Signature]

Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

Job No: 10079  
 Location: well 6  
 Hole No: Ju-15  
 stage 3

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
10-17-78	0-75			Fast-break						Washed hole - Tremie method
		10	10	3:1	11:01	8.4	-	-	6	
		10		3:1	11:05	6.5				
			20	3:1	11:08	5.8				
		20	20	3:1	11:11	5.5				
			30	3:1	11:12	9.1				
		30	30	3:1	11:16	8.6				
		40	50	3:1	11:20	6.5				
		50	50	3:1	11:25	5.0				
			50	3:1	11:28	4.5				
				3:1	11:29	10.0				
		50	50	3:1	11:33	9.6				
		50	50	3:1	11:38	9.4		3.3		
										Carryover 2.7 bags to L-31.5
										Backfilled hole 1:1 mix - tremie method.

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 3.3 bags  
 WASTE: - bags  
 NET TAKE  
 IN HOLE: 3.3 bags

INSPECTOR J. Gallorini  
 REVIEWED BY [Signature]

Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

Job No: 10011  
 Location: well 6  
 Hole No: K-14  
 Stage 3

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
10-12-78	0-69			Fast break						Washed hole - tremie method
		10		3:1	11:55	7.7				Carryover 4.8 bags from
		30	40	3:1	12:00	7.4		0.1		G-8.
	0-69	10		1:1	12:58	4.5			0.8	Surface leakage developed
						8.5		0.7		3' east of hole.
								Waste on surface		This hole will be replaced
										by another. Stopped grouting
										with 3:1 mix.
										Mixed 1:1 grout.
										Pumped till 1:1 coming
										out on surface.
										Backfilled hole with 1:1
										mix - tremie method.

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 0.8 bags  
 WASTE: 0.7 bags  
 NET TAKE  
 IN HOLE: 0.1 bags

INSPECTOR

*J. Galliani*  
 REVIEWED BY *Robert H. Schuchman*

Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG

Location: well 6  
 Hole No: K-19  
 Stage 3

SONGS UNITS 2 & 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
10-5-78	0-150			Fast break						Washed hole - Tremie method
10-6-78	0-150			3:1	1:08	8.5	-	-	6	
		10		3:1	1:10	3.0				
				3:1	1:11	5.0				Comm. to Mm-18.5. water
			10	3:1	1:12	1.0		5.7		Comm. to Lm-15. @ 1:12.
				3:1	1:21	4.0		-	6	Capped Mm-18.5 @ 1:24
				3:1	1:25	4.0				GROUT OUT OF Lm-15 @ 1:25
		10		3:1	1:27	8.0				Capped hole @ 1:26
		20	20	3:1	1:31	2.0				Pressure rose rapidly after
		30	30	3:1	1:32	6.4				capping other holes.
			40	3:1	1:34	1.0		6.0		
		40	40	3:1	1:38	18.0	-	-	6	
			40	3:1	1:42	7.8				
		40	50	3:1	1:48	7.0		1.1		
			50	3:1	1:49	8.7				
			50	3:1	1:52	7.5		0.3		Surface leak near collar of
										hole. @ 50 psi. Had to
										repair seal with quick set
										gROUT. Moved to K-9.
										Carryover 4.9 bags to K-9.
	0-150	10		1:1	3:10	7.8	-	-	3	Carryover 3.3 bags from Lm-15.
			10	1:1	3:11	6.5		0.8		Comm. to Mm-18.5. Capped hole
		10	20	1:1	3:13	8.7				when 1:1 grout coming out.
			20	1:1	3:18	8.3				No comm. to Lm-15
		30	30	1:1	3:24	8.0				
		40	40	1:1	3:31	7.4		0.5		
										Carryover 5 bags to backfill.
										Backfilled hole with 1:1 mix -
										tremie method.

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 14.4 bags  
 WASTE: - bags  
 NET TAKE  
 IN HOLE: 14.4 bags

INSPECTOR [Signature]  
 REVIEWED BY [Signature]

Casing in Hole \_\_\_\_\_ Ft.  
 Type Casing \_\_\_\_\_  
 Rep/Contractor Bechtel

BECHTEL POWER CORPORATION  
 GROUTING LOG  
 SONGS UNITS 2 & 3

Job No: 10074  
 Location: well 6  
 Hole No: L-31.5  
stage 3

DATE	INTERVAL	PRESSURE		MIX*	TIME	TANK LEVEL	TAKE CFM	BAGS TAKE	BAGS MIXED	REMARKS
		MIN	MAX							
10-17-78	0-100			Fast break						washed hole - tremie method
		10	10	3:1	11:46	9.4	-	-	-	
			10	3:1	11:48	9.0		1.8	-	Carryover 2.7 bags
				3:1	11:49	6.0	-	-	6	from Jm-15.
			10	3:1	11:52	4.0				
		20	20	3:1	11:53	8.6				
			20	3:1	11:58	7.0				
		20	20	3:1	12:02	5.5				
				3:1	12:04	8.0				
		20	20	3:1	12:07	7.8				
		30	40	3:1	12:14	6.0				
		40	40	3:1	12:19	5.4				
			40	3:1	12:26	4.0				
			40	3:1	12:27	9.5				
		40	40	3:1	12:32	8.5				
			40	3:1	12:36	8.0				
		50	50	3:1	12:44	7.8		4.7		
										Carryover 2.2 bags to 6B-22
										tooth filled hole 111 mix tremie method.

\*NOTE: All mix contains 1% interplast per weight of cement

TOTAL USED: 6.5 bags  
 WASTE: - bags  
 NET TAKE  
 IN HOLE: 6.5 bags

INSPECTOR J. J. [Signature]  
 REVIEWED BY [Signature]

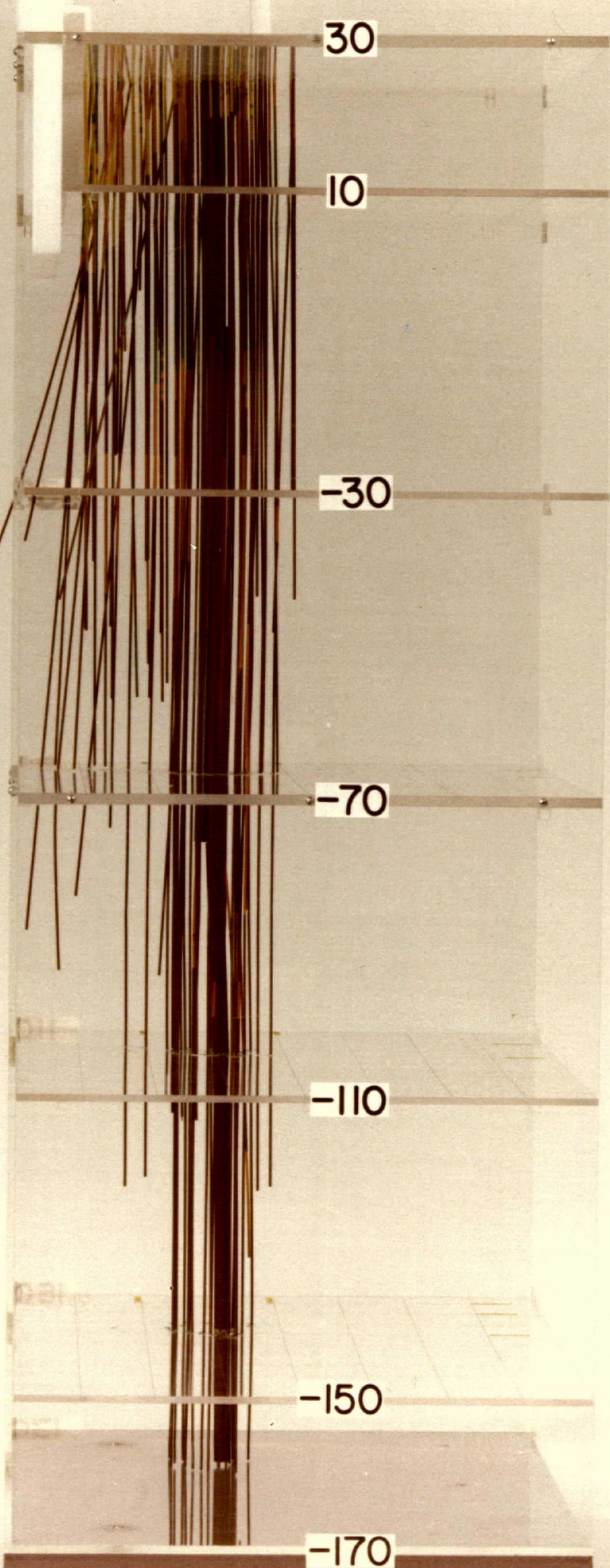




#### APPENDIX D

The three-dimensional stick model for Well No. 6 is a scale model illustrating the exploration work performed for the Deep Exploration Drilling Program and Exploration/Grouting Program. Scale of the model is 1/4-inch represents 1 foot. The drill holes are depicted by rods placed to the depth of the hole. Different colors represent materials encountered. Brown represents San Mateo Formation, orange represents disturbed sand, green represents either backfill grout (G-3) or grout placed in the Exploration/Grouting Program and yellow represents backfill sand.

The first picture is an overall view looking north at Well No. 6 showing the drill holes in profile from ground surface Elevation +30, to the bottom of the well at Elevation -170. The Unit 2 Fuel Handling Building is in the background and the Unit 2 Radwaste Storage Area is on the left. The second picture is a close-up of the previous view showing the area from Elevation +30 to approximately Elevation -40. The third view is an overhead view looking from about a 45 degree angle. The Unit 2 Radwaste area is in the background and the Fuel Handling Building is on the right. The fourth view is also an overhead view looking in a northwesterly direction along the axis of the cavity at an angle of about 45 degrees. The Radwaste Storage Area for Unit 2 is in the background.



30

10

-30

-70

-110

-150

-170

30

10

-30

000

8

